VEHICLE LIFT AND SUPPORT LOCATIONS

1. NOTICE ABOUT VEHICLE CONDITION WHEN JACKING UP VEHICLE

(a) The vehicle must be unloaded before jacking up / lifting up the vehicle. Never jack up / lift up a heavily loaded vehicle.

(b) When removing heavy parts such as the engine and transmission, the center of gravity of the vehicle may shift. To stabilize the vehicle, place a balance weight in a location where it will not roll or shift, or use a mission jack to hold the jacking support.

2. NOTICE FOR USING 4 POST LIFT

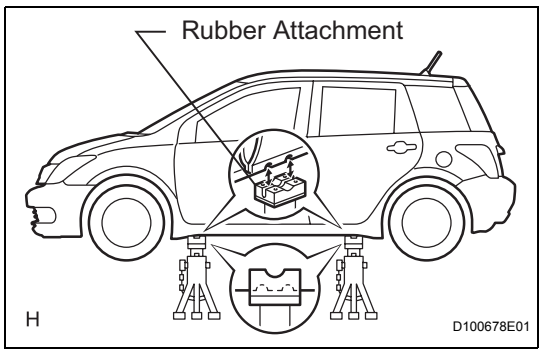
(a) Follow the safety procedures outlined in the lift instruction manual.

(b) Use precautionary measures to prevent the free wheel beam from damaging tires or wheels.

(c) Use wheel chocks to secure the vehicle.

3. NOTICE FOR USING JACK AND SAFETY STAND

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



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

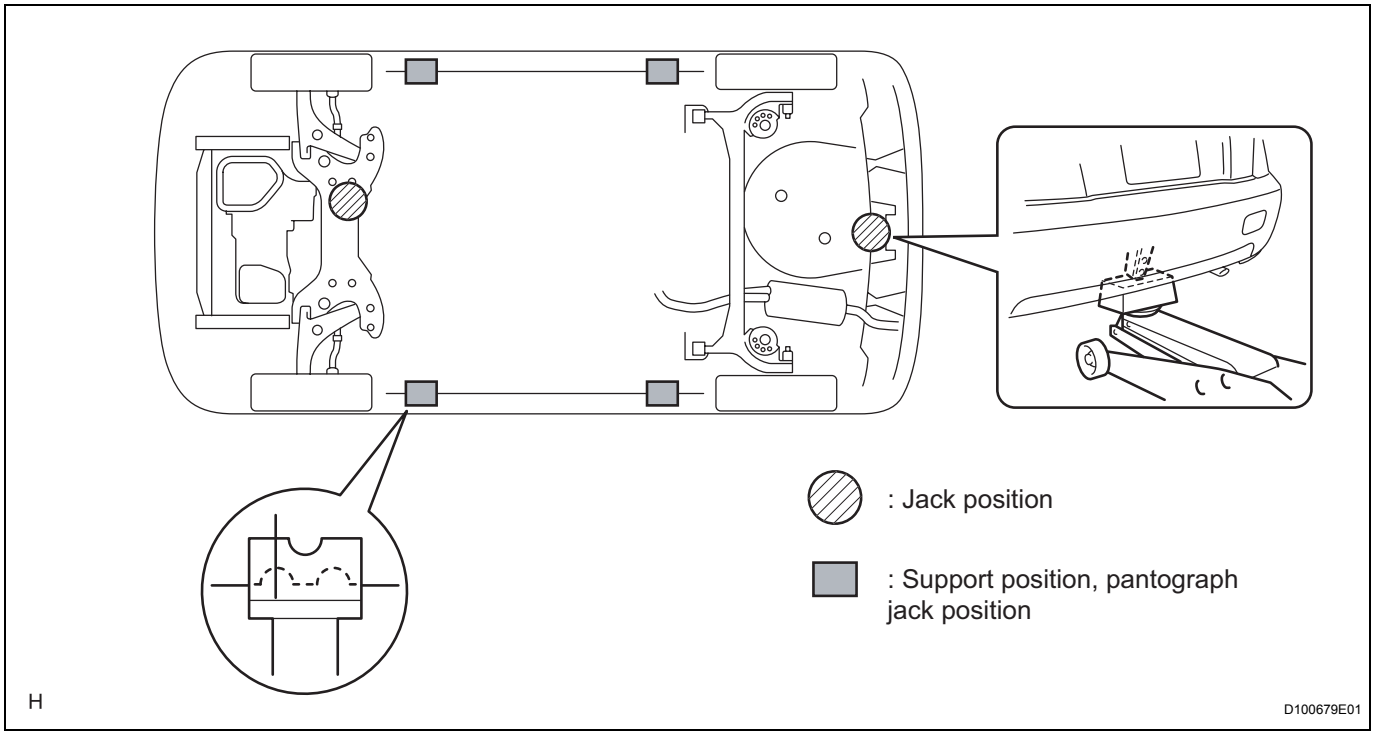
(c) Set the jack and safety stands to the specified locations of the vehicle accurately.

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

(e) When jacking up the entire vehicle:
- When jacking up the front wheels first, make sure wheel chocks are behind the rear wheels.
- When jacking up the rear wheels first, make sure wheel chocks are in front of the front wheels.

(f) When jacking up only the front or rear wheels of the vehicle:
- Before jacking up the front wheels, place wheel chocks on both sides of the rear wheels.
- Before jacking up the rear wheels, place wheel chocks on both sides of the front wheels.

(g) When lowering a vehicle that only has its front or rear wheels jacked up:
- Before lowering the front wheels, make sure wheel chocks are in front of the rear wheels.
- Before lowering the rear wheels, make sure wheel chocks are behind the front wheels.



(h) It is extremely dangerous to perform any work on a vehicle raised on a jack alone, even for work that can be finished quickly. Safety stands must be used to support it.

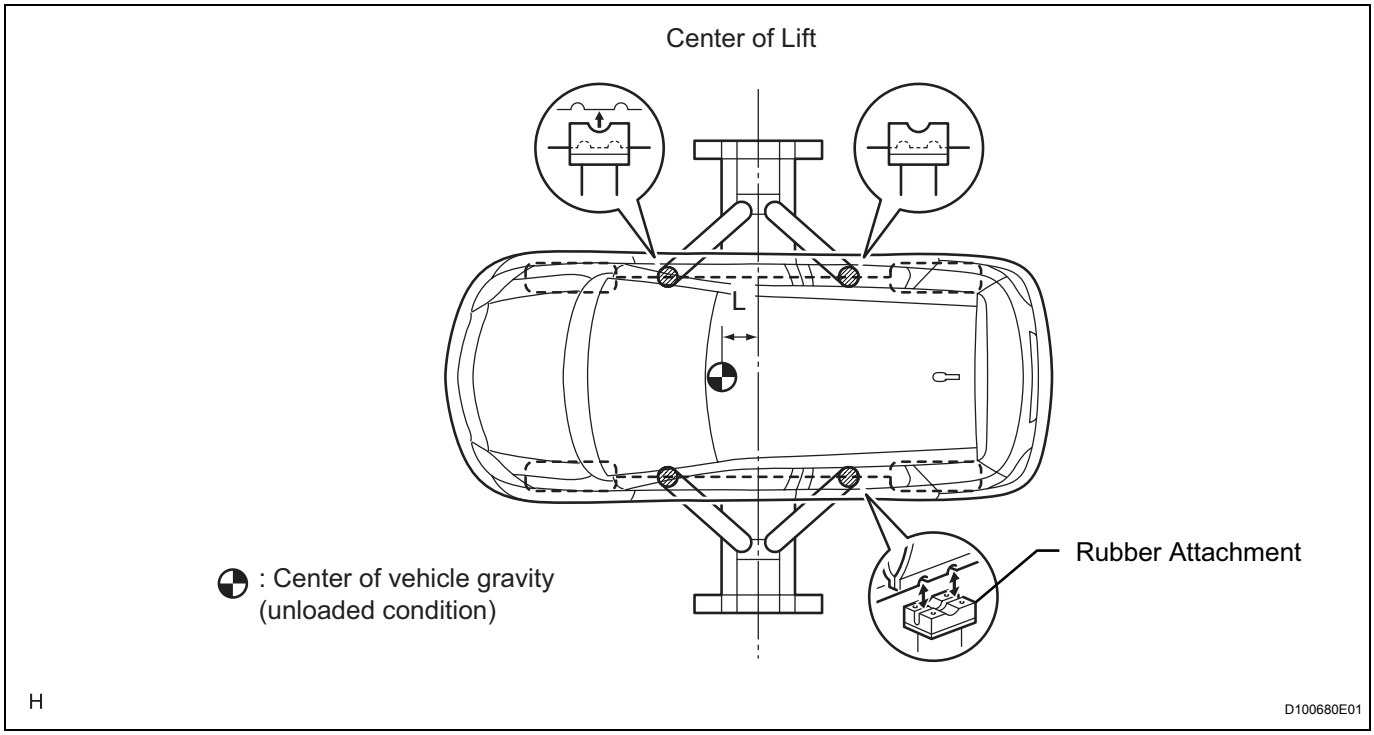
4. NOTICE FOR USING SWING ARM TYPE LIFT

(a) Follow safety procedures outlined in its instruction manual.

(b) Use a swing arm equipped with a rubber attachment, as shown in the illustration.

(c) When using the lift, make sure that the vehicle is stabilized so that it will not tilt while work is being performed. Stabilize the vehicle by adjusting the lift arm's length and vehicle's position.

(d) When using the lift, its center should be as close to the vehicle's center of gravity as possible (length of "L" in the illustration should be as short as possible).



(e) Set the vehicle on the lift as level as possible. Then match the groove of the cradle to the rigid rack support location.

(f) Be sure to lock the swing arms before lifting and during work (if equipped with arm locks).

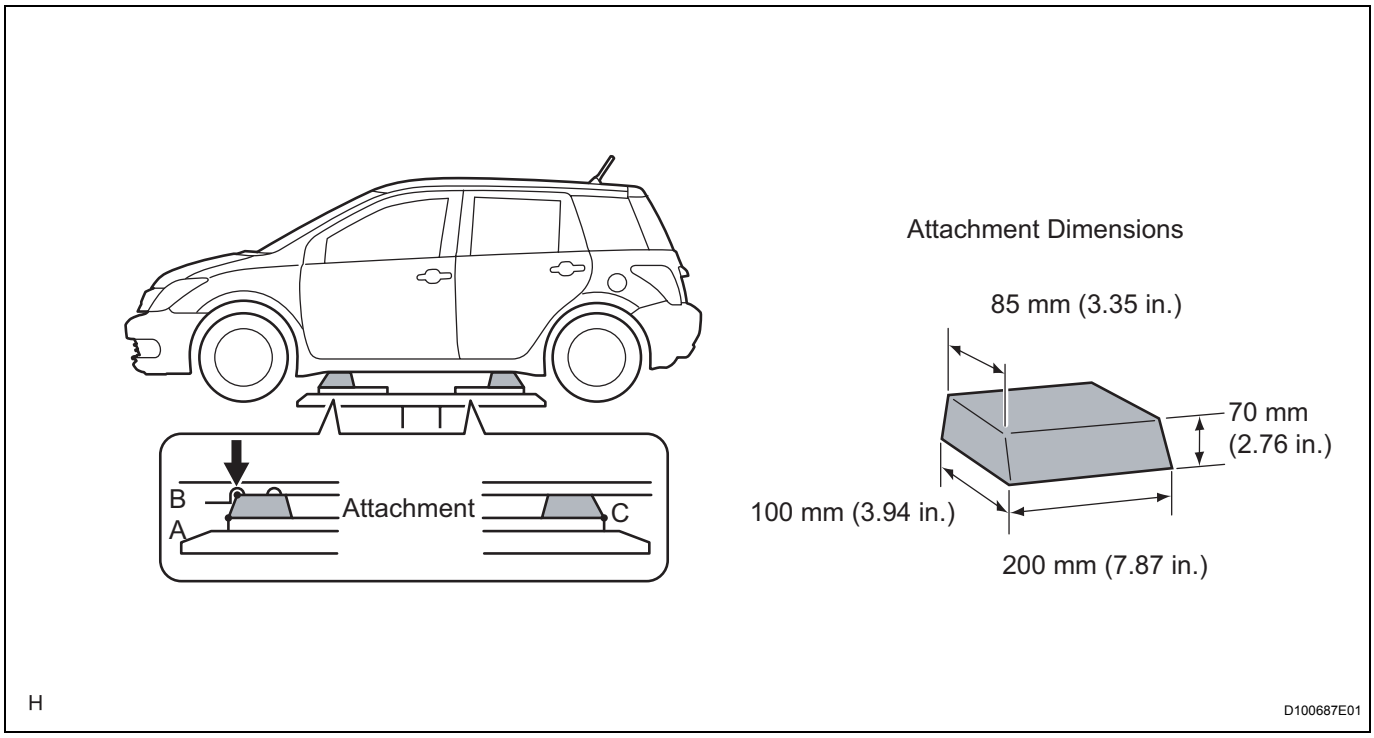
(g) Lift the vehicle up off the ground. Stand at a safe distance and shake the vehicle to check its stability.

5. NOTICE FOR USING PLATE TYPE LIFT

(a) Follow safety procedures outlined in its instruction manual.

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

(c) Refer to the illustration below to determine how to properly set the vehicle.



HINT:

Right and left set position	Place the vehicle over the center of the lift.
Front and rear set position	Place the attachments at the ends of the rubber plate surface, under the vehicle lift pad (A and C in the illustration). Raise the plate slightly and reposition the vehicle so the top of the attachment (B in the illustration) is aligned with the front side notch in the vehicle rocker flange.

(d) Use the lift to raise the vehicle up off the ground, and shake it to make sure that it is stable.

INITIALIZATION

System Name
Sliding Roof System

1. RESET SLIDING ROOF DRIVE GEAR (MOTOR)

NOTICE:

The sliding roof drive gear (motor) must be reset (pulse sensor's location must be set) when one of the following occurs: 1) the battery cable has been disconnected, 2) the drive gear connector is connected/disconnected, or 3) the sliding roof is replaced or installed/removed. If the drive gear is not reset, the AUTO function will not operate.

(a) The sliding roof AUTO operation and the jam protection function may not operate normally if the battery cable is disconnected/reconnected, or the battery is replaced or recharged. Initialize the sliding roof system using the method below.

(1) Turn the ignition switch ON.

(2) Fully open the sliding roof.

(3) Press and hold the sliding roof motor switch on the SLIDE/OPEN side for 2 seconds or more. The sliding roof control ECU built into the drive gear will memorize the position of the sliding roof. Initialization is now complete.

HINT:

If the battery cable is disconnected, the sliding roof control ECU may not detect the position of the roof glass. If the sliding roof AUTO operation is still disabled even after the drive gear has been initialized, the Hall IC may be malfunctioning. The Hall IC is built into the drive gear and detects the roof glass position. If the result is not as specified, replace the drive gear assembly (sliding roof control ECU).

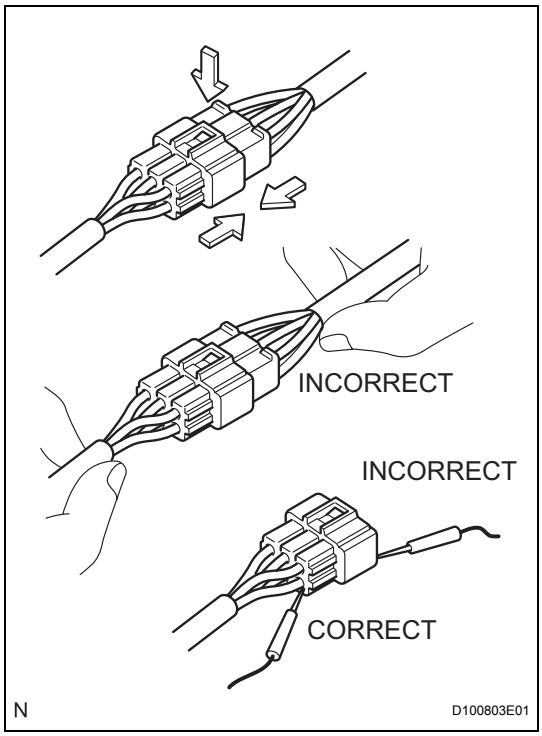
IN

ELECTRONIC CIRCUIT INSPECTION PROCEDURE

1. BASIC INSPECTION

(a) WHEN MEASURING RESISTANCE OF ELECTRONIC PARTS

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



(b) HANDLING CONNECTORS

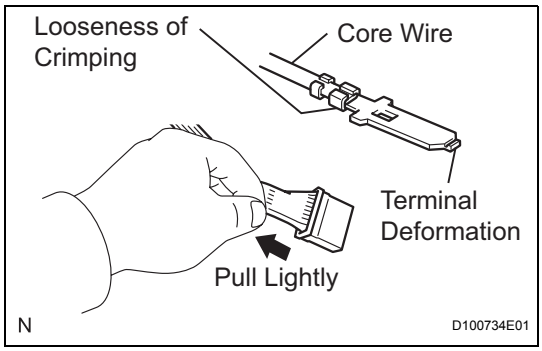
(1) When disconnecting a connector, first squeeze the mating halves tightly together to release the lock, and then press the lock claw and separate the connector.

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

(3) Before connecting a connector, check that there are no deformed, damaged, loose or missing terminals.

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

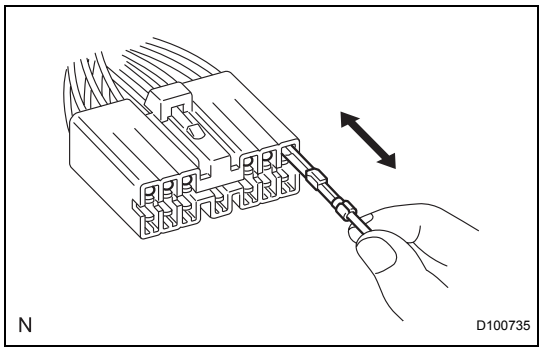
(5) If checking a connector with a TOYOTA electrical tester, check the connector from the backside (harness side) using a mini test lead.
NOTICE:
- **As a waterproof connector cannot be checked from the backside, check it by connecting a sub-harness.**
- **Do not damage the terminals by moving the inserted tester needle.**



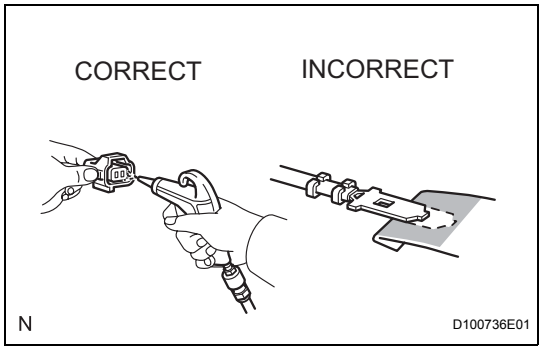
(c) CHECKING CONNECTORS

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

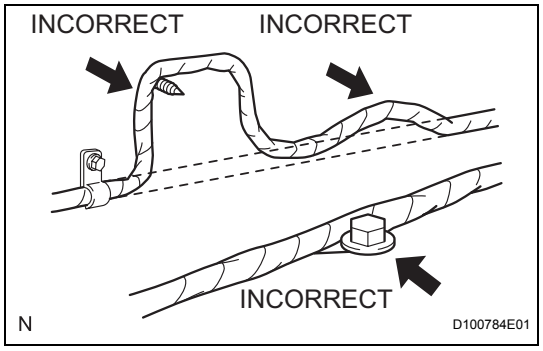
(2) Checking when a connector is disconnected: Check by pulling the wire harness lightly from the backside of the connector. Look for unlatched terminals, missing terminals, loose crimps or broken conductor wires. Check visually for corrosion, metallic or foreign matter and water, and bent, rusted, overheated,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



(3) Checking the contact pressure of the terminal:
Prepare a spare male terminal. Insert it into a female terminal, and check for ample tension when inserting and after full engagement.
NOTICE:
When testing a gold-plated female terminal, always use a gold-plated male terminal.

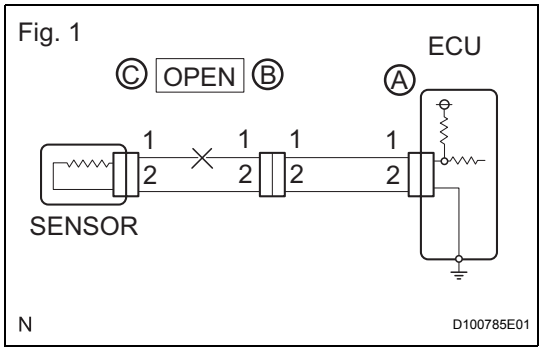


(d) REPAIR METHOD OF CONNECTOR TERMINAL
(1) If there is any foreign matter on the terminal, clean the contact point using an air gun or cloth. Never rub the contact point using sandpaper as the plating may come off.
(2) If there is abnormal contact pressure, replace the female terminal. If the male terminal is gold-plated (gold color), use a gold-plated female terminal; if it is silver-plated (silver color), use a silver-plated female terminal.
(3) Damaged, deformed, or corroded terminals should be replaced. If the terminal does not lock into the housing, the housing may have to be replaced.



(e) HANDLING OF WIRE HARNESS
(1) If removing a wire harness, check the wiring and clamping before proceeding so that it can be restored in the same way.
(2) Never twist, pull or slacken the wire harness more than necessary.
(3) The wire harness should never come into contact with a high temperature part, or rotating, moving, vibrating or sharp-edged parts. Avoid contact with panel edges, screw tips and other sharp items.
(4) When installing parts, never pinch the wire harness.
(5) Never cut or break the cover of the wire harness. If it is cut or broken, replace it or repair it with vinyl tape.

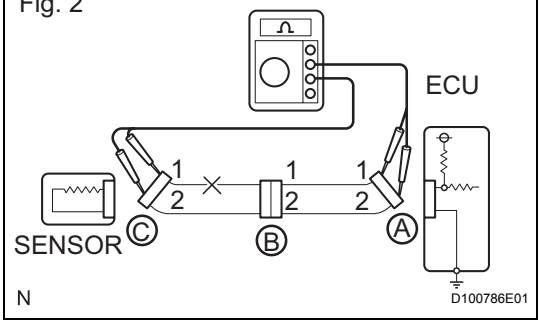
Fig. 1



2. CHECK FOR OPEN CIRCUIT

(a) For an open circuit in the wire harness in Fig. 1, check the resistance or voltage, as described below.

Fig. 2

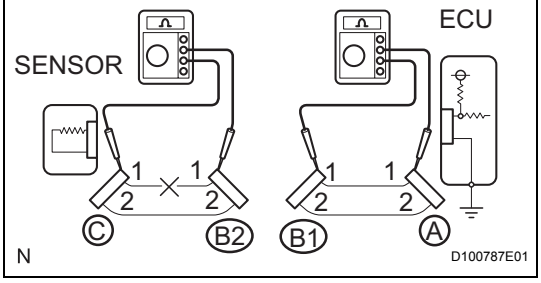


(b) Check the resistance.
(1) Disconnect connectors A and C, and measure the resistance between them.
Standard resistance (Fig. 2)

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

HINT:
Measure the resistance while lightly shaking the wire harness vertically and horizontally.
If the results match the examples above, an open circuit exists between terminal 1 of connector A and terminal 1 of connector C.

Fig. 3

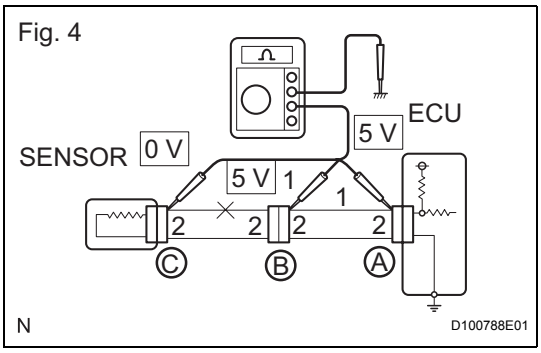


(2) Disconnect connector B and measure the resistance between the connectors.
Standard resistance (Fig. 3)

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

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

Fig. 4



(c) Check the voltage.
(1) In a circuit in which voltage is applied to the ECU connector terminal, an open circuit can be checked by conducting a voltage check.
With each connector still connected, measure the voltage between the body ground and these terminals (in this order): 1) terminal 1 of connector A, 2) terminal 1 of connector B, and 3) terminal 1 of connector C.
Standard voltage (Fig. 4)

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

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

Fig. 5

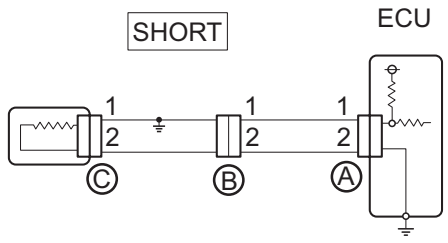


Fig. 6

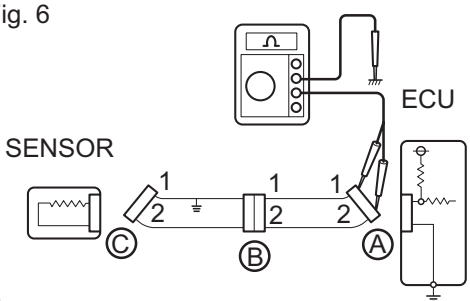
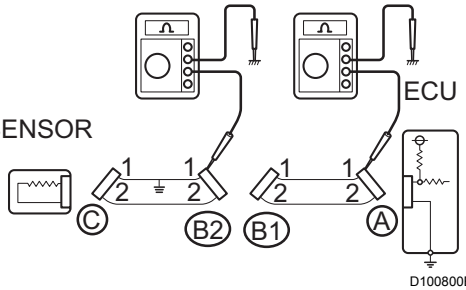


Fig. 7



3. CHECK FOR SHORT CIRCUIT

(a) If the wire harness is ground shorted (Fig. 5), locate the section by conducting a resistance check with the body ground (below).

(b) Check the resistance with the body ground.

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

Standard resistance (Fig. 6)

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

HINT:

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

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

(2) Disconnect connector B and measure the resistance.

Standard resistance (Fig. 7)

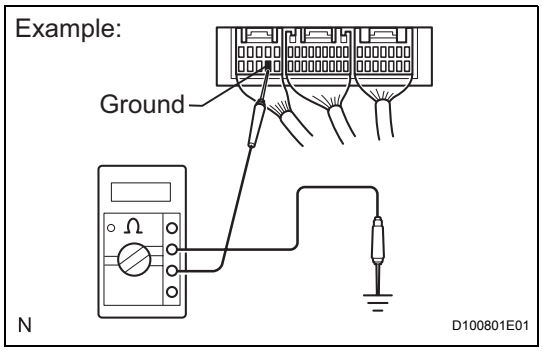
Tester Connection	Specified Condition
Connector A terminal 1 - Body ground	10 kΩ or higher
Connector B2 terminal 1 - Body ground	Below 1 Ω

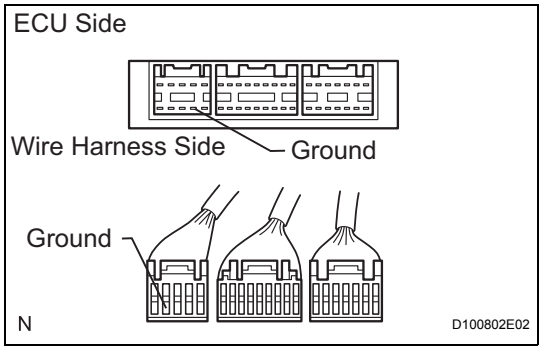
If the results match the examples above, a short circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

4. CHECK AND REPLACE ECU

NOTICE:

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





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

(1) Measure the resistance between the ECU ground terminal and body ground.
Standard resistance:
Below 1 Ω

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

HOW TO USE THIS MANUAL

GENERAL INFORMATION

1. GENERAL DESCRIPTION

(a) This manual is written in accordance with SAE J2008.
  (1) Diagnosis
  (2) Removing / Installing, Replacing, Disassembling / Reassembling, Checking and Adjusting
  (3) Final Inspection

(b) The following procedures are omitted from this manual. However, these procedures must be performed.
  (1) Use a jack or lift to perform operations.
  (2) Clean all removed parts.
  (3) Perform a visual check.

2. INDEX

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

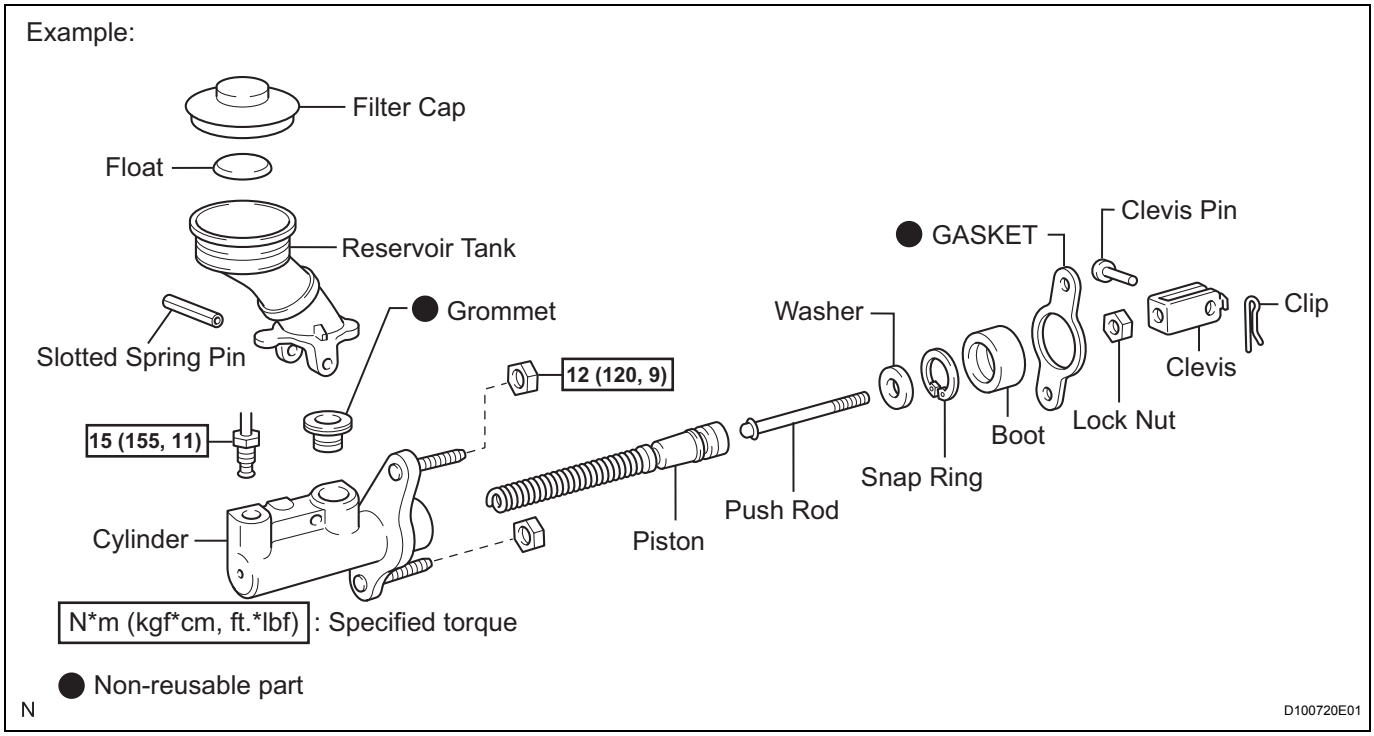
3. PREPARATION

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

4. REPAIR PROCEDURES

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

(b) Non-reusable parts, grease application areas, precoated parts and torque specifications are noted in the component illustrations.
The following illustration is an example.



(c) Torque specifications, grease application areas and non-reusable parts are emphasized in the procedures.
HINT:
There are cases where such information can only be explained by using an illustration. In these cases, torque, oil and other information are described in the illustration.

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

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

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

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

5. SERVICE SPECIFICATIONS

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

6. TERM DEFINITIONS

CAUTION	Possibility of injury to you or other people.
NOTICE	Possibility of damage to components being repaired.
HINT	Provides additional information to help you perform repairs.

7. INTERNATIONAL SYSTEM OF UNITS

(a) The units used in this manual comply with the International System of Units (SI) standard. Units from the metric system and English system are also provided.
Example:
Torque: 30 N*m (310 kgf*cm, 22 ft.*lbf)

GLOSSARY OF SAE AND SCION TERMS

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

SAE ABBREVIATIONS	SAE TERMS	SCION TERMS ( )-ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner, A/CL
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	HAC
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection	Direct Injection (DI./INJ)
DI	Distributor Ignition	-
DLC3	Data Link Connector 3	OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Trouble Code
DTM	Diagnostic Test Mode	-
ECL	Engine Coolant Level	-
ECM	Engine Control Module	Engine Electronic Control Unit (ECU)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM) Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Distributorless Ignition (DLI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_2S)
IAC	Idle Air Control	Idle Speed Control (ISC)

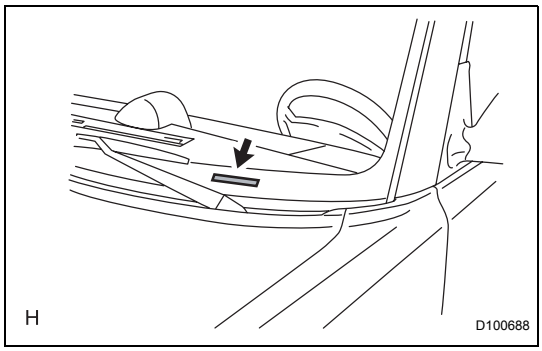
SAE ABBREVIATIONS	SAE TERMS	SCION TERMS ( )-ABBREVIATIONS
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Airflow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Light	Check Engine Light
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalytic Convert (OC), CCo
OL	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E-ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter
TCM	Transmission Control Module	Transmission ECU, ECT ECU
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)

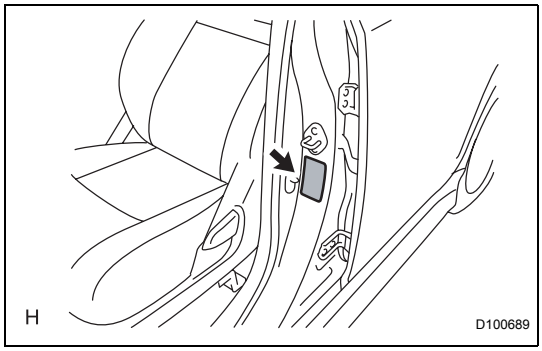
SAE ABBREVIATIONS	SAE TERMS	SCION TERMS ( )-ABBREVIATIONS
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) Manifold Converter CC_{RO}
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	-
3GR	Third Gear	-
4GR	Fourth Gear	-

IN

IDENTIFICATION INFORMATION

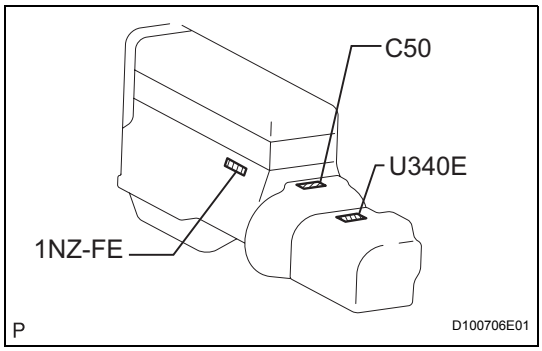
VEHICLE IDENTIFICATION AND SERIAL NUMBERS





1. VEHICLE IDENTIFICATION NUMBER

(a) The vehicle identification number is stamped on the vehicle identification number plate and certification label, as shown in the illustrations.
(1) Vehicle Identification Number Plate
(2) Certification Label



2. ENGINE SERIAL NUMBER AND TRANSAXLE SERIAL NUMBER

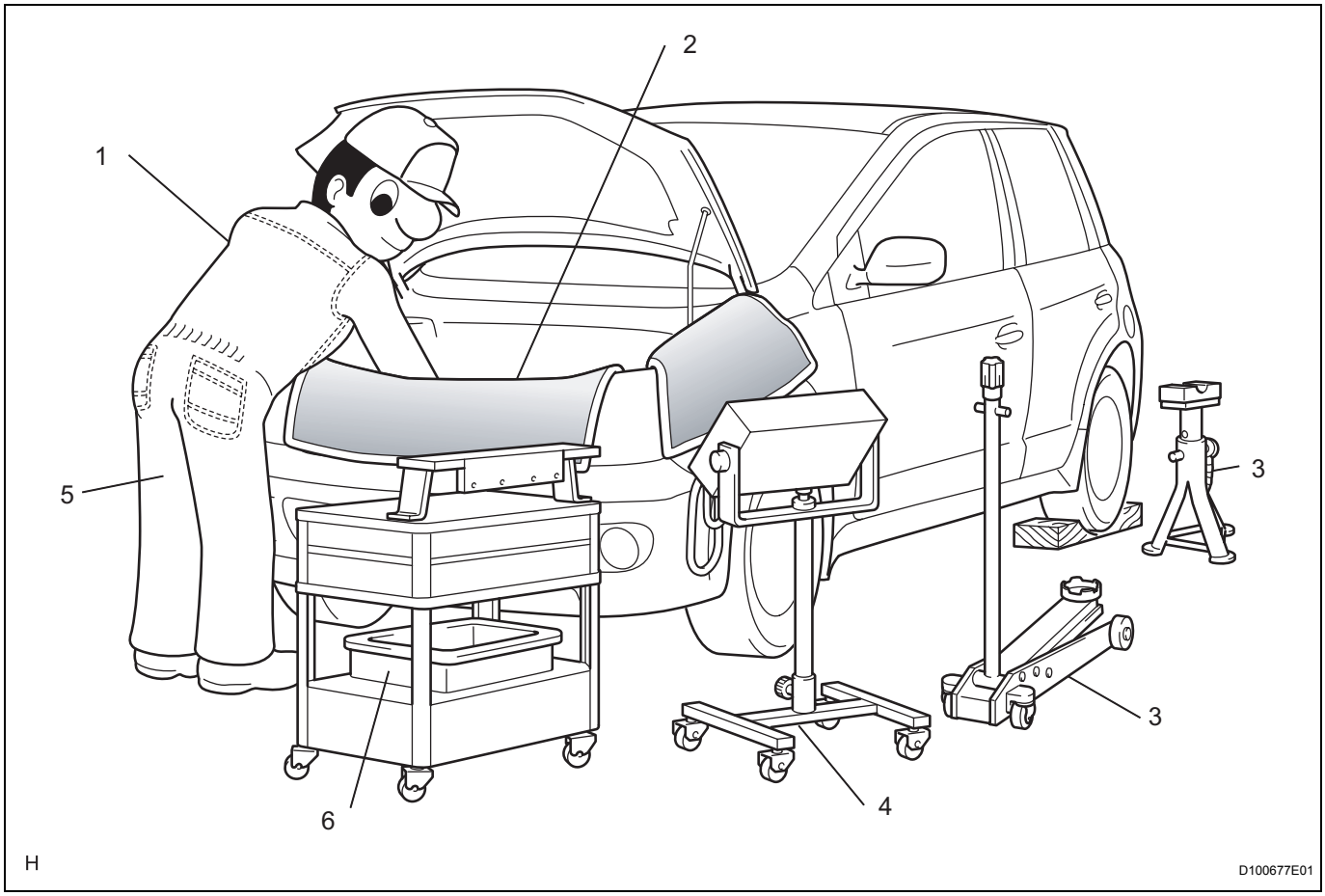
(a) The engine serial number is stamped on the cylinder block of the engine and the transaxle serial number is stamped on the housing as shown in the illustration.
(1) Engine Serial Number
(2) Transaxle Serial Number

REPAIR INSTRUCTION

PRECAUTION

1. BASIC REPAIR HINT

(a) HINTS ON OPERATIONS

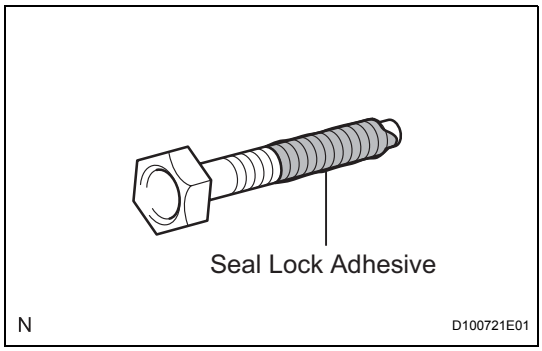


1	Attire	• Always wear a clean uniform. • Hat and safety shoes must be worn.
2	Vehicle protection	Prepare a grille cover, fender cover, seat cover and floor mat before starting the operation.
3	Safe operation	• When working with 2 or more persons, be sure to check safety for one another. • When working with the engine running, make sure to provide ventilation for exhaust fumes in the workshop. • If working on high temperature, high pressure, rotating, moving, or vibrating parts, wear appropriate safety equipment and take extra care not to injure yourself or others. • When jacking up the vehicle, be sure to support the specified location with a safety stand. • When lifting up the vehicle, use appropriate safety equipment.
4	Preparation of tools and measuring gauge	Before starting operation, prepare a tool stand, SST, gauge, oil and parts for replacement.
5	Removal and installation, disassembly and assembly operations	• Diagnose with a thorough understanding of proper procedures and of the reported problem. • Before removing the parts, check the general condition of the assembly and for deformation and damage. • When the assembly is complicated, take notes. For example, note the total number of electrical connections, bolts, or hoses removed. Add matchmarks to insure reassembly of components in the original positions. Temporarily mark hoses and their fittings if needed. • Clean and wash the removed parts if necessary and assemble them after a thorough check.

6	Removed parts	• Place the removed parts in a separate box to avoid mixing them up with the new parts or contaminating the new parts. • For non-reusable parts such as gaskets, O-rings, and self-locking nuts, replace them with new ones as instructed in this manual. • Retain the removed parts for customer inspection, if requested.

IN

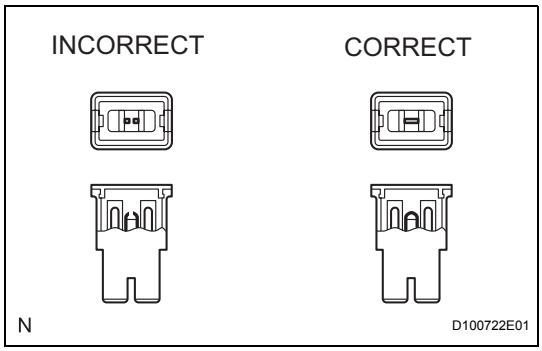
(b) JACKING UP AND SUPPORTING VEHICLE
(1) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.



(c) PRECOATED PARTS
(1) Precoated parts are bolts and nuts that are coated with a seal lock adhesive at the factory.
(2) If a precoated part is retightened, loosened or moved in any way, it must be recoated with the specified adhesive.
(3) When reusing a precoated part, clean off the old adhesive and dry the part with compressed air. Then apply new seal lock adhesive appropriate to that part.
(4) Some seal lock agents harden slowly. You may have to wait for the seal lock adhesive to harden.

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

(e) BOLTS, NUTS AND SCREWS
(1) Carefully follow all the specifications for tightening torques. Always use a torque wrench.



(f) FUSES
(1) When inspecting a fuse, check that the wire of the fuse is not broken.
(2) When replacing fuses, be sure that the new fuse has the correct amperage rating. Do not exceed the rating or use one with a lower rating.

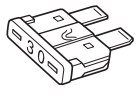
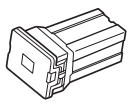
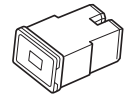
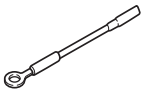
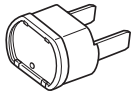
Illustration	Symbol	Part Name	Abbreviation
 N	N	FUSE	FUSE
 N	N	MEDIUM CURRENT FUSE	M-FUSE

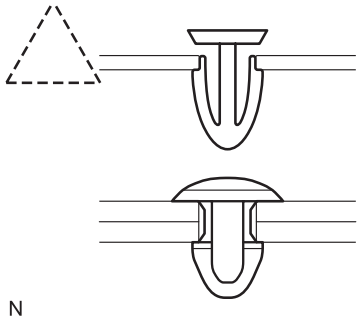
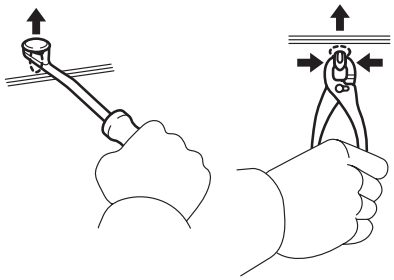
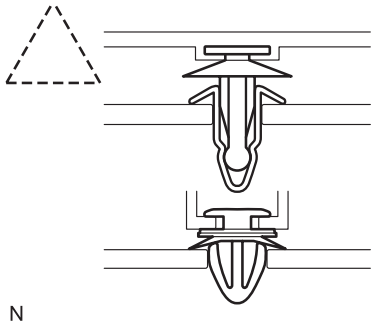
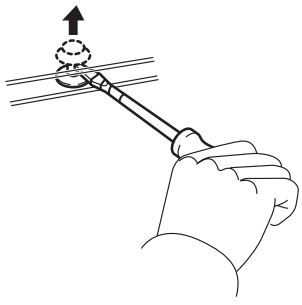
Illustration	Symbol	Part Name	Abbreviation
 N	N	HIGH CURRENT FUSE	H-FUSE
 N	N	FUSIBLE LINK	FL
 N	N	CIRCUIT BREAKER	CB

(g) CLIPS

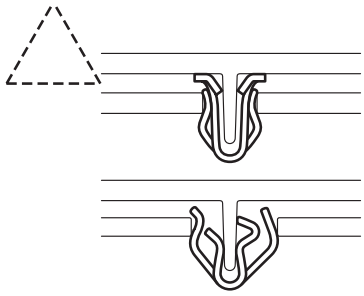
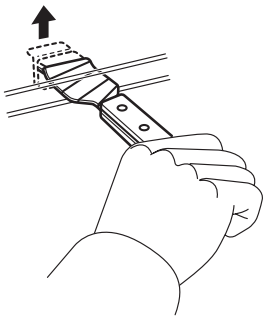
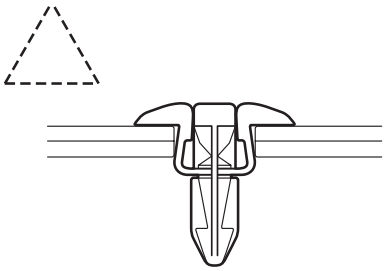
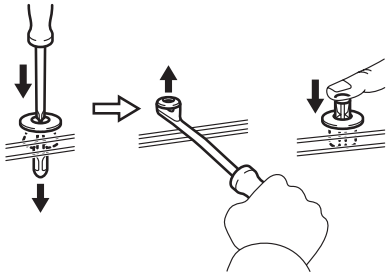
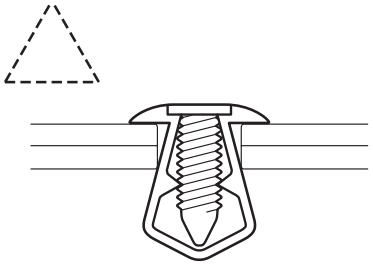
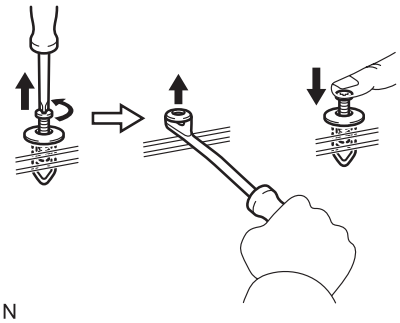
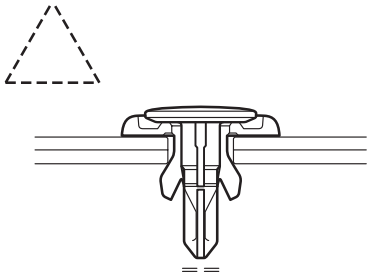
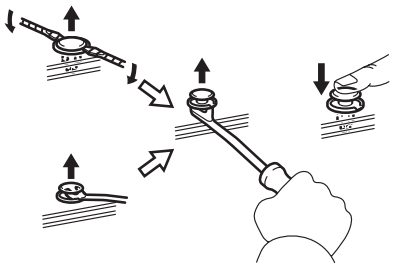
(1) The removal and installation methods of typical clips used for vehicle body parts are shown in the table below.

HINT:

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

Shape (Example)	Illustration	Procedures
 N	 N	1. Remove clip with clip remover or pliers.
 N	 N	1. Remove fastener with clip remover or screwdriver.

IN

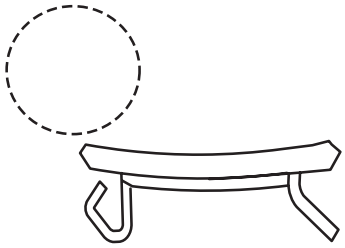
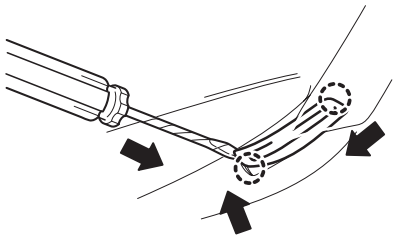
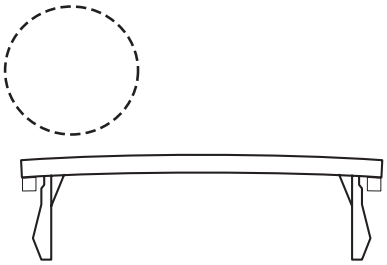
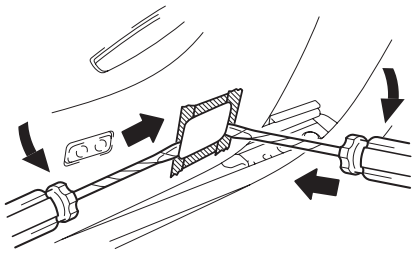
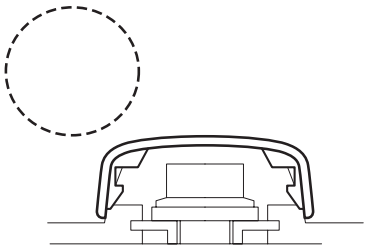
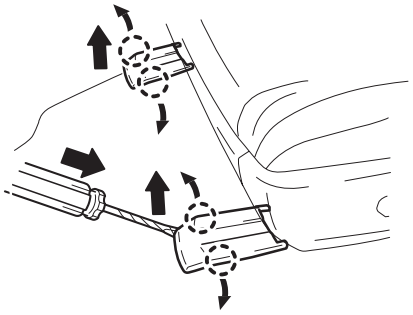
Shape (Example)	Illustration	Procedures
 N	 N	1. Remove clip with wide scraper to prevent panel damage.
 N	 N	1. Remove clip by pushing center pin through and prying out shell.
 N	 N	1. Remove clip by unscrewing center pin and prying out shell.
 N	 N	1. Remove clip by prying out pin and then prying out shell.

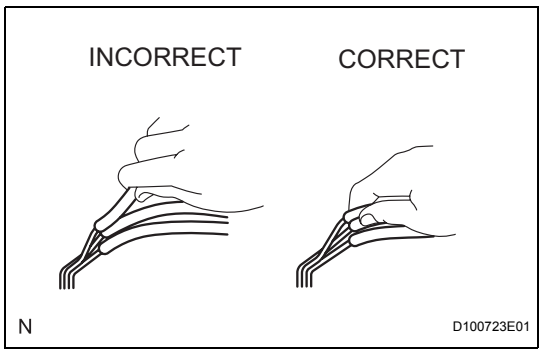
(h) CLAWS

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

HINT:

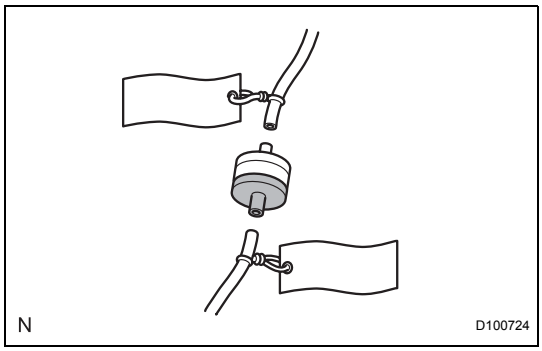
If claws of caps or covers are damaged during a procedure, always replace the caps or covers with new ones.

Shape (Example)	Illustration	Procedures
		1. Using a screwdriver, detach the claws and remove the cap or cover.
		1. Using a screwdriver, detach the claws and remove the cap or cover.
		1. Using a screwdriver, detach the claws and remove the cap or cover.



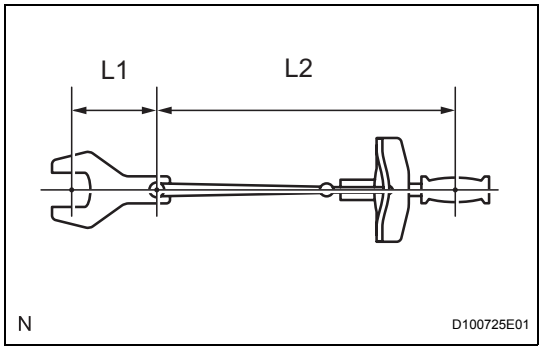
(i) REMOVAL AND INSTALLATION OF VACUUM HOSES

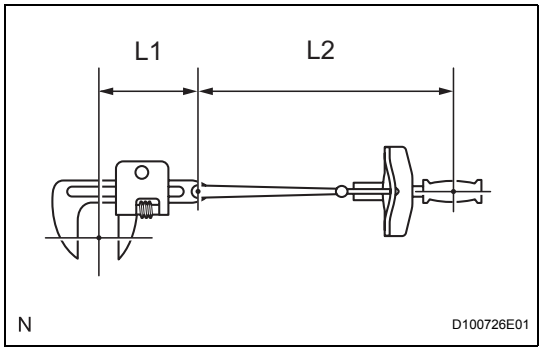
(1) To disconnect a vacuum hose, pull and twist from the end of the hose. Do not pull from the middle of the hose as this may cause damage.



(2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.
(3) After completing any hose related repairs, double-check that the vacuum hoses are properly connected. The label under the hood shows the proper layout.
(4) When using a vacuum gauge, never force the hose onto a connector that is too large. If a hose has been stretched, it may leak air. Use a step-down adapter if necessary.

(j) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL





(1) Use the formula below to calculate special torque values for situations where SST or an extension tool is combined with the torque wrench.
Formula:
T' = L2/(L1 + L2) * T

T'	**Reading of torque wrench {N*m (kgf*cm, ft.*lbf)}**
T	**Torque {N*m (kgf*cm, ft.*lbf)}**
L1	**Length of SST or extension tool {cm (in.)}**
L2	**Length of torque wrench {cm (in.)}**

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

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

The SCION xA is equipped with a Supplemental Restraint System (SRS) and seat belt pretensioner.

CAUTION:
Failure to carry out the service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing and lead to a serious injury. Furthermore, if a mistake is made when servicing the SRS, it is possible that the SRS may fail to operate properly. Before servicing (including removal, installation, inspection or replacement of parts), be sure to read the following section carefully.

(a) GENERAL NOTICE

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

(2) Work must be started at least 90 seconds after the ignition switch is turned OFF and after the cable is disconnected from the negative (-) battery terminal.
The SRS is equipped with a back-up power source. If work is started within 90 seconds after turning the ignition switch OFF and disconnecting the cable from the negative (-) battery terminal, the SRS may deploy.
When the cable is disconnected from the negative (-) battery terminal, clock and audio system memory is erased. Before starting work, make a note of the settings of each memory system. When work is finished, reset the clock and audio system as before.
CAUTION:
Never use a back-up power source (battery or other) to avoid erasing system memory. The back-up power source may inadvertently power the SRS and cause it to deploy.

(3) In minor collisions where the SRS does not deploy, the steering pad, front passenger airbag assembly, curtain shield airbag assembly, front seat side airbag assembly, instrument panel lower airbag assembly and front seat outer belt assembly with pretensioner should be inspected before further use of the vehicle.

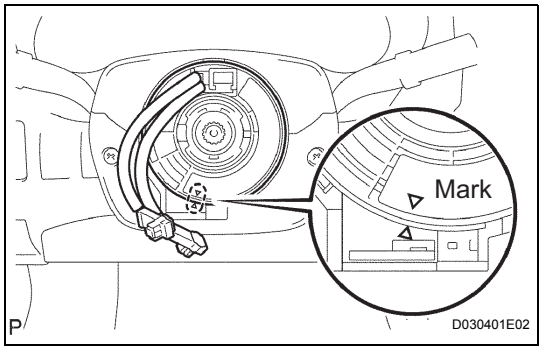
(4) Never use SRS parts from another vehicle. When replacing parts, use new parts.

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

(6) Never disassemble and attempt to repair the steering pad, front passenger airbag assembly, curtain shield airbag assembly, front seat side airbag assembly, instrument panel lower airbag assembly and front seat outer belt assembly with pretensioner.

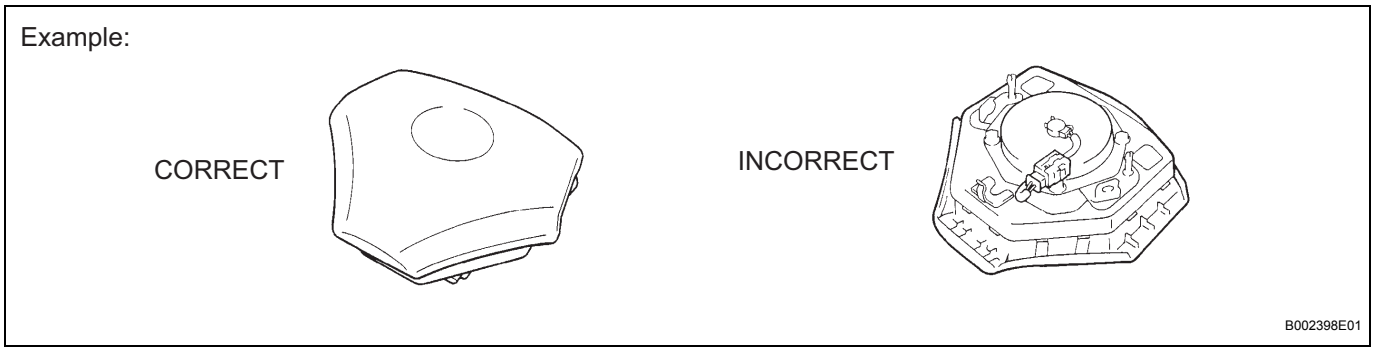
(7) Replace the steering pad, front passenger airbag assembly, curtain shield airbag assembly, front seat side airbag assembly, instrument panel lower airbag assembly and front seat outer belt assembly with pretensioner if: 1) damage has occurred from being dropped, or 2) cracks, dents or other defects in the case, bracket or connector are present.

(8) Do not directly expose the airbag sensor assembly or airbag assembly to hot air or flames.
(9) Use a voltmeter / ohmmeter with high impedance (minimum=10 kΩ) for troubleshooting electrical circuits.
(10) Information labels are attached to the SRS components. Follow the instructions on the labels.
(11) After work on the SRS is completed, check the SRS warning light.

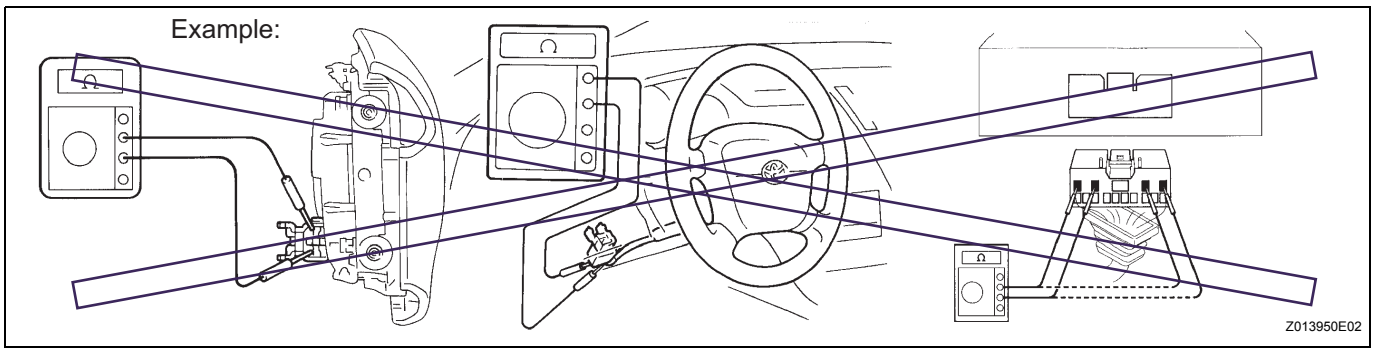


(b) SPIRAL CABLE
(1) The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, as cable disconnection and other problems may occur. Refer to the information about correct installation of the steering wheel.

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



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



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

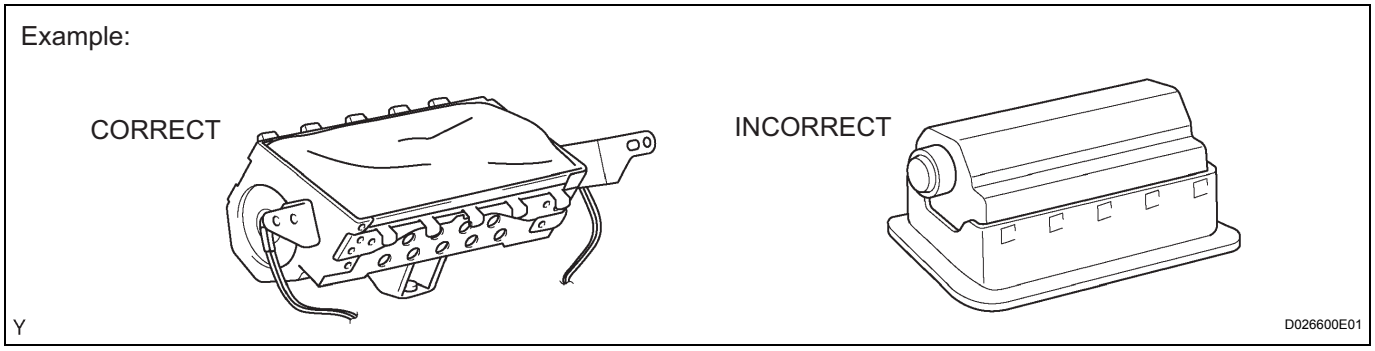
(4) Store the steering pad assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

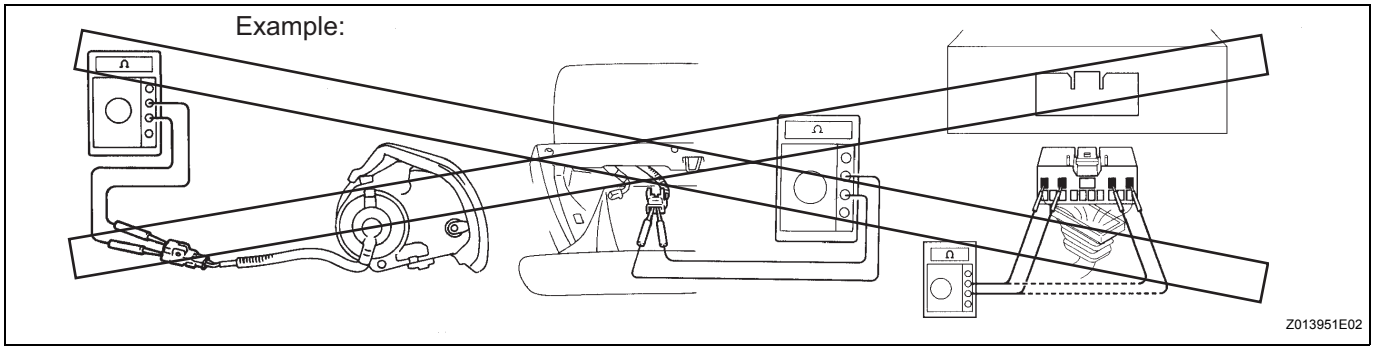
(6) When disposing of the vehicle or the steering pad assembly by itself, the airbag should be deployed using SST before disposal. Activate the airbag in a safe place away from electrical noise.

(d) FRONT PASSENGER AIRBAG ASSEMBLY

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



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



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

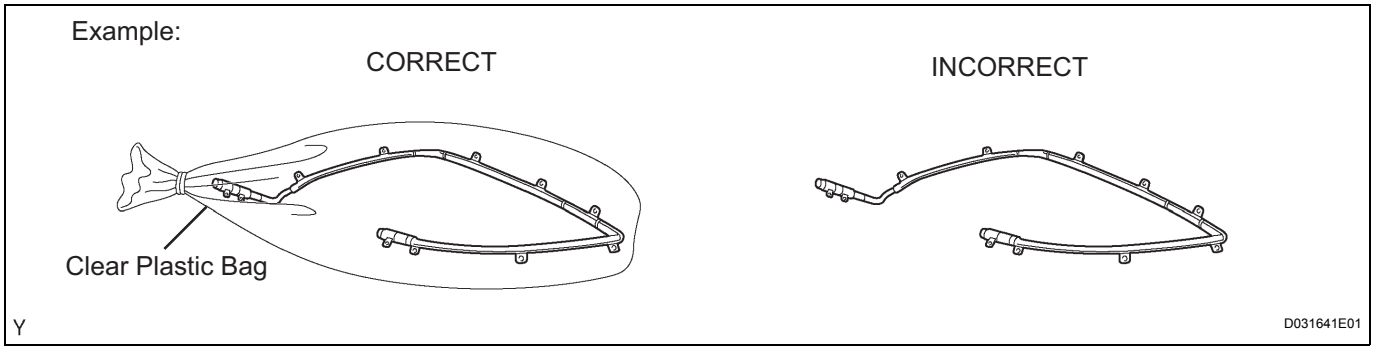
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

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

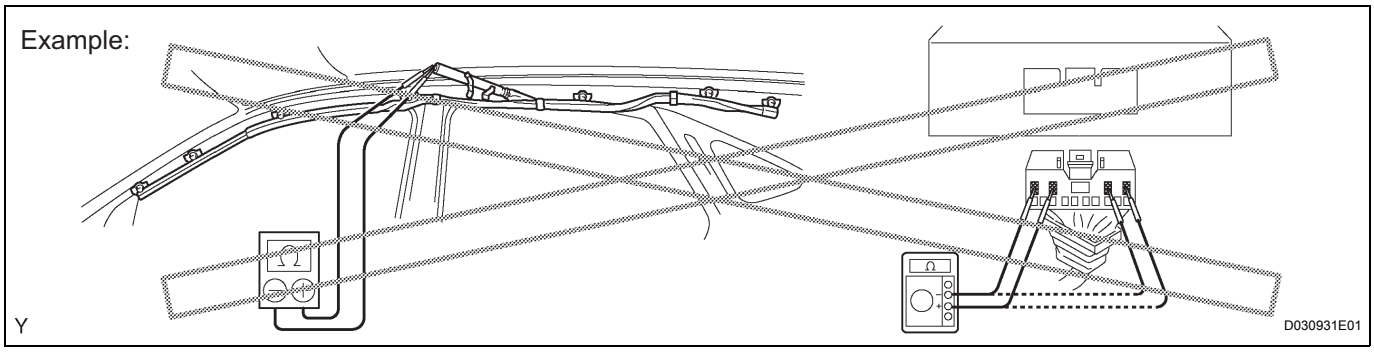
(e) CURTAIN SHIELD AIRBAG ASSEMBLY

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



CAUTION:
The plastic bag is not reusable.

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



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

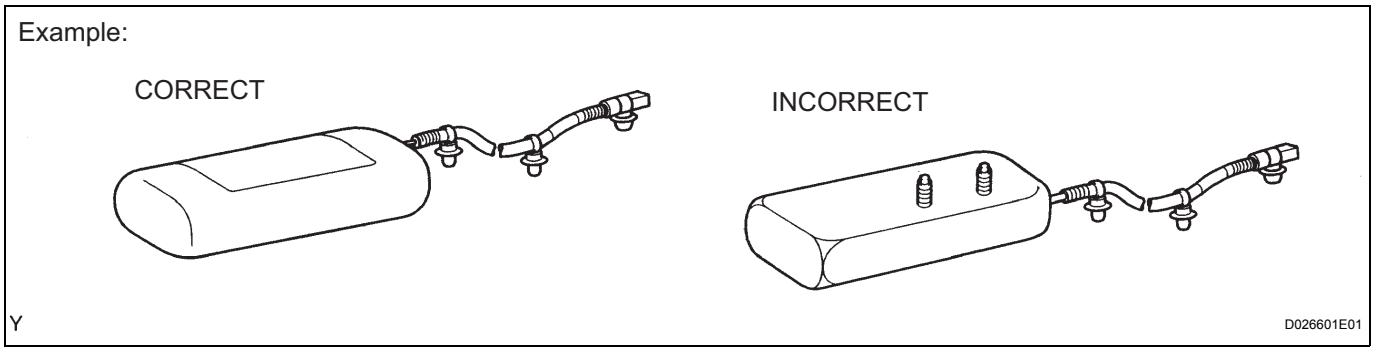
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

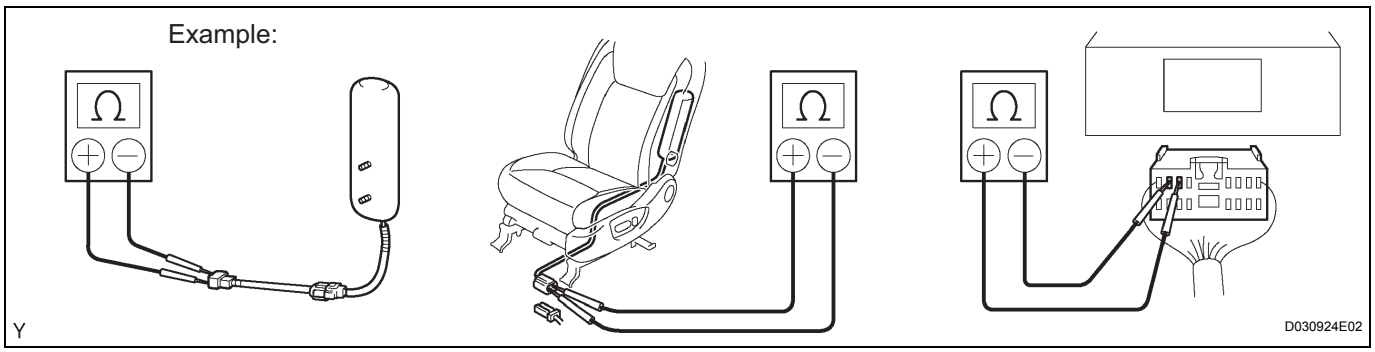
(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal. Activate the airbag in a safe place away from electrical noise.

(f) FRONT SEAT SIDE AIRBAG ASSEMBLY

(1) Always place a removed or new front seat side airbag assembly with the airbag inflation direction facing up.



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



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

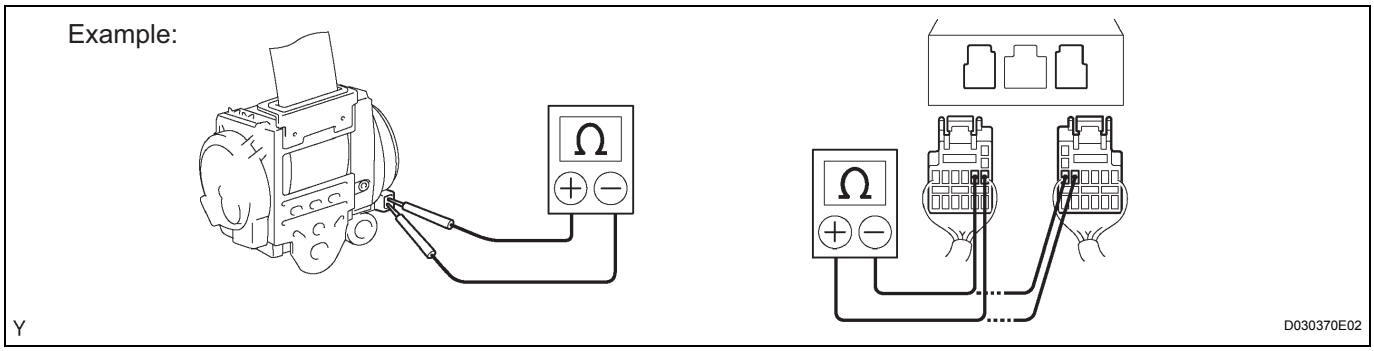
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to currents entering the squib wiring.

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

(g) FRONT SEAT OUTER BELT ASSEMBLY with PRETENSIONER

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



(2) Never install the seat outer belt on another vehicle.

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

(4) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the pretensioner deploying due to currents entering the squib wiring.

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

(6) As the seat outer belt is hot after the pretensioner is activated, allow some time for it to cool down sufficiently before disposal. Never apply water to try to cool down the seat outer belt.

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

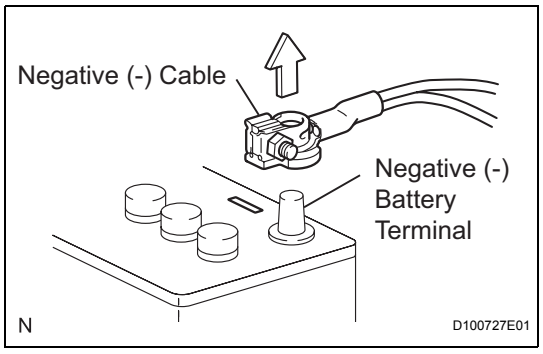
(h) AIRBAG SENSOR ASSEMBLY

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

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

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

(i) WIRE HARNESS AND CONNECTOR
(1) The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken, repair or replace it.



3. ELECTRONIC CONTROL

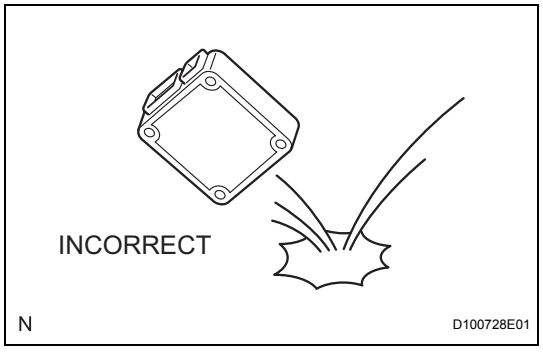
(a) REMOVAL AND INSTALLATION OF BATTERY TERMINAL

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

(1) Before performing electronic work, disconnect the cable from the negative (-) battery terminal to prevent component and wire damage caused by accidental short circuits.
(2) When disconnecting the cable, turn the ignition switch OFF and headlight dimmer switch OFF, and loosen the cable nut completely. Perform these operations without twisting or prying the cable. Then disconnect the cable.
(3) Clock settings, radio settings, audio system memory, DTCs and other data are erased when the cable is disconnected from the negative (-) battery terminal. Write down any necessary data before disconnecting the cable.

(b) HANDLING OF ELECTRONIC PARTS
(1) Do not open the cover or case of the ECU unless absolutely necessary. If the IC terminals are touched, the IC may be rendered inoperative by static electricity.
(2) Do not pull the wires when disconnecting electronic connectors. Pull the connector itself.



(3) Be careful not to drop electronic components, such as sensors or relays. If they are dropped on a hard surface, they should be replaced.
(4) When cleaning the engine with steam, protect the electronic components, air filter and emission-related components from water.
(5) Never use an impact wrench to remove or install temperature switches or temperature sensors.
(6) When measuring the resistance of a wire connector, insert the tester probe carefully to prevent terminals from bending.

4. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

(a) PLACE FOR REMOVING AND INSTALLING FUEL SYSTEM PARTS
(1) Work in a location with good air ventilation that does not have welders, grinders, drills, electric motors, stoves, or any other ignition sources.

IN

(2) Never work in a pit or near a pit as vaporized fuel will collect in those places.

(b) REMOVING AND INSTALLING FUEL SYSTEM PARTS

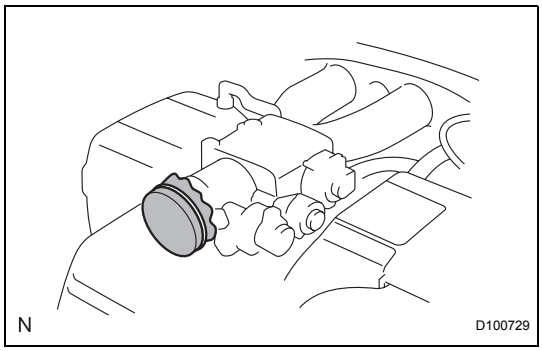
(1) Prepare a fire extinguisher before starting the operation.

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

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

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

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

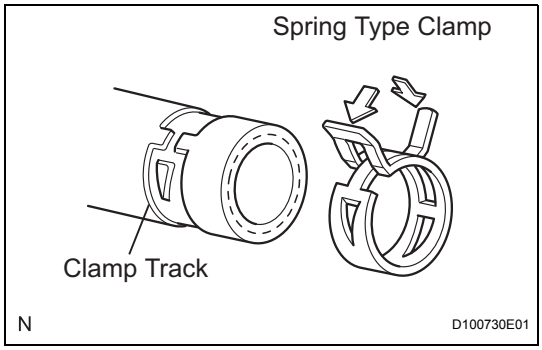


5. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS

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

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

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



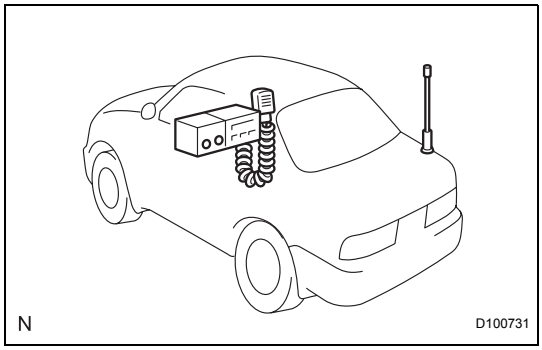
6. HANDLING OF HOSE CLAMPS

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

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

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

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

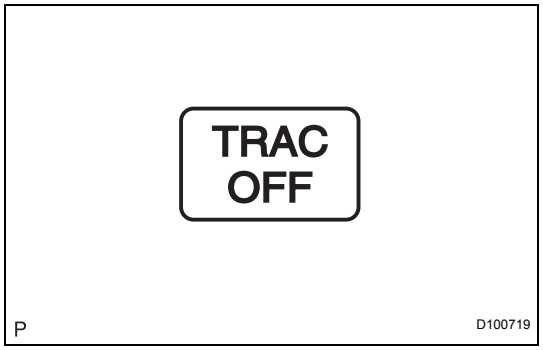


7. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEMS

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

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

(c) Keep the antenna and feeder separate from other wirings as much as possible. This will prevent signals of the communication equipment from affecting vehicle equipment and vice versa.
(d) Check that the antenna and feeder are correctly adjusted.
(e) Do not install any high-powered mobile communication system.



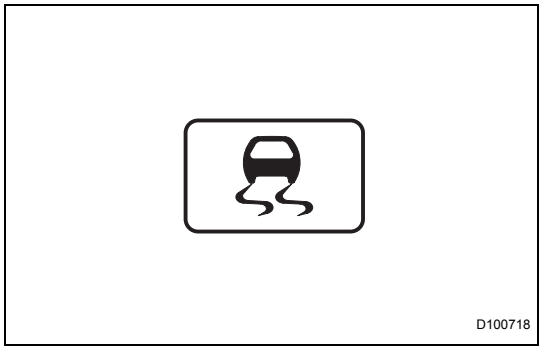
8. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TRAC) SYSTEM

When testing with a 2-wheel drum tester such as a speedometer tester, a combination tester for the speedometer and brake, a chassis dynamometer, or when jacking up the front wheels and turning the wheels, turn the TRAC system OFF by pressing the TRAC OFF switch.

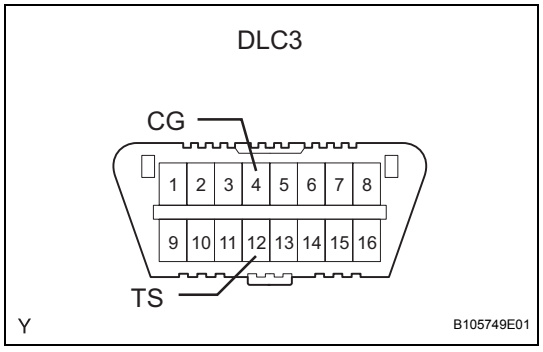
NOTICE:

TRAC system OFF condition can be confirmed by the "TRAC OFF" warning indicator light in the combination meter.

(a) Confirm that the TRAC system is OFF.
  (1) Press the TRAC OFF switch to turn off the TRAC system.
  (2) Check that the TRAC OFF indicator light illuminates.
  HINT:
  The slip indicator light should always illuminate immediately after the engine is started.



  (3) Begin testing.
  (4) Press the TRAC OFF switch to turn on the TRAC system and check that the TRAC OFF indicator light turns off.
  HINT:
  The slip indicator light blinks when the TRAC system is operating.



9. FOR VEHICLES EQUIPPED WITH VEHICLE STABILITY (VSC) SYSTEM

(a) NOTICES WHEN USING DRUM TESTER
  (1) Before beginning testing, disable the VSC. To disable the VSC, turn the ignition switch OFF and connect SST to terminals TS and CG of the DLC3.
  SST 09843-18040
  NOTICE:
  - **Confirm that the VSC warning light blinks.**
  - **VSC system will be reset when the engine is started.**
  - **For safety, secure the vehicle with restraint chains while using a wheel dynamometer.**

(b) NOTICES OF RELATED OPERATIONS TO VSC
(1) Do not carry out unnecessary installation and removal as it might affect the adjustment of VSC related parts.
(2) Be sure to follow the instructions for work preparation and final confirmation of proper operation of the VSC system.

10. FOR VEHICLES EQUIPPED WITH CATALYTIC CONVERTER

CAUTION:

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

(a) Use only unleaded gasoline.
(b) Avoid idling the engine for more than 20 minutes.
(c) Avoid performing unnecessary spark jump tests.
(1) Perform a spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(2) While testing, never race the engine.
(d) Avoid a prolonged engine compression measurement. Engine compression measurements must be performed as rapidly as possible.
(e) Do not run the engine when the fuel tank is nearly empty. This may cause the engine to misfire and create an extra load on the converter.

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

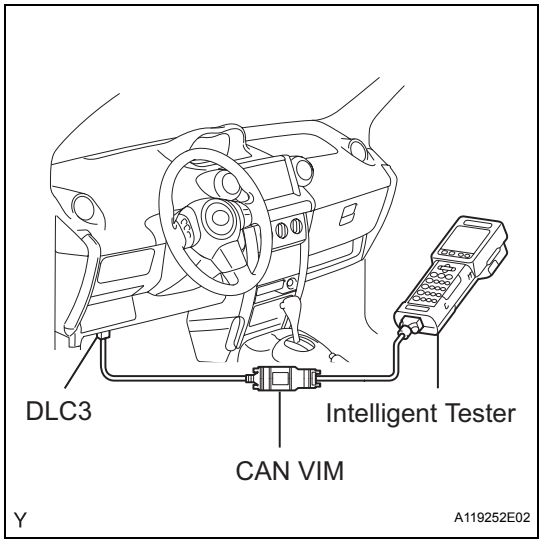
GENERAL INFORMATION

A large number of ECU controlled systems are used in the SCION xA. In general, ECU controlled systems are considered to be very intricate, requiring a high level of technical knowledge to troubleshoot. However, most problem checking procedures only involve inspecting the ECU controlled system's circuits one by one. An adequate understanding of the system and a basic knowledge of electricity is enough to perform effective troubleshooting, accurate diagnoses and necessary repairs.

FOR USING INTELLIGENT TESTER

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

* If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
* If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



HOW TO PROCEED WITH TROUBLESHOOTING

1. OPERATION FLOW

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

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

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

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4	SYMPTOM CONFIRMATION AND DTC (AND FREEZE FRAME DATA) CHECK

(a) Visually check the wire harnesses, connectors and fuses for open and short circuits.
(b) Warm up the engine to the normal operating temperature.
(c) Confirm the problem symptoms and conditions, and check for DTCs.

Result

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

B → Go to step 6

A

5	DTC CHART

(a) Check the results obtained in the DTC check. Then find the output DTC in the DTC chart. Look at the "Trouble Area" column for a list of potentially malfunctioning circuits and / or parts.

NEXT	Go to step 7

6	PROBLEM SYMPTOMS TABLE

(a) Check the results obtained in the symptom confirmation. Then find the problem symptoms in the problem symptoms table. Look at the "Suspected Area" column for a list of potentially malfunctioning circuits and / or parts.

NEXT

7	CIRCUIT INSPECTION OR PARTS INSPECTION

(a) Confirm the malfunctioning circuit or part.

NEXT

8	ADJUST, REPAIR OR REPLACE

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

NEXT

9	CONFIRMATION TEST

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

NEXT

END

2. CUSTOMER PROBLEM ANALYSIS

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

3. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE

HINT:

The diagnostic system in the SCION xA has various functions.

- The first function is the Diagnostic Trouble Code (DTC) check. A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs. In a DTC check, a previous malfunction's DTC can be checked by a technician during troubleshooting.
- Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly.

  By using these functions, the problem areas can be narrowed down and troubleshooting is more effective. Diagnostic functions are incorporated in the following system in the SCION xA.

System	DTC Check	Check Mode	Freeze Frame Data	Sensor Check / Test Mode (Input Signal Check)	Data List	Active Test	Customize
SFI System (1NZ-FE)	○	○	○		○	○	
Automatic Transaxle System (U340E)	○	○	○		○	○	
Anti-lock Brake System	○	○	○	○	○	○	
Vehicle Stability Control System	○	○	○	○	○	○	
Air Conditioning System	○				○	○	
Airbag System	○	○			○		

System	DTC Check	Check Mode	Freeze Frame Data	Sensor Check / Test Mode (Input Signal Check)	Data List	Active Test	Customize
Power Door Lock Control System							
Meter / Gauge System					○		
Power Window Control System							
Sliding Roof System							○
CAN Communication	○						

- In the DTC check, it is very important to determine whether the problem indicated by the DTC is either: 1) still occurring, or 2) occurred in the past but has since returned to normal. In addition, the DTC should be compared to the problem symptom to see if they are related. For this reason, DTCs should be checked before and after confirmation of symptoms (i.e., whether or not problem symptoms exist) to determine current system conditions, as shown in the flowchart below.
- Never skip the DTC check. Failing to check DTCs may, depending on the case, result in unnecessary troubleshooting for systems operating normally or lead to repairs not related to the problem. Follow the procedures listed in the flowchart in the correct order.
- The following flowchart shows how to proceed with troubleshooting using the DTC check. Directions from the flowchart will indicate how to proceed either to DTC troubleshooting or to the troubleshooting of each problem symptom.

1	DTC CHECK

NEXT

2	MAKE A NOTE OF DTCS DISPLAYED AND THEN CLEAR MEMORY

NEXT

3	SYMPTOM CONFIRMATION

Result

Result	Proceed to
No symptoms exist	A
Symptoms exist	B

B → Go to step 5

A

IN

4	SIMULATION TEST USING SYMPTOM SIMULATION METHODS

NEXT

5	DTC CHECK

Result

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

B → TROUBLESHOOTING OF PROBLEM INDICATED BY DTC

A

6	SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptoms exist	A
No symptoms exist	B

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

B → SYSTEM NORMAL

A

TROUBLESHOOTING OF EACH PROBLEM SYMPTOM

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

4. **SYMPTOM SIMULATION**

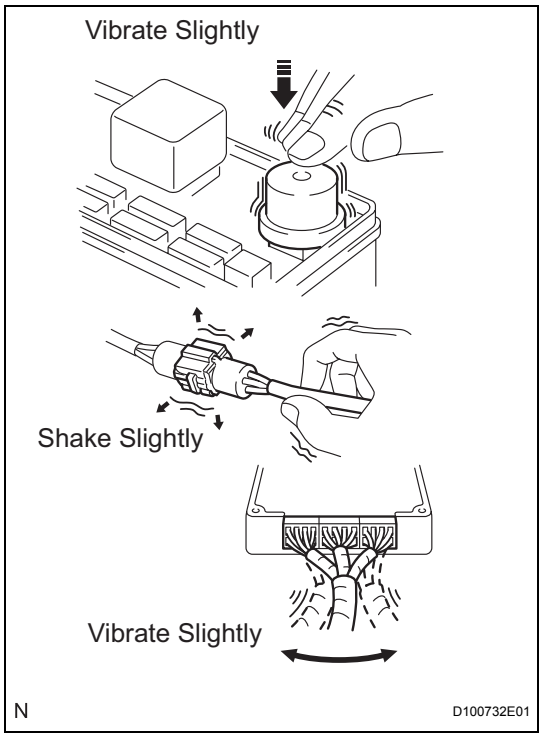
HINT:

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

For example:

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

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



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

(1) PART AND SENSOR

Apply slight vibration with a finger to the part of the sensor suspected to be the cause of the problem, and check whether or not the malfunction occurs.

NOTICE:

Applying strong vibration to relays may open them.

(2) CONNECTORS

Slightly shake the connector vertically and horizontally.

(3) WIRE HARNESS

Slightly shake the wire harness vertically and horizontally.

HINT:

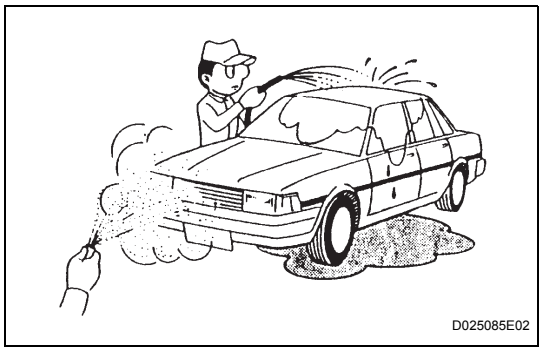
The connector joint and fulcrum of the vibration are the major areas that should be checked thoroughly.

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

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

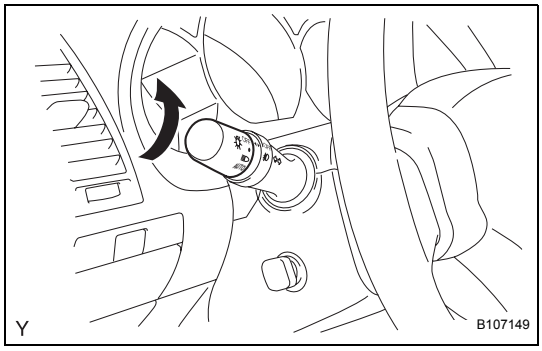
NOTICE:

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



(c) WATER SPRINKLING METHOD: When a malfunction seems to occur on a rainy day or in high-humidity.
(1) Sprinkle water onto the vehicle and check if the malfunction occurs.
NOTICE:
- **Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by spraying water onto the front of the radiator.**
- **Never apply water directly onto the electronic components.**

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



(d) HIGH ELECTRICAL LOAD METHOD: When a malfunction seems to occur when the electrical load is excessive.
(1) Turn on the heater blower, headlight, rear window defogger and all other electrical loads. Check if the malfunction reoccurs.

5. DIAGNOSTIC TROUBLE CODE CHART

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

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

6. PROBLEM SYMPTOMS TABLE

When a "Normal" code is output during a DTC check but the problem is still occurring, use the Problem Symptoms Table. The suspected areas (circuits or parts) for each problem symptom are in the table. The suspected areas are listed in order of probability. A description of each of the chart's columns are below.

Item	Description
Symptom	-
Suspected Area	Indicates the circuit or part which needs to be checked.
See Page	Indicates the page where the flowchart for each circuit is located.

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

7. CIRCUIT INSPECTION

A description of the main areas of each circuit inspection is below.

Item	Description
Description	The major role, operation of the circuit and its component parts are explained.
DTC No., DTC Detection Condition, Trouble Area	Indicates the diagnostic trouble codes, diagnostic trouble code detection conditions, and trouble areas of a problem.
Wiring Diagram	This shows a wiring diagram of a circuit. Use this diagram together with an ELECTRICAL WIRING DIAGRAM to thoroughly understand the circuit. Wire colors are indicated by an alphabetical code: • B = Black • L = Blue • R = Red • BR = Brown • LG = Light Green • V = Violet • G = Green • O = Orange • W = White • GR = Gray • P = Pink • Y = Yellow • SB = Sky Blue The first letter indicates the basic wire color and the second letter indicates the color of the stripe.
Inspection Procedures	Use the inspection procedures to determine if the circuit is normal or abnormal. If abnormal, use the inspection procedures to determine whether the problem is located in the sensors, actuators, wire harnesses or ECU.
Indicates the condition of the connector of the ECU during the check	Connector being checked is connected: Connections of tester are indicated by (+) or (-) after the terminal name. Connector being checked is disconnected: For illustrations of inspections between a connector and body ground, information about the body ground is not shown in the illustration.

TERMS

ABBREVIATIONS USED IN MANUAL

ABBREVIATIONS	MEANING
1st	First
2nd	Second
2WD	Two Wheel Drive Vehicle (4 x 2)
3rd	Third
4th	Fourth
4WD	Four Wheel Drive Vehicle (4 x 4)
4WS	Four Wheel Steering System
5th	Fifth
A.D.D.	Automatic Disconnecting Differential
A/C	Air Conditioner
A/F	Air-Fuel Ratio
A/T, ATM	Automatic Transmission (Transaxle)
ABS	Anti-Lock Brake System
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACM	Active Control Engine Mount
ACSD	Automatic Cold Start Device
AFS	Adaptive Front-Lighting System
AHC	Active Height Control Suspension
AID	Air Injection Control Driver
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
ASSB	Assembly Services Sdn. Bhd.
ASSY	Assembly
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
B/L	Bi-Level
B/S	Bore-Stroke Ratio
B+	Battery Voltage
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
BDC	Bottom Dead Center
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
C/V	Check Valve
Calif.	California
CAN	Controller Area Network
CB	Circuit Breaker

IN

ABBREVIATIONS	MEANING
CCo	Catalytic Converter For Oxidation
CCV	Canister Closed Valve
CD	Compact Disc
CF	Cornering Force
CG	Center Of Gravity
CH	Channel
CKD	Complete Knock Down
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System
CTR	Center
CV	Control Valve
CW	Curb Weight
D/INJ	Direct Injection
DC	Direct Current
DEF	Defogger
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
DLC	Data Link Connector
DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
DVD	Digital Versatile Disc
E/G	Engine
EBD	Electronic Brake Force Distribution
EC	Electrochromic
ECAM	Engine Control And Measurement System
ECD	Electronically Controlled Diesel
ECDY	Eddy Current Dynamometer
ECT	Electronic Controlled Automatic Transmission/Transaxle
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDIC	Electronic Diesel Injection Control
EDU	Electronic Driving Unit
EFI	Electronic Fuel Injection
EGR	Electronic Gas Recirculation
EGR	Exhaust Gas Recirculation
EGR-VM	EGR-Vacuum Modulator
ELR	Emergency Locking Retractor
EMPS	Electric Motor Power Steering
ENG	Engine
ES	Easy & Smooth
ESA	Electronic Spark Advance

ABBREVIATIONS	MEANING
ETCS-i	Electronic Throttle Control System-intelligent
EVAP	Evaporative Emission Control
EVP	Evaporator
E-VRV	Electric Vacuum Regulating Valve
EX	Exhaust
F/G	Fuel Gauge
F/P	Fuel Pump
F/W	Flywheel
FE	Fuel Economy
FF	Front-Engine Front-Wheel-Drive
FIPG	Formed In Place Gasket
FL	Fusible Link
FPU	Fuel Pressure Up
FR / Fr	Front
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GND	Ground
GPS	Global Positioning System
GSA	Gear Shift Actuator
H/B	Hatchback
HAC	High Altitude Compensator
H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Headlamp)
HPU	Hydraulic Power Unit
HSG	Housing
HT	Hard Top
HV	Hybrid Vehicle
HWS	Heated Windshield System
I/P	Instrument Panel
IC	Integrated Circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
INT	Intermittent
IRS	Independent Rear Suspension
ISC	Idle Speed Control
J/B	Junction Block
J/C	Junction Connector
KD	Kick-Down
L/H/W	Length, Height, Width
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left-Hand

ABBREVIATIONS	MEANING
LHD	Left-Hand Drive
LLC	Long-Life Coolant
LNG	Liquefied Natural Gas
LO	Low
LPG	Liquefied Petroleum Gas
LSD	Limited Slip Differential
LSP & PV	Load Sensing Proportioning and Bypass Valve
LSPV	Load Sensing Proportioning Valve
M/T, MTM	Manual Transmission (Transaxle)
MAP	Manifold Absolute Pressure
MAX.	Maximum
MG1	Motor Generator No.1
MG2	Motor Generator No.2
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MMT	Multi-mode Manual Transmission
MP	Multipurpose
MPI	Multipoint Electronic Injection
MPX	Multiplex Communication System
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
NO. / No.	Number
O/D	Overdrive
O/S	Oversize
O2S	Oxygen Sensor
OC	Oxidation Catalyst
OCV	Oil Control Valve
OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
ORVR	On-board Refueling Vapor Recovery
P & BV	Proportioning And Bypass Valve
P/W	Power Window
PBD	Power Back Door
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PROM	Programmable Read Only Memory
PS	Power Steering
PSD	Power Slide Door
PTC	Positive Temperature Coefficient
PTO	Power Take-Off
PZEV	Partial Zero Emission Vehicle
R & P	Rack and Pinion

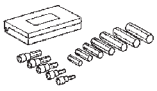
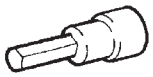
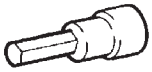
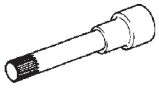
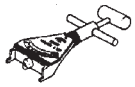
ABBREVIATIONS	MEANING
R/B	Relay Block
R/F	Reinforcement
RAM	Random Access Memory
RBS	Recirculating Ball Type Steering
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
RR / Rr	Rear
RRS	Rigid Rear Suspension
RSE	Rear Seat Entertainment
RWD	Rear-Wheel Drive
SC	Supercharger
SCV	Swirl Control Valve
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold-Start Fuel Injection
SW	Switch
SYS	System
T/A	Transaxle
T/M	Transmission
TACH	Tachometer
TAM	P.T. TOYOTA-Astra Motor
TASA	TOYOTA Argentina S.A.
TAT	TOYOTA Motor Thailand Co. Ltd.
TAW	TOYOTA Auto Works Co. Ltd.
TBI	Throttle Body Electronic Fuel Injection
TC	Turbocharger
TCCS	TOYOTA Computer-Controlled System
TCV	Timing Control Valve
TDC	Top Dead Center
TDV	TOYOTA de Venezuela C.A.
TEMP.	Temperature
TEMS	TOYOTA Electronic Modulated Suspension
TFT	TOYOTA Free-Tronic
TIS	Total Information System For Vehicle Development
TKM	TOYOTA Kirloskar Motor Ltd.
TMC	TOYOTA Motor Corporation
TMMIN	PT. TOYOTA Motor Manufacturing Indonesia

ABBREVIATIONS	MEANING
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TMP	TOYOTA Motor Philippines Corp.
TMT	TOYOTA Motor Thailand Co. Ltd.
TRAC	Traction Control System
TRC	Traction Control System
TSAM	TOYOTA South Africa Motors (Pty) Ltd.
TURBO	Turbocharge
TWC	Three-Way Catalyst
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VENT	Ventilator
VGRS	Variable Gear Ratio Steering
VIM	Vehicle Interface Module
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Stability Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
VVT-i	Variable Valve Timing-intelligent
W/ / w/	With
W/H	Wire Harness
W/O / w/o	Without
WGN	Wagon

SSM

	08826-00080	Seal Packing Black or equivalent (FIPG)	-
	08826-00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	-
	08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	-

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	-
	09040-00011	Hexagon Wrench Set	-
	(09043-20080)	Socket Hexagon Wrench 8	-
	(09043-20120)	Socket Hexagon Wrench 12	-
	09043-50080	Bi-hexagon Wrench 8 mm	-
	09090-04020	Engine Sling Device	-
	09216-00021	Belt Tension Gauge	-

EQUIPMENT

Alignmenttester	-
Angle gauge	-
Bar (width 2 to 3 mm)	-
Caliper gauge	-
Chain block	-
CO/HC meter	-
Compression gauge	-
Connecting rod aligner	-
Cylinder gauge	-
Dial indicator with magnetic base	-
Engine sling device	-
Feeler gauge	-
Heater	-
Micrometer	-
OBD II scan tool	-
Piston ring compressor	-
Piston ring expander	-
Plastic faced hammer	-
Plasticgage	-
Precision straight edge	-
Radiator cap tester	-
Reamer	-
Slide caliper	-
Spring tension gauge	-
Steel square	-
Tachometer	-
Timing light	-
Tire pressure gauge	-
Toe-in gauge	-
Torque wrench	-
Universal engine lifter	-
Valve seat cutter	-
V-block	-
Vernier caliper	-
Wooden block	-

EQUIPMENT

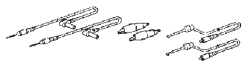
Clip	-
Stop Watch	-
Measuring Flask	-
Ohmmeter	-
Torque Wrench	-

SSM

	08826-00080	Seal Packing Black or equivalent (FIPG)	FUEL INJECTOR

1NZ-FE ENGINE CONTROL SYSTEM

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

EQUIPMENT

Torque Wrench	-

EQUIPMENT

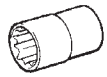
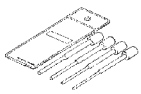
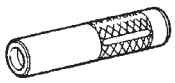
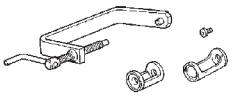
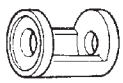
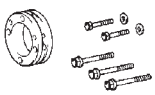
Torque Wrench	-

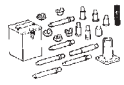
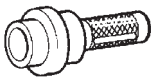
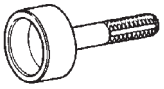
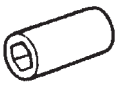
SSM

	08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	-

1NZ-FE ENGINE MECHANICAL

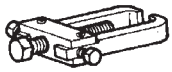
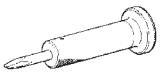
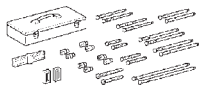
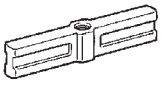
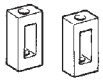
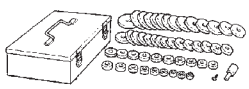
SST

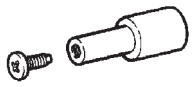
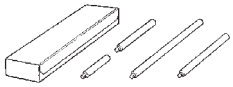
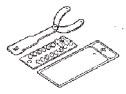
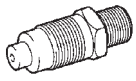
	09011-38121	12 mm Socket Wrench for 12 Pointed Head	Crankshaft bearing cap
	09023-38400	Union Nut Wrench 14mm	Camshaft timing sprocket
	09032-00100	Oil Pan Seal Cutter	-
	09201-10000	Valve Guide Bushing Remover & Replacer Set	-
	(09201-01050)	Valve Guide Bushing Remover & Replacer 5	-
	09201-41020	Valve Stem Oil Seal Replacer	-
	09202-70020	Valve Spring Compressor	-
	(09202-00010)	Attachment	-
	09205-16010	Cylinder Head Bolt Wrench	Connecting rod cap
	09213-58012	Crankshaft Pulley Holding Tool	-
	(91111-50845)	Bolt	-

	09221-25026	Piston Pin Remover & Replacer	-
	(09221-00021)	Body	-
	(09221-00030)	Spring	-
	(09221-00141)	Guide H	-
	(09221-00150)	Bushing D	-
	(09221-00190)	Guide K	-
	09223-22010	Crankshaft Front Oil Seal Replacer	-
	09223-56010	Crankshaft Rear Oil Seal Replacer	-
	09228-06501	Oil Filter Wrench	-
	09268-46021	Nozzle Holder Retaining Nut Wrench	Engine oil pressure switch
	09330-00021	Companion Flange Holding Tool	-
	09628-00011	Ball Joint Puller	-

PP

PP

	09628-62011	Boll Joint Puller	-
	09670-00010	Front Crossmember Guide Tool	-
	09817-33190	Sensor Socket Wrench	Engine coolant temperature sensor
	09843-18040	Diagnosis Check Wire No.2	-
	09930-00010	Drive Shaft Nut Chisel	-
	09950-50013	Puller C Set	Crankshaft pulley
	(09951-05010)	Hanger 150	-
	(09952-05010)	Slide Arm	-
	(09953-05020)	Center Bolt 150	-
	(09954-05021)	Claw No.2	-
	09950-60010	Replacer Set	Tight plug
	(09951-00180)	Replacer 18	-

	(09951-00250)	Replacer 25	-
	(09951-00380)	Replacer 38	-
	(09952-06010)	Adapter	-
	09950-70010	Handle Set	-
	(09951-07100)	Handle 100	-
	09960-10010	Variable Pin Wrench Set	Water pump pulley
	(09962-01000)	Variable Pin Wrench Arm Assy	-
	(09963-00600)	Pin 6	-
	09992-00500	Compression Gauge Attachment	-

PP

EQUIPMENT

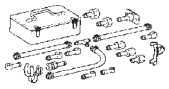
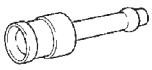
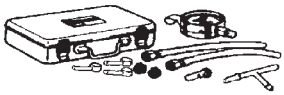
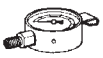
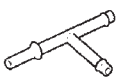
Radiator cap tester	-
Thermometer	-
Torque wrench	-
Slide calipers	-
Heater	-

COOLANT

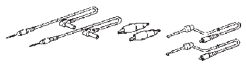
Item	Capacity	Classification
Engine coolant	M/T: 4.4 liters (4.6 US pts, 3.9 Imp. qts) A/T: 4.3 liters (4.5 US pts, 3.8 Imp. qts)	Use only "Toyota Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids)

1NZ-FE FUEL

SST

	09268-21010	Fuel Hose Puller	-
	09268-41047	Injection Measuring Tool Set	-
	(09268-41110)	Adaptor	-
	(09268-41300)	Clamp	-
	(95336-08070)	Hose	-
	09268-45014	EFI Fuel Pressure Gauge	-
	(09268-41200)	Gauge	-
	(09268-41220)	Hose	-
	(09268-41250)	T Joint	-
	09842-30080	Wire H EFI Inspection	-

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

LUBRICANT

Item	Capacity	Classification
Oil grade	-	ILAC multigrade engine oil
Drain and refill with oil filter change	3.7 liters (3.9 US qts, 3.3 Imp. qts)	-
Drain and refill without oil filter change	3.4 liters (3.6 US qts, 3.0 Imp. qts)	-
Dry fill	4.1 liters (4.3 US qts, 3.6 Imp. qts)	-

SSM

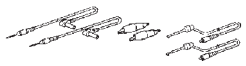
	08826-00080	Seal Packing Black or equivalent (FIPG)	-
	08826-00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	-

1NZ-FE EMISSION CONTROL

SST

	09224-00010	O2 Sensor Wrench	-

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

1NZ-FE EXHAUST

SST

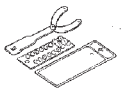
	09224-00010	O2 Sensor Wrench	-

EQUIPMENT

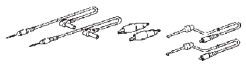
Torque wrench	-
Vernier caliper	-
Wooden block	-

1NZ-FE COOLING

SST

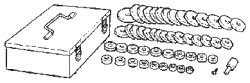
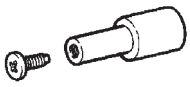
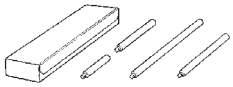
	09960-10010	Variable Pin Wrench Set	-
	(09962-01000)	Variable Pin Wrench Arm Assy	-
	(09963-00600)	Pin 6	-

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-
	09216-00021	Belt Tension Gauge	-

1NZ-FE LUBRICATION

SST

	09228-06501	Oil Filter Wrench	-
	09950-60010	Replacer Set	Oil pump seal
	(09951-00250)	Replacer 25	-
	(09951-00380)	Replacer 38	-
	(09952-06010)	Adapter	-
	09950-70010	Handle Set	-
	(09951-07100)	Handle 100	-

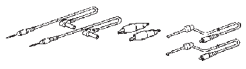
PP

EQUIPMENT

Feeler gauge	-
Precision straight edge	-
Radiator cap tester	-
Torque wrench	-
Wooden block	-

1NZ-FE IGNITION

RECOMMENDED TOOLS

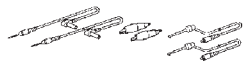
	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

EQUIPMENT

Torque wrench	-
Spark plug cleaner	-

1NZ-FE STARTING

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

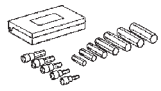
EQUIPMENT

Ammeter	-
Ohmmeter	-
Service wire	-
Torque wrench	-
Vernier calipers	-

EQUIPMENT

Ammeter	-
Ohmmeter	-
Service wire	-
Torque wrench	-
Vernier calipers	-

RECOMMENDED TOOLS

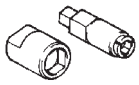
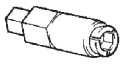
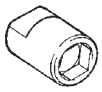
	09011-2C590	Socket Wrench 30mm	-
	09013-6C130	Socket Hexagon 10mm	-
	09040-00011	Hexagon Wrench Set	-
	09090-04020	Engine Sling Device	-

EQUIPMENT

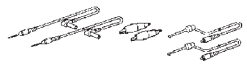
Ohmmeter	
Voltmeter	
Chain block	
Torque wrench	
Dial indicator with magnetic base	
Feeler gauge	
Vernier calipers	
Slide calipers	
Plastic hammer	
Straight edge	

1NZ-FE CHARGING

SST

	09286-46011	Injection Pump Spline Shaft Puller	-
	09820-63010	Alternator Pulley Set Nut Wrench Set	-
	(09820-06010)	Alternator Rotor Shaft Wrench	-
	(09820-06020)	Alternator Pulley Set Nut 22 mm Wrench	-

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

LUBRICANT

Automatic transaxle fluid: Dry fill	6.8 litter (7.2 US qts, 6.0 Imp.qts)	ATF type T-IV
Automatic transaxle fluid: Drain and refill	2.9 litter (3.1 US qts, 2.6 Imp.qts)	ATF type T-IV

SSM

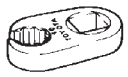
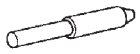
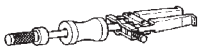
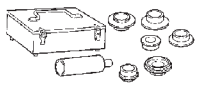
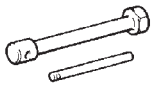
	08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	-

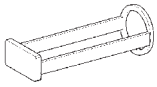
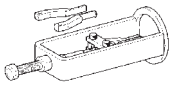
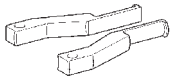
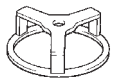
LUBRICANT

Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT3

U340E AUTOMATIC TRANSMISSION

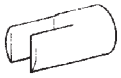
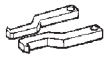
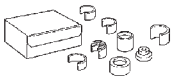
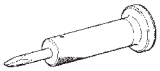
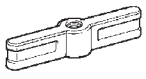
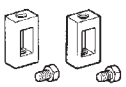
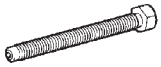
SST

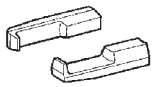
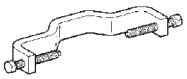
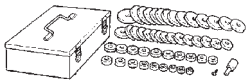
	09023-12701	Union Nut Wrench 17mm	-
	09221-25026	Piston Pin Remover & Replacer	-
	(09221-00071)	Guide A	-
	09223-15030	Oil Seal & Bearing Replacer	-
	09308-00010	Oil Seal Puller	-
	09308-10010	Oil Seal Puller	-
	09316-60011	Transmission & Transfer Bearing Replacer	-
	(09316-00011)	Replacer Pipe	-
	09320-89010	Transfer Clutch Spring Compressor	-
	09350-32014	TOYOTA Automatic Transmission Tool Set	-
	(09351-32010)	One-way Clutch Test Tool	-

	(09351-32020)	Stator Stopper	-
	09350-36010	TOYOTA Automatic Transmission Tool Set	-
	09387-00020	Direct Clutch Wrench	-
	09387-00041	Bearing Puller Assembly	-
	(09387-01021)	Claw No.2	-
	(09387-02010)	Oil Seal Replacer	-
	(09387-02020)	One-way Clutch Test Tool Set	-
	09387-00060	Second Brake Wrench	-
	09387-00070	First & Reverse Brake Wrench	-
	09387-00120	Counter Drive Gear Nut Wrench	-
	09527-17011	Rear Axle Shaft Bearing Remover	-
	09554-14010	Differential Oil Seal Replacer	-

PP

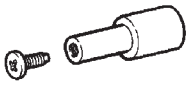
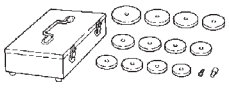
PP

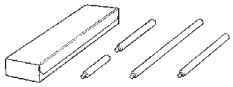
	09564-32011	Differential Preload Adaptor	-
	09612-65014	Steering Worm Bearing Puller	-
	(09612-01010)	Claw A	-
	(09612-01040)	Claw D	-
	09726-27012	Front Suspension Arm Bushing Remover & Replacer	-
	(09726-02041)	Replacer	-
	09726-40010	Lower Control Shaft Bearing Replacer	-
	09930-00010	Drive Shaft Nut Chisel	-
	09950-40011	Puller B Set	-
	(09951-04010)	Hanger 150	-
	(09952-04010)	Slide Arm	-
	(09953-04020)	Center Bolt 150	-

	(09953-04030)	Center Bolt 200	-
	(09954-04010)	Arm 25	-
	(09955-04061)	Claw No.6	-
	(09957-04010)	Attachment	-
	(09958-04011)	Holder	-
	09950-60010	Replacer Set	-
	(09951-00190)	Replacer 19	-
	(09951-00220)	Replacer 22	-
	(09951-00320)	Replacer 32	-
	(09951-00350)	Replacer 35	-
	(09951-00390)	Replacer 39	-
	(09951-00400)	Replacer 40	-

PP

PP

	(09951-00430)	Replacer 43	-
	(09951-00460)	Replacer 46	-
	(09951-00480)	Replacer 48	-
	(09951-00530)	Replacer 53	-
	(09951-00550)	Replacer 55	-
	(09951-00610)	Replacer 61	-
	(09951-00650)	Replacer 65	-
	(09951-00720)	Replacer 72	-
	(09952-06010)	Adapter	-
	09950-60020	Replacer Set No.2	-
	(09951-00680)	Replacer 68	-
	(09951-00750)	Replacer 75	-

	(09951-00790)	Replacer 79	-
	(09951-00890)	Replacer 89	-
	(09951-07150)	Handle 150	-
	09950-70010	Handle Set	-
	(09951-07100)	Handle 100	-
	(09951-07150)	Handle 150	-
	(09951-07200)	Handle 200	-

PP

EQUIPMENT

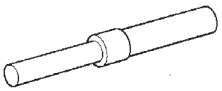
Vernier calipers	
Dial indicator with magnetic base	
Torque wrench	

LUBRICANT

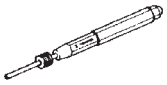
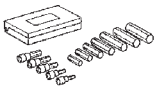
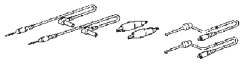
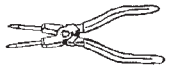
Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No.116 DOT 3

CLUTCH

SST

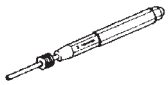
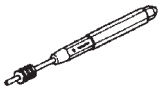
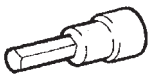
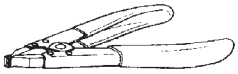
	09023-00101	Union Nut Wrench 10 mm	-
	09301-00210	Clutch Guide Tool	-
	09333-00013	Universal Joint Bearing Remover & Replacer	-

RECOMMENDED TOOLS

	09031-00030	Pin Punch	-
	09040-00011	Hexagon Wrench Set	-
	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-
	09905-00013	Snap Ring Pliers	-

PP

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	-
	09031-00030	Pin Punch	-
	09031-00040	Pin Punch .	-
	(09043-20060)	Socket Hexagon Wrench 6	-
	09090-04020	Engine Sling Device	-
	09905-00012	Snap Ring No.1 Expander	-

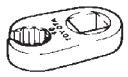
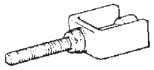
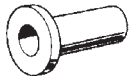
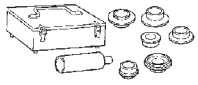
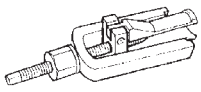
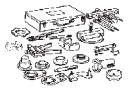
PP

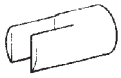
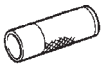
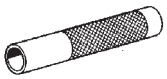
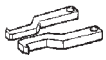
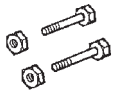
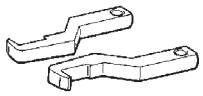
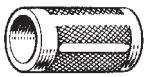
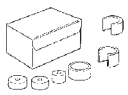
EQUIPMENT

Torque wrench	
Cylinder gauge	
Dial indicator or dial indicator with magnetic base	
Feeler gauge	
Micrometer	
Vernier calipers	
Dial indicator with magnetic base	
Tire pressure gauge	
Alignment tester	
Toe-in gauge	
Slide calipers	
Angle gauge	
Chisel	
Plastic hammer	
Press	
Wooden block	
Heater	
V-block	

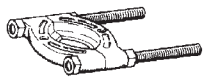
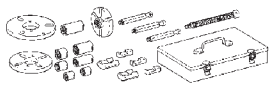
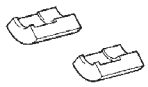
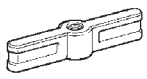
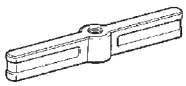
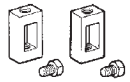
C50 MANUAL TRANSMISSION

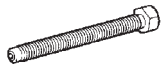
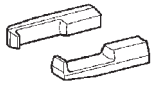
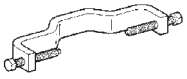
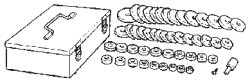
SST

	09023-00101	Union Nut Wrench 10 mm	-
	09308-00010	Oil Seal Puller	-
	09309-12020	5th Driven Gear Replacer	-
	09309-36010	Transmission Rear Bearing Replacer	-
	09316-60011	Transmission & Transfer Bearing Replacer	-
	(09316-00011)	Replacer Pipe	-
	(09316-00021)	Replacer A	-
	(09316-00031)	Replacer B	-
	09319-60020	Output Shaft Needle Roller Bearing Remover	-
	09350-32014	TOYOTA Automatic Transmission Tool Set	-
	(09351-32120)	Overdrive Bearing Replacer	-

	09564-32011	Differential Preload Adaptor	-
	09608-04031	Front Hub Inner Bearing Cone Replacer	-
	09612-22011	Tilt Handle Bearing Replacer	-
	09612-65014	Steering Worm Bearing Puller	-
	(09612-01040)	Claw D	-
	(09612-01050)	Hanger Pin with Nut	-
	(09612-01060)	Claw E	-
	09636-20010	Upper Ball Joint Dust Cover Replacer	-
	09710-20011	Front Suspension Bushing Tool Set	-
	(09710-06071)	Replacer	-
	09726-36010	Lower Control Arm Bushing Replacer	-
	09817-16011	Back-up Light Switch Tool	-

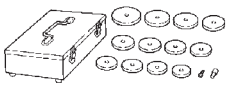
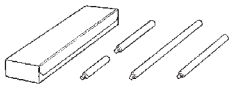
PP

	09950-00020	Bearing Remover	-
	09950-00030	Bearing Remover Attachment	-
	09950-30012	Puller A Set	-
	(09951-03010)	Upper Plate	-
	(09953-03010)	Center Bolt	-
	(09954-03010)	Arm	-
	(09955-03011)	Claw No.1	-
	(09957-04010)	Attachment	-
	09950-40011	Puller B Set	-
	(09951-04010)	Hanger 150	-
	(09951-04020)	Hanger 200	-
	(09952-04010)	Slide Arm	-

	(09953-04020)	Center Bolt 150	-
	(09953-04030)	Center Bolt 200	-
	(09954-04010)	Arm 25	-
	(09955-04061)	Claw No.6	-
	(09955-04071)	Claw No.7	-
	(09957-04010)	Attachment	-
	(09958-04011)	Holder	-
	09950-60010	Replacer Set	-
	(09951-00190)	Replacer 19	-
	(09951-00200)	Replacer 20	-
	(09951-00220)	Replacer 22	-
	(09951-00360)	Replacer 36	-

PP

PP

	(09951-00370)	Replacer 37	-
	(09951-00420)	Replacer 42	-
	(09951-00530)	Replacer 53	-
	(09951-00550)	Replacer 55	-
	09950-60020	Replacer Set No.2	-
	(09951-00680)	Replacer 68	-
	(09951-00710)	Replacer 71	-
	09950-70010	Handle Set	-
	(09951-07100)	Handle 100	-
	(09951-07150)	Handle 150	-
	(09951-07200)	Handle 200	-

LUBRICANT

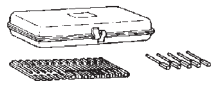
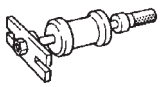
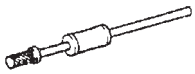
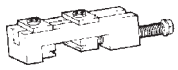
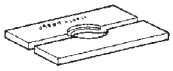
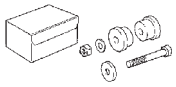
Item	Capacity	Classification
Manual transaxle oil	1.9 liters (2.0 US qts, 1.7 Imp. qts)	API GL-4 or GL-5 SAE 75W-90

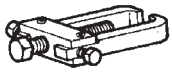
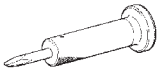
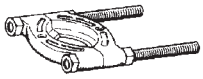
SSM

	08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	-
	08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	-

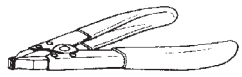
DRIVE SHAFT

SST

	09240-00020	Wire Gauge Set	-
	(09242-00080)	Wire Gauge 0.8 mm (0.031 in.)	-
	09520-01010	Drive Shaft Remover Attachment	-
	09520-24010	Differential Side Gear Shaft Puller	--
	(09520-32040)	Shocker Set	-
	09521-24010	Rear Axle Shaft Puller	-
	09527-10011	Rear Axle Shaft Bearing Remover	-
	09608-16042	Front Hub Bearing Adjusting Tool	-
	(09608-02021)	Bolt & Nut	-
	(09608-02041)	Retainer	-
	09628-00011	Ball Joint Puller	-

	09628-62011	Boll Joint Puller	-
	09930-00010	Drive Shaft Nut Chisel	-
	09950-00020	Bearing Remover	-

RECOMMENDED TOOLS

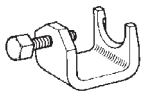
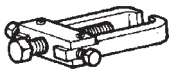
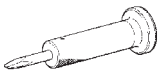
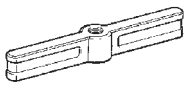
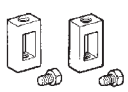
	09011-2C590	Socket Wrench 30mm	-
	09905-00012	Snap Ring No.1 Expander	-

EQUIPMENT

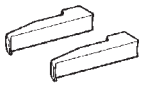
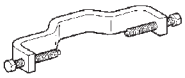
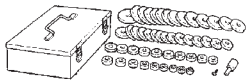
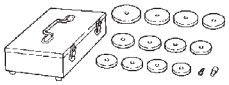
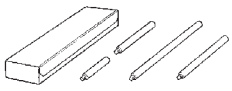
Torque wrench	
Dial indicator with magnetic base	

AXLE

SST

	09520-00031	Rear Axle Shaft Puller	-
	09527-17011	Rear Axle Shaft Bearing Remover	-
	09608-32010	Steering Knuckle Oil Seal Replacer	-
	09628-00011	Ball Joint Puller	-
	09628-10011	Ball Joint Puller	-
	09628-62011	Boll Joint Puller	-
	09930-00010	Drive Shaft Nut Chisel	-
	09950-40011	Puller B Set	-
	(09951-04020)	Hanger 200	-
	(09952-04010)	Slide Arm	-
	(09953-04020)	Center Bolt 150	-

PP

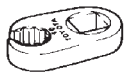
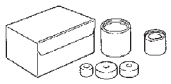
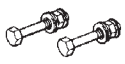
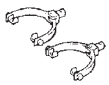
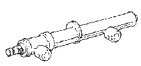
	(09954-04010)	Arm 25	-
	(09955-04011)	Claw No.1	-
	(09957-04010)	Attachment	-
	(09958-04011)	Holder	-
	09950-60010	Replacer Set	-
	(09951-00370)	Replacer 37	-
	(09951-00600)	Replacer 60	-
	09950-60020	Replacer Set No.2	-
	(09951-00680)	Replacer 68	-
	09950-70010	Handle Set	-
	(09951-07100)	Handle 100	-

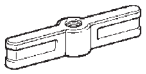
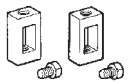
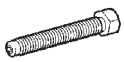
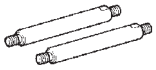
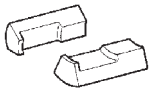
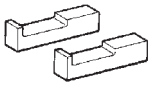
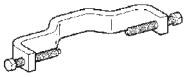
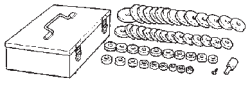
LUBRICANT

Front drive shaft outboard joint grease Capacity	155 to 170 g (5.5 to 6.1 oz.)
Front drive shaft inboard joint grease capacity	125 to 135 g (4.5 to 4.8 oz.)

SUSPENSION

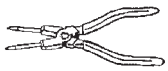
SST

	09023-00101	Union Nut Wrench 10 mm	-
	09309-37010	Transmission Bearing Replacer	-
	09628-00011	Ball Joint Puller	-
	09670-00010	Front Crossmember Guide Tool	-
	09710-14013	Rear Suspension Bushing Tool Set	-
	(09710-00021)	Pipe	-
	09727-30021	Coil Spring Compressor	-
	(09727-00010)	Bolt Set	-
	(09727-00021)	Arm Set	-
	(09727-00031)	Compressor	-
	09950-40011	Puller B Set	-

	(09951-04010)	Hanger 150	-
	(09952-04010)	Slide Arm	-
	(09953-04010)	Center Bolt 100	-
	(09953-04030)	Center Bolt 200	-
	(09954-04020)	Arm 100	-
	(09955-04031)	Claw No.3	-
	(09955-04051)	Claw No.5	-
	(09957-04010)	Attachment	-
	(09958-04011)	Holder	-
	09950-60010	Replacer Set	-
	(09951-00560)	Replacer 56	-

PP

RECOMMENDED TOOLS

	09011-2C590	Socket Wrench 30mm	-
	09905-00013	Snap Ring Pliers	-
	(09904-00090)	Claw Set	-

EQUIPMENT

Torque wrench	
Dial indicator with magnetic base	

TIRE AND WHEEL

EQUIPMENT

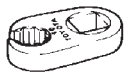
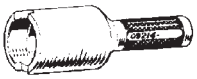
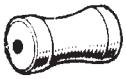
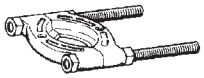
Dial indicator with magnetic base	-
Tire pressure gauge	-
Wheel balancer	-

EQUIPMENT

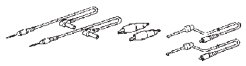
Alignment tester	-
Angle gauge	-
Camber-caster-kingpin gauge	-
Chain block	-
Dial indicator with magnetic base	-
Drill (Safety equipment: protective goggles, etc.)	Shock absorber disposal
engine sling device	-
Tire pressure gauge	-
Toe-in gauge	-
Torque wrench	-

BRAKE CONTROL

SST

	09023-00101	Union Nut Wrench 10 mm	-
	09214-76011	Crankshaft Pulley Replacer	-
	09520-00031	Rear Axle Shaft Puller	-
	(09520-00040)	Shocker	-
	09521-00020	Drive Shaft Boot Clamping Tool	-
	09950-00020	Bearing Remover	-

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

EQUIPMENT

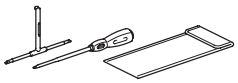
Torque wrench	-

LUBRICANT

Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT3

BRAKE

SST

	09023-00101	Union Nut Wrench 10 mm	-
	09703-30011	Tool Set, Brake Shoe Return Spring	-
	09718-00010	Shoe Hold Down Spring Driver	-
	09737-00020	Brake Booster Push Rod Wrench	-

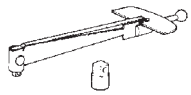
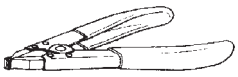
EQUIPMENT

Dial indicator with magnetic base	-
Slide calipers	-
Torque wrench	-

EQUIPMENT

Torque wrench	

RECOMMENDED TOOLS

	09025-00010	Torque Wrench (30 kgf-cm)	
	09905-00012	Snap Ring No.1 Expander	

EQUIPMENT

Torque wrench	
Dial indicator with magnetic base	
Feeler gauge	
Micrometer	
Vernier calipers	

PARKING BRAKE

EQUIPMENT

Torque wrench	-
Brake drum gauge	-
Ruler	-

LUBRICANT

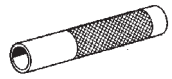
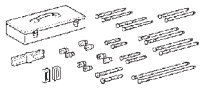
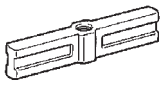
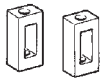
Item	Capacity	Classification
Power steering fluid (Total)	0.7 liters (0.7 US qts, 0.6 Imp.qts)	ATF "DEXRON" II or III

SSM

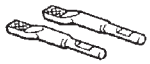
	08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	

STEERING COLUMN

SST

	09612-22011	Tilt Handle Bearing Replacer	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05021)	Claw No.2	

RECOMMENDED TOOLS

	09904-00010	Expander Set	
	(09904-00020)	No. 1 Claw	

EQUIPMENT

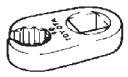
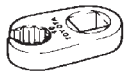
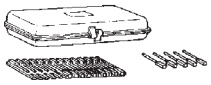
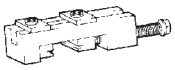
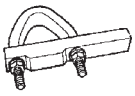
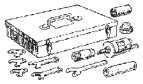
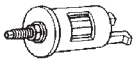
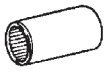
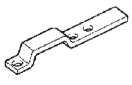
Voltmeter	
Anmeter	
Ohmmeter	
Vinyl tape	
Hexagon wrench 4 mm (0.15 in.)	
Hexagon wrench 5 mm (0.20 in.)	
Hexagon wrench 14 mm (0.55 in.)	
Gas leak detector	
Radiator cap tester	
Torque wrench	

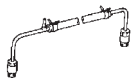
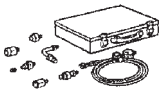
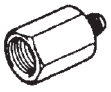
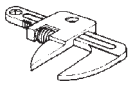
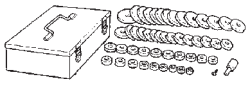
LUBRICANT

Item	Capacity	Classification
Compressor oil	-	ND-OIL or equivalent

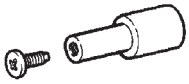
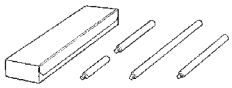
POWER STEERING

SST

	09023-12701	Union Nut Wrench 17mm	
	09023-38201	Union Nut Wrench 12mm	
	09240-00020	Wire Gauge Set	
	09521-24010	Rear Axle Shaft Puller	
	09612-00012	Rack & Pinion Steering Rack Housing Stand	
	09612-24014	Steering Gear Housing Overhaul Tool Set	
	(09613-22011)	Steering Rack Shaft Bushing Puller	
	09616-00011	Steering Worm Bearing Adjusting Socket	
	09630-00014	Power Steering Gear Housing Overhaul Tool Set	
	(09631-00132)	Vane Pump Bracket	
	09631-10041	Steering Rack Cover D	

	09631-12071	Steering Rack Oil Seal Test Tool	
	(09633-00010)	Packing	
	09640-10010	Power Steering Pressure Gauge Set	
	(09641-01010)	Gauge Assy	
	(09641-01030)	Attachment B	
	(09641-01060)	Attachment E	
	09670-00010	Front Crossmember Guide Tool	
	09922-10010	Variable Open Wrench	
	09950-60010	Replacer Set	
	(09951-00200)	Replacer 20	
	(09951-00210)	Replacer 21	
	(09951-00240)	Replacer 24	

PP

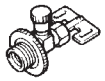
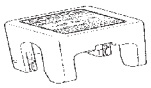
	(09951-00280)	Replacer 28	
	(09951-00340)	Replacer 34	
	(09951-00370)	Replacer 37	
	(09952-06010)	Adapter	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	
	(09951-07200)	Handle 200	
	(09951-07360)	Handle 360	

EQUIPMENT

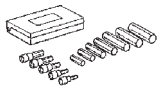
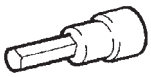
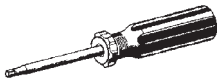
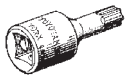
Bolt Length: 35.0 mm (1.378 in.) Pitch: 1.0 mm (0.039 in.) Diameter: 6.0 mm (0.236 in.)	Airbag disposal
Plastic bag	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diameter: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diameter: 360 mm (14.17 in.)	Airbag disposal
Torque wrench	-

AIR CONDITIONING

SST

	07110-58060	Air Conditioner Service Tool Set	-
	(07117-58060)	Refrigerant Drain Service Valve	-
	(07117-58070)	T-Joint	-
	(07117-58080)	Quick Disconnect Adapter	-
	(07117-58090)	Quick Disconnect Adapter	-
	(07117-78050)	Refrigerant Charging Gauge	-
	(07117-88060)	Refrigerant Charging Hose	-
	(07117-88070)	Refrigerant Charging Hose	-
	(07117-88080)	Refrigerant Charging Hose	-
	09870-00015	A/C Quick Joint Puller No.1	-

RECOMMENDED TOOLS

	09040-00011	Hexagon Wrench Set	-
	(09043-20050)	Socket Hexagon Wrench 5	-
	(09043-30140)	Straight Hexagon Wrench 14	-
	09041-00030	Torx Driver T30	-
	09042-00010	Torx Socket T30	-
	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-
	95416-00140	Gas Leak Detector (Halogen Leak Detector) (DENSO Part No.)	-

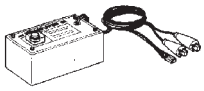
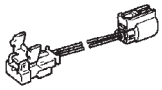
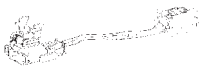
PP

EQUIPMENT

Torque wrench	
Slide calipers	

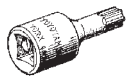
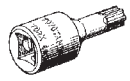
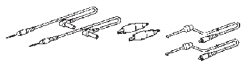
SUPPLEMENTAL RESTRAINT SYSTEM

SST

	09082-00700	SRS Airbag Deployment Tool	-
	09082-00750	Airbag Deployment Wire Sub-harness No.3	-
	09082-00780	Airbag Deployment Wire Sub-harness No.6	-
	09082-00802	Airbag Deployment Wire Sub-Harness No. 8	-
	(09082-10801)	Wire A	-
	(09082-20801)	Wire B	-
	(09082-30801)	Wire C	-
	09843-18040	Diagnosis Check Wire No.2	-

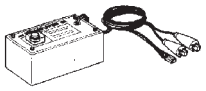
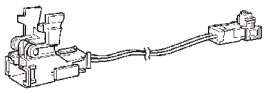
PP

RECOMMENDED TOOLS

	09042-00010	Torx Socket T30	-
	09042-00020	Torx Socket T40	-
	09082-00050	TOYOTA Electrical Tester Set	-
	(09083-00150)	Test Lead Set	-

SEAT BELT

SST

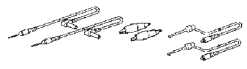
	09082-00700	SRS Airbag Deployment Tool	
	09082-00770	Airbag Deployment Wire Sub-harness No.5	

EQUIPMENT

Torque wrench	

LIGHTING

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

EQUIPMENT

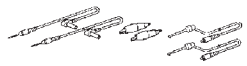
Tape	To avoid surface damage

WIPER AND WASHER

SST

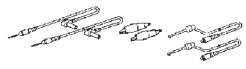
	09843-18040	Diagnosis Check Wire No.2	-

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

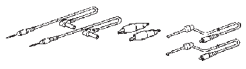
DOOR LOCK

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

METER

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

EQUIPMENT

Torque wrench	
Tape	To avoid surface damage

SSM

	08833-00030	Three cement black or equivalent	
	08850-00801	Windshield Glass Adhesive Set or equivalent	

EQUIPMENT

Brass bar	
Clip remover	
Hand remover	
Hammer	
Plastic-faced hammer	
Tape	To avoid surface damage
Torque wrench	

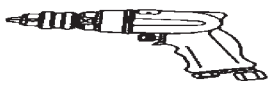
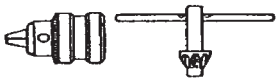
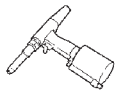
LUBRICANT

Item	Capacity	Classification
MP grease	-	-

AUDIO / VISUAL

RECOMMENDED TOOLS

PP

	09050-00032	Air Drill	-
	(09050-0010)	Chuck Set	-
	(09050-00220)	Handle	-
	09050-20010	Air Riveter	-
	(09050-02010)	Dust Cap	-
	09060-60350	Revet Cutter	-
	(09050-02020)	Nose Piece No.1	-

EQUIPMENT

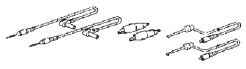
Torque wrench	
Ohmmeter	

SSM

	08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	

HORN

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

EQUIPMENT

Torque wrench	

WINDSHIELD / WINDOWGLASS

RECOMMENDED TOOLS

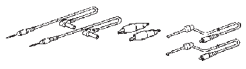
	09070-20010	Moulding Remover	

EQUIPMENT

Knife	
Piano wire	
Plastic sheet	
Sealer gun	
Torque wrench	
Tape	
Wooden block or similar object	

MIRROR

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Tape	To avoid surface damage
Torque wrench	

INSTRUMENT PANEL

EQUIPMENT

Torque wrench	
Tape	To avoid surface damage

SEAT

EQUIPMENT

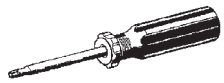
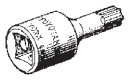
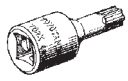
Clip remover	
Hog ring pliers	
Hog ring	
Protective tape	to avoid surface damage
Torque wrench	

ENGINE HOOD / DOOR

SST

	09812-00010	Door Hinge Set Bolt Wrench	
	09812-00020	Door Hinge Set Bolt Wrench	

RECOMMENDED TOOLS

	09041-00020	"Torx" Driver T25	
	09042-00010	"Torx" Socket T30	
	09042-00020	"Torx" Socket T40	

EXTERIOR

RECOMMENDED TOOLS

	09070-20010	Moulding Remover	-

EQUIPMENT

Clip remover	
Double-sided tape	
Heat light	
Piano wire	
Protective tape	To avoid surface damage
Torque wrench	
Wooden block or similar object	For tying both piano wire ends

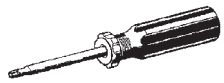
INTERIOR

EQUIPMENT

Clip remover	
Protective tape	To avoid surface damage

SLIDING ROOF

RECOMMENDED TOOLS

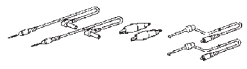
	09041-00020	Torx Driver T25	-
	09082-00040	TOYOTA Electrical Tester	-

EQUIPMENT

Torque wrench	

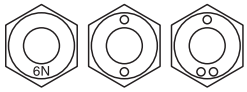
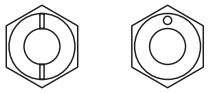
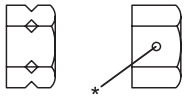
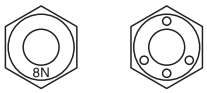
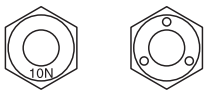
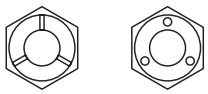
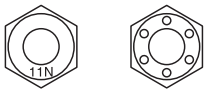
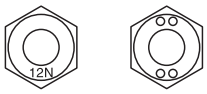
CAN COMMUNICATION

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

HOW TO DETERMINE NUT STRENGTH

Nut Type

Present Standard Hexagon Nut	Old Standard Hexagon Nut		Class
	Cold Forging Nut	Cutting Processed Nut	
No Mark			4N
No Mark (w/ Washer)	No Mark (w/ Washer)	No Mark	5N (4T)
			6N
			7N (5T)
			8N
		No Mark	10N (7T)
			11N
			12N

HINT:
- *: Nut with 1 or more marks on one side surface of the nut.
- Use the nut with the same number of the nut strength classification or greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example:
- Bolt = 4T
- Nut = 4N or more

TORQUE SPECIFICATIONS

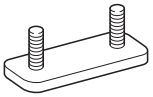
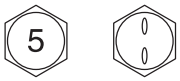
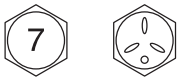
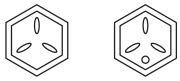
Part tightened	N*m	kgf*cm	ft.*lbf
Generator x Engine : for bolt A	18.5	189	14
Generator x Engine : for bolt B	54	550	40
Vane pump x Engine	44	449	33
No. 2 camshaft bearing cap x Cylinder head	13	1339	9
No. 1 camshaft bearing cap x Cylinder head	23	235	17
Camshaft timing sprocket x No. 2 camshaft	64	653	47
Screw plug x Timing chain cover	15	153	11
Cylinder head cover x Cylinder head	10	102	7
Ignition coil x Cylinder head cover	9.0	92	80 in.*lbf
No. 2 cylinder head cover x Cylinder head	7.0	71	62 in.*lbf
No. 1 chain vibration damper x Cylinder block	9.0	92	80 in.*lbf
Chain tensioner slipper x Cylinder block	9.0	92	80 in.*lbf
No. 1 chain tensioner x Cylinder block	9.0	92	80 in.*lbf
Engine mounting insulator RH x Engine and body : for bolt A	45	459	33
Engine mounting insulator RH x Engine and body : for bolt B	52	530	38
Liquid tube x Body	9.8	100	7 in.*lbf
Camshaft timing oil control valve x Cylinder head	7.5	76	66 in.*lbf
Crankshaft pulley x Crankshaft	128	1,305	95
Oil pan drain plug x No. 2 oil pan	37.5	383	28
Stud bolt x Cylinder head : for bolt A	10	102	7.4 in.*lbf
Stud bolt x Cylinder head : for bolt B	4.0	41	35 in.*lbf
Stud bolt x Cylinder head : for bolt C	10	102	7.4
Stud bolt x Cylinder head : for bolt D	9.0	92	80 in.*lbf
Oil control valve filter x Cylinder head	30	306	22
No. 1 taper screw plug x Cylinder head	44	449	33
Cylinder head x Cylinder block	1st: 29 2nd: 90° 3rd: 90°	1st: 300 2nd: 90° 3rd: 90°	1st: 22 2nd: 90° 3rd: 90°
Camshaft timing gear x No. 1 camshaft	64	653	47
Oil dipstick guide x Cylinder head	9.0	92	80 in.*lbf
Intake manifold x Cylinder head	30	306	22
Exhaust manifold support bracket x Cylinder block and exhaust manifold	44	449	32
No. 1 exhaust manifold heat insulator x Exhaust manifold	8.0	82	71 in.*lbf
Front exhaust pipe x Exhaust manifold	43	438	32
Water filler x Body	7.5	76	66 in.*lbf
No. 1 water by-pass pipe x Engine	9.0	92	80 in.*lbf
Engine hanger x Cylinder block	40	408	30
Engine coolant temperature sensor x Cylinder head	20	204	15
Exhaust manifold x Cylinder head	27	275	20
Booster vacuum tube x Cylinder head	9.0	92	80 in.*lbf
Drive plate x Crankshaft	88	900	65

Part tightened	N*m	kgf*cm	ft.*lbf
Flywheel x Crankshaft	1st: 49 2nd: 90°	1st: 500 2nd: 90°	1st: 36 2nd: 90°
Engine and transaxle assembly x Suspension crossmember	64	653	47
Engine mounting bracket LH x Engine mounting insulator LH	49	500	36
Front suspension crossmember x Body : for bolt A	116	1,183	86
Front suspension crossmember x Body : for bolt B	70	714	52
Front suspension member reinforcement LH x Front suspension crossmember and body	47	479	35
Front suspension member reinforcement RH x Front suspension crossmember and body	47	479	35
Front suspension arm lower LH x Steering knuckle	98	999	72
Tie rod end LH x Steering knuckle	49	500	36
Speed sensor frond LH x Steering knuckle	8.0	82	71
Front axle hub LH nut x Drive shaft	216	2,203	160
Cylinder block water drain cock x Cylinder block	35	357	26
Stud bolt x Cylinder block	5.0	51	44
Crankshaft bearing cap x Cylinder block	1st: 22 2nd: 90°	1st: 224 2nd: 90°	1st: 16 2nd: 90°
Connecting rod cap x Connecting rod	1st: 15 2nd: 90°	1st: 153 2nd: 90°	1st: 11 2nd: 90°
Oil pan x Cylinder block	24	245	18
Oil strainer x Cylinder block	11	112	8.1
No. 2 oil pan x Oil pan	9.0	92	80 in.*lbf
Oil filter union x No. 2 oil pan	30	306	22
Oil filter x Oil filter union	17.5	178	13
Camshaft position sensor x Cylinder head	8.0	82	71 in.*lbf
Timing chain cover x Cylinder head and cylinder block : for bolt A	24	245	18 in.*lbf
Timing chain cover x Cylinder head and cylinder block : for bolt B	11	112	8.1 in.*lbf
Timing chain cover x Cylinder head and cylinder block : for bolt C	11	112	8.1 in.*lbf
Timing chain cover x Cylinder head and cylinder block : for bolt D	24	245	18
Timing chain cover x Cylinder head and cylinder block : for nut E	24	245	18
Water pump x Timing chain cover	11	112	8
Engine mounting bracket RH x Timing chain cover	55	561	41
Water pump pulley x Water pump	15	153	11
Fuel delivery pipe x Cylinder head : for bolt A	19	194	14
Fuel delivery pipe x Cylinder head : for bolt B	9.0	92	80 in.*lbf
Camshaft timing oil control valve x Cylinder block	7.5	76	66 in.*lbf
Ventilation valve x Cylinder head cover	27	275	20
Water inlet x Cylinder block	9.0	92	80 in.*lbf
Spark plug x Cylinder head cover	18	184	13

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

Bolt Type

Hexagon Head Bolt			Stud Bolt	Weld Bolt	Class
Normal Recess Bolt		Deep Recess Bolt			
					4T
					5T
					6T
					7T
					8T
					9T
					10T
					11T

SS

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter (mm)	Pitch (mm)	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N*m	kgf*cm	ft.*lbf	N*m	kgf*cm	ft.*lbf
4T	6	1	5	55	48 in.*lbf	6	60	52 in.*lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 in.*lbf	7.5	75	65 in.*lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.*lbf	9	90	78 in.*lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

1NZ-FE ENGINE CONTROL SYSTEM

SERVICE DATA

Camshaft timing oil control valve

Camshaft Timing Oil Control Valve	Condition	Specified Condition
Standard resistance	20°C (68°F)	6.9 to 7.9 Ω

SS

Camshaft position sensor

Camshaft Position Sensor	Coolant Temperature	Specified Condition
Standard resistance	Hot	1.630 to 2.740 Ω
	Cold	2.065 to 3.225 Ω

Engine coolant temperature sensor

Engine Coolant Temperature Sensor	Condition	Specified Condition
Standard resistance	20°C (68°F)	2.29 to 2.60 Ω
	80°C (176°F)	0.301 to 0.327 Ω

Knock sensor

Knock Sensor	Condition	Specified Condition
Standard resistance	20°C (68°F)	120 to 280 Ω

Throttle position sensor

Throttle Position Sensor	Tester Connection	Throttle Valve Position	Specified Condition
Standard resistance	1 (VC) - 2 (E2)	-	2.5 to 6.0 Ω
	3 (VTA) - 2 (E2)	Fully close	0.2 to 11.0 Ω
	3 (VTA) - 2 (E2)	Fully open	2.0 to 16.0 Ω

EFI relay

EFI Relay	Tester Connection	Specified Condition
Standard resistance	3 - 5	10 kΩ or higher
	3 - 5	Below 1 Ω (when battery voltage is applied to terminal 1 and 2)

Circuit opening relay

Circuit Opening Relay	Tester Connection	Specified Condition
Standard resistance	3 - 5	10 kΩ or higher
	3 - 5	Below 1 Ω (when battery voltage is applied to terminal 1 and 2)

TORQUE SPECIFICATIONS

Camshaft timing oil control valve

Part Tightened	N*m	kgf*cm	ft.*lbf
Camshaft timing oil control valve x Cylinder head	7.5	76	66 in.*lbf

Camshaft position sensor

Part Tightened	N*m	kgf*cm	ft.*lbf
Camshaft position sensor x Cylinder head	8.0	82	71 in.*lbf

Crankshaft position sensor

Part Tightened	N*m	kgf*cm	ft.*lbf
Crankshaft position sensor x Cylinder bock	7.5	76	66 in.*lbf

Engine coolant temperature sensor

Part Tightened	N*m	kgf*cm	ft.*lbf
Engine coolant temperature sensor x Cylinder bock	20	204	15

Throttle body

Part Tightened	N*m	kgf*cm	ft.*lbf
Throttle body x Cylinder bock	30	306	22
Transmission oil filter tube sub-assembly x Cylinder head	5.5	56	49 in.*lbf
Oil cooler tube x Transmission oil filter tube sub-assembly	5.5	56	49 in.*lbf
Accelerator control cable x Throttle body	13	133	10
Air cleaner assembly x Body	7.8	80	69 in.*lbf
Air cleaner inlet x Body	7.5	76	66 in.*lbf

Knock sensor

Part Tightened	N*m	kgf*cm	ft.*lbf
Knock sensor x Cylinder block	20	204	15

Idle air control valve

Part Tightened	N*m	kgf*cm	ft.*lbf
Idle air control valve x Throttle body	3.4	35	30 in.*lbf

Throttle position sensor

Part Tightened	N*m	kgf*cm	ft.*lbf
Throttle position sensor x Throttle body	2.0	20	18 in.*lbf

ECM

Part Tightened	N*m	kgf*cm	ft.*lbf
Idle air control valve x Throttle body	3.0	31	27 in.*lbf

1NZ-FE ENGINE MECHANICAL

SERVICE DATA

Ignition timing	-	8 to 12° BTDC
Engine idle speed	M/T	600 to 700 rpm
	A/T	650 to 750 rpm
Compression	Standard compression pressure	1,471 kPa (15.0 kgf/cm^2, 213 psi)
	Minimum pressure	1,079 kPa (11.0 kgf/cm^2, 156 psi)
	Difference between each cylinder	98 kPa (1.0 kgf/cm^2, 14 psi)
Generator V belt tension	New belt	121 to 143 lbf
	Used belt	55 to 88 lbf
Vane pump V belt tension	New belt	99 to 121 lbf
	Used belt	55 to 77 lbf
Generator V belt deflection	New belt	7.0 to 8.5 mm (0.28 to 0.33 in.)
	Used belt	11.0 to 13.0 mm (0.43 to 0.51 in.)
Vane pump V belt deflection : Pressing force 98 N (10 kgf, 22 lbf)	New belt	8.0 to 10.0 mm (0.31 to 0.39 in.)
	Used belt	11.0 to 13.0 mm (0.43 to 0.51 in.)
Valve clearance (cold)	Intake	0.15 to 0.25 mm (0.006 to 0.010 in.))
	Exhaust	0.25 to 0.35 mm (0.010 to 0.014 in.)
Chain	Maximum chain elongation	123.2 mm (4.850 in.)
Chain tensioner slipper	Maximum wear	1.0 mm (0.039 in.)
No. 1 chain vibration damper	Maximum wear	1.0 mm (0.039 in.)
Cylinder head for flatness	Maximum warpage : Cylinder block side	0.05 mm (0.0020 in.)
	Maximum warpage : Intake manifold side	0.10 mm (0.0039 in.)
	Maximum warpage : Exhaust manifold side	0.10 mm (0.0039 in.)
Cylinder head set bolt	Standard length	142.8 to 144.2 mm (5.622 to 5.677 in.)
	Maximum length	147.1 mm (5.791 in.)
Cylinder block for flatness	Maximum warpage	0.05 mm (0.0020 in.)
Intake valve	Standard overall length	89.25 mm (3.5138 in.)
	Minimum overall length	88.75 mm (3.4941 in.)
	Standard valve stem diameter	4.970 to 4.985 mm (0.1957 to 0.1963 in.)
	Standard margin thickness	1.0 mm (0.039 in.)
	Minimum margin thickness	0.7 mm (0.028 in.)
Exhaust valve	Standard overall length	87.90 mm (3.4606 in.)
	Minimum overall length	87.40 mm (3.4409 in.)
	Standard valve stem diameter	4.965 to 4.980 mm (0.1955 to 0.1961 in.)
	Standard margin thickness	1.15 mm (0.045 in.)
	Minimum margin thickness	0.7 mm (0.028 in.)
Valve spring	Standard free length	45.05 to 45.15 mm (1.774 to 1.778 in.)
	Maximum deviation	1.6 mm (0.063 in.)
	Maximum angle (reference)	2°
	Standard installed tension	149 to 165 N (15.2 to 16.8 kgf, 33.5 to 37.1 lbf) at 32.5 mm (1.280 in.)
	Maximum workin	286 to 316 N (29.1 to 32.2 kgf, 64.2 to 71.0 lbf) at 23.9 mm (0.941 in.)

Intake valve guide bush	Bush inside diameter	5.010 to 5.030 mm (0.1972 to 0.1980 in.)
	Standard oil clearance : bush and valve	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
	Maximum oil clearance : bush and valve	0.08 mm (0.0032 in.)
	Standard bore diameter (STD) : bush bore diameter of cylinder head	9.685 to 9.706 mm (0.3813 to 0.3821 in.)
	Standard bore diameter (O/S 0.05) : bush bore diameter of cylinder head	9.7355 to 9.756 mm (0.3833 to 0.3841 in.)
	Standard protrusion height	9.0 to 9.4 mm (0.354 to 0.370 in.)
	Standard oil clearance : bush and cylinder head	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust valve guide bush	Bush inside diameter	5.010 to 5.030 mm (0.1972 to 0.1980 in.)
	Standard oil clearance	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
	Maximum oil clearance	0.10 mm (0.0039 in.)
	Standard bore diameter (STD) : bush bore diameter of cylinder head	9.685 to 9.706 mm (0.3813 to 0.3821 in.)
	Standard bore diameter (O/S 0.05) : bush bore diameter of cylinder head	9.7355 to 9.756 mm (0.3833 to 0.3841 in.)
	Standard protrusion height	9.0 to 9.4 mm (0.354 to 0.370 in.)
	Standard oil clearance : bush and cylinder head	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
Valve lifter	Standard lifter diameter	30.966 to 30.976 mm (1.2191 to 1.2195 in.)
	Standard lifter bore diameter	31.000 to 31.025 mm (1.2205 to 1.2215 in.)
	Standard oil clearance	0.024 to 0.059 mm (0.0009 to 0.0023 in.)
	Maximum oil clearance	0.1 mm (0.0039 mm)
Camshaft timing gear	Minimum gear diameter (w/ chain)	96.2 mm (3.787 in.)
Camshaft timing sprocket	Minimum gear diameter (w/ chain)	96.2 mm (3.787 in.)
Camshaft	Maximum circle runout	0.03 mm (0.0012 in.)
	Standard cam lobe height	44.617 to 44.717 mm (1.7566 to 1.7605 in.)
	Minimum cam lobe height	44.47 mm (1.7508 in.)
	Standard journal diameter : No. 1 journal	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
	Standard journal diameter : Other journals	22.949 to 22.965 mm (0.9035 to 0.9041 in.)
No. 2 camshaft	Maximum circle runout	0.03 mm (0.0012 in.)
	Standard cam lobe height	44.666 to 44.766 mm (1.7585 to 1.7624 in.)
	Minimum cam lobe height	44.52 mm (1.7528 in.)
	Standard journal diameter : No. 1 journal	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
	Standard journal diameter : Other journals	22.949 to 22.965 mm (0.9035 to 0.9041 in.)
Camshaft thrust clearance	Standard thrust clearance	0.040 to 0.095 mm (0.0016 to 0.0037 in.)
	Maximum thrust clearance	0.11 mm (0.0043 in.)
Camshaft oil clearance	Standard oil clearance	0.040 to 0.095 mm (0.0016 to 0.0037)
	Maximum oil clearance	0.115 mm (0.0045 in.)
Camshaft bearing cap setting ring pin	Standard protrusion height	8.5 to 9.5 mm (0.335 to 0.374 in.)
Union	Standard protrusion : A	29 mm (1.14 in.)
	Standard protrusion B:	44 mm (1.73 in.)
Intake manifold	Maximum warpage	0.10 mm (0.004 in.)
Exhaust manifold	Maximum warpage	0.70 mm (0.028 in.)

SS

Connecting rod thrust clearance	Standard thrust clearance	0.16 to 0.36 mm (0.0063 to 0.0142 in.)
	Maximum thrust clearance	0.36 mm (0.0142 in.)
Connecting rod oil clearance	Standard oil clearance	0.016 to 0.040 mm (0.0006 to 0.0016 in.)
	Maximum oil clearance	0.06 mm (0.0024 i)
Crankshaft oil clearance	Standard oil clearance	0.010 to 0.023 mm (0.0004 to 0.0009 in.)
	Maximum oil clearance	0.07 mm (0.0028 in.)
Cylinder bore	Standard diameter	75.000 to 75.013 mm (2.9528 to 2.9533 in.)
Piston with pin	Standard piston diameter	74.945 to 74.955 mm (2.9506 to 2.9510 in.)
	Standard piston hole diameter at 20° (68°F)	18.013 to 18.016 mm (0.7092 to 0.7093 in.)
	Standard piston pin diameter	18.001 to 18.004 mm (0.7087 to 0.7088 in)
	Standard oil clearance : piston and piston pin	0.009 to 0.015 mm (0.0004 to 0.0006 in.)
	Maximum oil clearance : piston and piston pin	0.050 mm (0.0020 in.)
Piston clearance	Standard oil clearance	0.055 to 0.078 mm (0.0022 to 0.0031 in.)
	Maximum oil clearance	0.08 mm (0.0032 in.)
Connecting rod	Standard connecting rod inside diameter	17.965 to 17.985 mm (0.7073 to 0.7081 in.)
	Maximum misalignment	0.05 mm (0.0020 in.) per 100 mm (3.94 in.)
	Maximum twist	0.05 mm (0.0020 in.) per 100 mm (3.94 in.)
Piston ring	Standard ring groove clearance : No. 1 ring	0.02 to 0.04 mm (0.0008 to 0.0016 in.)
	Standard ring groove clearance : No. 1 ring	0.02 to 0.04 mm (0.0008 to 0.0016 in.)
	Standard ring groove clearance : No. 2 ring	0.01 to 0.03 mm (0.0004 to 0.0012 in.)
	Standard ring groove clearance : Oil ring	0.01 to 0.03 mm (0.0004 to 0.0012 in.)
	Standard end gap : No. 1 ring	0.25 to 0.35 mm (0.0098 to 0.0138 in.)
	Maximum end gap : No. 1 ring	0.91 mm (0.0358 in.)
	Standard end gap : No. 2 ring	0.35 to 0.50 mm (0.0138 to 0.0197 in.)
	Maximum end gap : No. 1 ring	1.06 mm (0.0417 in.)
	Standard end gap : Oil ring	0.10 to 0.35 mm (0.039 to 0.0138 in.)
	Maximum end gap : Oil ring	0.82 mm (0.0323 in.)
Connecting rod bolt	Standard diameter	6.6 to 6.7 mm (0.260 to 0.264 in.)
	Maximum diameter	6.4 mm (0.252 in.)
Crankshaft	Maximum circle runout	0.03 mm (0.0012 in.)
	Standard diameter : main journal	45.988 to 46.000 mm (1.8106 to 1.8110 in.)
	Maximum taper and distortion : main journal	0.02 mm (0.0008 in.)
	Standard diameter : crank pin	39.992 to 40.000 mm (1.5745 to 1.5748 in.)
	Maximum taper and distortion : crank pin	0.2 mm (0.0008 in.)
	Standard sprocket diameter (w/ chain)	51.72 mm (2.0362 in.)
	Minimum sprocket diameter (w/ chain)	50.5 mm (1.988 in.)
Crankshaft bearing cap set bolt	Standard diameter	7.3 to 7.5 mm (0.287 to 0.295 in.)
	Minimum diameter	7.2 mm (0.283 in.)

1NZ-FE FUEL

SERVICE DATA

Fuel

Fuel	Condition	Specified Condition
Standard fuel pressure	at Idle	304 to 343 kPa 3.1 to 3.5 kgf/cm^2, 44 to 50 psi)
	Remains as specified for 5 minutes after engine stopped	147 kPa (1.5 kgf/cm^2, 21 psi)

Fuel injector

Fuel Injector	Condition		Specified Condition
Standard injection volume	Fuel pressure	298 to 301.5 kPa (3.0 to 3.1 kgf/cm^2, 43 to 44 psi)	196.49 to 204.51 cm^3/min., (12.0 to 12.4in^3/min.)
	Fuel temperature	21°C (70°F)	
	Ambient temperature	21°C (70°F)	
Standard resistance	21°C (70°F)		13.5 to 14.2 Ω

Fuel pump

Fuel Pump	Condition	Specified Condition
Standard resistance	20°C (68°F)	0.2 to 3.0 Ω

TORQUE SPECIFICATIONS

Fuel injector

Part Tightened		N*m	kgf*cm	ft.*lbf
Fuel delivery pipe x Cylinder head	Bolt A (delivery pipe)	19	194	14
	Bolt B (fuel tube)	9.0	92	80 in.*lbf
No. 2 cylinder head cover x Cylinder head		7.0	71	62 in.*lbf

Fuel pump

Part Tightened	N*m	kgf*cm	ft.*lbf
Fuel tank vent tube set plate x Fuel tank	3.5	6136	31 in.*lbf
Rear seat cushion support bracket x Body	5.0	51	44 in.*lbf

Fuel tank

Part Tightened		N*m	kgf*cm	ft.*lbf
Check valve support x Fuel tank		3.5	36	31 in.*lbf
Check valve protector x Fuel tank		3.5	36	31 in.*lbf
Fuel tank assembly x Body		14.3	146	11
Fuel tank filler pipe x Fuel tank	for clamp	7.5	76	66 in.*lbf
No. 3 parking brake cable x Body		5.4	55	48 in.*lbf
No. 2 parking brake cable x Body		5.4	55	48 in.*lbf

1NZ-FE EMISSION CONTROL

SERVICE DATA

Vacuum switching valve (Purge VSV)	Standard resistance		23 to 26 Ω at 20°C (68°F)
Heated oxygen sensor (for Bank 1 Sensor 1)	Standard resistance	1 (HT1A) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
		1 (HT1A) - 4 (E2)	10 kΩ or higher
Heated oxygen sensor (for Bank 1 Sensor 2)	Standard resistance	1 (HT1B) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
		1 (HT1B) - 4 (E2)	10 kΩ or higher

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Charcoal canister x Body	19	194	14
Ventilation valve x Cylinder head cover	27	275	20
Heated oxygen sensor (for bank 1 sensor 1) x Front exhaust pipe : for use with SST	44	449	32
Heated oxygen sensor (for bank 1 sensor 1) x Front exhaust pipe : for use without SST	40	408	30
Heated oxygen sensor (for bank 1 sensor 2) x Front exhaust pipe : for use with SST	44	449	32
Heated oxygen sensor (for bank 1 sensor 2) x Front exhaust pipe : for use without SST	40	408	30

1NZ-FE EXHAUST

SERVICE DATA

Compression spring minimum length	40.5 mm (1.594 in.)

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Heated oxygen sensor (for Bank 1 Sensor 2) x Front exhaust pipe : for use with SST	40	408	30
Heated oxygen sensor (for Bank 1 Sensor 2) x Front exhaust pipe : for use without SST	44	449	32
Tail pipe x Front exhaust pipe	32	326	24
Front panel brace x Body	20	204	14

1NZ-FE COOLING

SERVICE DATA

Thermostat	Valve opening temperature		80 to 84°C (176 to 183°F)
	Valve lift	at 95°C (203°F)	8.5 mm (0.33 in.) or more
Radiator cap	Standard opening pressure		93 to 123 kPa (0.95 to 1.25 kgf*cm^2, 13.5 to 17.8 psi)
	Minimum opening pressure		78 kPa (0.8 kgf*cm^2, 11.4 psi)
Fan	Standard amperage	at 20°C (68°F)	11.7 to 14.7 A
Cooling Fan Resister	Resistance	at 20°C (68°F)	1.17 to 1.43 Ω
No. 1 Cooling fan relay	Resistance	3 - 5	10 kΩ or higher
		3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)
No. 2 cooling fan relay	Resistance	3 - 4	Below 1 Ω
		3 - 5	10 kΩ or higher
		3 - 4	10 kΩ or higher (when battery voltage is applied to terminals 1 and 2)
		3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Radiator Drain Plug sub-assembly x Radiator	13	129	9.4
Water pump x Cylinder block	11	112	8
Water pump pulley x Water pump	15	153	11
Water Inlet x Cylinder block	9.0	92	80 in.*lbf
Water filler x Radiator	7.5	76	66 in.*lbf
Fan shroud x Radiator	7.5	76	66 in.*lbf
Radiator support upper x body	5.0	51	44 in.*lbf
Hood Lock Support x Body	5.0	51	44 in.*lbf

1NZ-FE LUBRICATION

SERVICE DATA

Oil pressure : at idle	29 kPa (0.3 kgf/cm^2, 4.2 psi) or more
Oil pressure : at 3,000 rpm	150 to 550 kPa (1.5 to 5.6 kgf/cm^2, 22 to 80 psi) or more
Oil pump : Tip clearance	Standard: 0.060 to 0.180 mm (0.0024 to 0.0071 in.) Maximum: 0.28 mm (0.0110 in.)
Oil pump : Body clearance	Standard: 0.250 to 0.325 mm (0.0098 to 0.0128 in.) Maximum: 0.425 mm (0.0167 in.)
Oil pump : Side clearance	Standard: 0.03 to 0.09 mm (0.0012 to 0.0035 in.) Maximum: 0.15 mm (0.0059 in.)

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Oil pressure switch x Cylinder block	15	153	11
Oil filter x Oil filter union	17.2	175	13
Oil pump cover x Timing chain cover : for bolt	8.8	90	78 in.*lbf
Oil pump cover x Timing chain cover : for nut	10	102	7.6
Oil pump relief valve plug x Timing chain cover	25	255	18
Timing chain cover x Cylinder head and cylinder block : for bolt A	24	245	18
Timing chain cover x Cylinder head and cylinder block : for bolt B	11	112	8.1
Timing chain cover x Cylinder head and cylinder block : for bolt C	11	112	8.1
Timing chain cover x Cylinder head and cylinder block : for bolt D	24	245	18
Timing chain cover x Cylinder head and cylinder block : for nut E	24	245	18
Oil pan drain plug x No. 2 oil pan	37.5	382	28

1NZ-FE IGNITION

SERVICE DATA

Spark plug	Standard electrode gap	0.7 to 0.8 mm (0.028 to 0.031 in.) for new spark plug

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Spark plug x Cylinder head sub-assembly	18	184	13
Ignition coil assembly x Cylinder head cover	9.0	92	80 in.*lbf

TORQUE SPECIFICATIONS

Automatic Transaxle Assembly

Part tightened	N*m	kgf*cm	ft.*lbf
Park/neutral position switch assembly (for bolt)	5.4	55	48 in.*lbf
Park/neutral position switch assembly (for nut)	6.9	70	61 in.*lbf
Automatic transaxle housing x Engine block	30	301	22
Torque converter clutch assembly x Drive plate	27	280	20
Oil cooler tube clamp x Automatic transaxle	5.5	56	49 in.*lbf
Oil cooler inlet tube sub-assembly No.1 x Automatic transaxle	34	347	25
Oil cooler outlet tube sub-assembly No.1 x Automatic transaxle	34	347	25
Transmission control cable bracket x Automatic transaxle	12	122	9
Transmission revolution sensor x Automatic transaxle	5.4	55	48 in.*lbf
Transmission oil filler tube sub-assembly x Automatic transaxle	5.5	56	49 in.*lbf
Wheel nut	103	1,050	76
Starter assembly x Automatic transaxle	37	380	27
Starter assembly x Starter wire	9.8	100	87 in.*lbf
Engine mounting bracket LH x Automatic transaxle	64	653	47
Engine mounting bracket rear x Automatic transaxle	49	500	36
Engine mounting bracket LH x Ground cable	26	260	19
Engine mounting bracket rear x Automatic transaxle	49	500	36
Engine mounting bracket LH x Ground cable	26	260	19
Engine mounting bracket LH x Engine mounting insulator LH	49	500	36
Engine mounting bracket rear x Engine mounting insulator rear	64	653	47
Hood sub-assembly	13	132	10
Drain plug x Automatic transaxle oil pan	49	500	36
Automatic transaxle case x Transmission wire	5.4	55	48 in.*lbf
Automatic transaxle oil pan x Automatic transaxle case	7.8	80	69 in.*lbf
Oil strainer sub-assembly x Transmission valve body assembly	11	110	8
Transmission valve body assembly x Automatic transaxle	11	110	8
Transmission valve body assembly x Manual detent spring sub-assembly	11	110	8
Transmission valve body assembly x Shift solenoid valves	11	110	8
Transmission control cable assembly x Body	5.0	51	44 in.*lbf
Engine hanger x Engine	40	408	30
Control shaft lever x Park/neutral position switch assembly	13	130	9
Engine mounting bracket rear x Heat insulator	18	180	13
Engine block x Heat insulator	18	180	13
Air cleaner bracket x Automatic transaxle	19	195	14
Wire harness clamp bracket x Automatic transaxle	5.0	51	44 in.*lbf
Transmission control cable support x Automatic transaxle	12	122	9
Floor shift assembly x Body	12	122	9
Floor shift assembly x Transmission control cable assembly	12	122	9
Transaxle revolution sensor x Transaxle case	5.4	55	48 in.*lbf
Union x Tansaxle case	27	275	20
Elbow x Transaxle case	27	275	20
Manual valve lever shaft x Control lever	13	130	10
Manual valve lever shaft x Park/neutral position switch	6.9	70	61 in.*lbf
Park/neutral position switch x Transaxle case	5.4	55	48 in.*lbf
Screw plug	7.4	75	65 in.*lbf
Drain plug	49	500	36
Transaxle case x Oil pan	7.8	80	71 in.*lbf

Part tightened	N*m	kgf*cm	ft.*lbf
Oil strainer x Valve body assembly	11	110	8
ATF temperature sensor lock plate x Valve body assembly	11	110	8
Transaxle wire x Transaxle case	5.4	55	48 in.*lbf
Valve body assembly x Transaxle case	11	110	8
Detent spring x Valve body assembly	11	110	8
Parking lock pawl bracket x Transaxle case	20	205	15
Transaxle housing x Transaxle case Bolt A	29	300	21
Transaxle housing x Transaxle case Bolt B	22	220	16
Transaxle housing x Oil separator	9.8	100	87 in.*lbf
Transaxle rear cover x Screw plug	7.4	75	65 in.*lbf
Transaxle rear cover x Transaxle case	25	250	18
Oil pump x Transaxle case	22	220	16
Counter drive gear lock nut	280	2,855	207
Oil pump body x Stator shaft	9.8	100	7
Valve body assembly x Shift solenoid valve	11	110	8
Accumulator piston cover x Valve body assembly	11	110	8
Pressure relief ball cover x Upper valve body	6.5	66	57 in.*lbf
Upper valve body x Lower valve body	11	110	8
Lower valve body x Lower valve body cover Bolt A	6.6	67	58 in.*lbf
Lower valve body x Lower valve body cover Bolt B	11	110	8
Bearing lock plate x Transaxle housing	11	110	8
Differential case x Differential ring gear	88	900	65

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Transmission control cable assembly x Body		5.0	51	44 in.*lbf
Floor shift shift lever assembly x Floor		12	122	9
Wire harness clamp x Manual transaxle		5.0	51	44 in.*lbf
Ground cable x Engine mounting bracket LH		26	260	19
Air cleaner bracket x Manual transaxle		19	195	14
Clutch release cylinder x Flexible hose tube		15	155	11
No. 1 engine hanger x Engine		40	408	408
Front suspension member reinforcement set bolt		47	479	35
Front suspension crossmember x body	Bolt A	70	714	52
	Bolt B	116	1,183	86
Engine mounting bracket LH x Manual transaxle		64	653	47
Rear engine mounting bracket x Manual transaxle	Bolt A	64	653	47
	Bolt B	18	180	13
Engine mounting insulator LH x Engine mounting bracket LH		49	500	36
Rear engine mounting insulator x Rear engine mounting bracket		64	653	47
Starter assembly x Manual transaxle		37	380	27
Starter assembly x Starter wire		9.8	100	87 in.*lbf
Manual transaxle x Engine		33	340	24
Filler plug x Manual transaxle		39	400	29
Drain plug x Manual transaxle		39	400	29
Bearing lock plate x Front transaxle case		11	115	8.3
No. 1 oil receiver pipe x Manual transmission case		17	175	13
No. 2 oil receiver pipe x Manual transmission case		17	17	13
Reverse restrict pin plug x Manual transmission case		13	130	9.3
Manual transaxle case receiver x Manual transmission case		11	115	8.3
No. 1 gear shift fork x No. 1 gear shift fork shaft		16	160	12
No. 2 gear shift fork x No. 2 gear shift fork shaft		16	160	12
No. 1 gear shift head x No. 2 gear shift fork shaft		16	160	12
Reverse shift arm bracket assembly x Front transaxle case		17	175	13
Manual transmission case x Front transaxle case	bolt	29	300	22
	nut	29	300	22
Reverse idler gear shaft bolt x Manual transmission case		29	300	22
No. 2 lock ball assembly x Manual transmission case		39	400	29
Shift detent ball x Manual transmission case		22	224	16
Shift detent ball x Front transaxle case		22	224	16
Bearing retainer rear x Manual transmission case		27	280	20
No. 3 gear shift fork x Gear shift fork shaft		16	160	12
Manual transmission output shaft rear set nut x output shaft		118	1200	87
Manual transmission case cover x Manual transmission case		18	185	14
Control shaft cover x Manual transmission case		20	200	14
No. 1 lock ball assembly x Manual transmission case		29	300	22
Selecting bell crank assembly x Manual transmission case		25	250	18

Part Tightened	N*m	kgf*cm	ft.*lbf
Floor shift control lever housing support bracket x Front transaxle case	18	188	14
Back-up light switch assembly x Manual transmission case	40	410	30
Speedometer driven hole cover sub-assembly x Manual transaxle	11	115	8.3
Release fork support x Front transaxle case	37	375	25
Clutch release cylinder assembly x Manual transaxle	12	120	9
Manual transmission filler plug x Manual transaxle	39	29	29
Drain plug sub-assembly x Manual transmission case	39	29	29
No. 2 electing bell crank plate washer x Selecting bell crank	12	120	9
Front defferential ring gear x Front differential case	77	790	57

1NZ-FE STARTING

SERVICE DATA

Starter assembly	Standard current		90 A or less at 11.5 V
Starter relay	Standard resistance	3 - 5	10 kΩ or higher
		3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)
Ignition switch	Standard resistance	All terminals	10 kΩ or higher
		2 (AM1) - 3 (ACC)	Below 1 Ω at ACC
		1 (AM1) - 2 (IG1)	Below 1 Ω at ON
		1 (AM1) - 3 (ACC)	Below 1 Ω at ON
		5 (AM2) - 6 (IG2)	Below 1 Ω at ON
		1 (AM1) - 2 (IG1)	Below 1 Ω at START
		4 (ST2) - 5 (AM2)	Below 1 Ω at START
		5 (AM2) - 6 (IG2)	Below 1 Ω at START
Starter magnet switch assembly	Standard resistance	50 - C	Below 1 Ω
		50 - Body	Below 2 Ω
Starter armature assembly	Standard resistance	Segment	Below 1 Ω
		Segment - Coil core	10 kΩ or higher
Starter armature assembly	Commutator depth	Standard	3.1 mm (0.354 in.)
		Maximum	3.8 mm (0.150 in.)
Starter commutator end frame	Brush length	Standard length	9.0 mm (0.354 in.)
		Maximum length	4.0 mm (0.158 in.)
	Standard resistance	Positive (+) - Negative (-)	10 kΩ or higher

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Starter wire x Terminal C	9.8	100	7
Starter assembly x Cylinder block sub-assembly	37	377	27

1NZ-FE CHARGING

SERVICE DATA

Battery	Standard voltage		12.5 to 12.9 V at 20°C (68°F)
Charging circuit with load	Standard amperage		30 A or more
Generator brush holder assembly	Brush length	Standard length	9.5 to 11.5 mm (0.374 to 0.453 in.)
		Minimum length	4.5 mm (0.177 in.)
Generator rotor assembly	Standard resistance	Slip ring	2.1 to 2.5 Ω at 20°C (68°F)
		Slip ring - Rotor core	10 kΩ or higher
	Slip ring diameter	Standard diameter	14.2 to 14.4 mm (0.559 to 0.567 in.)
		Minimum diameter	12.8 mm (0.504 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Adjusting Bar x Cylinder Head	11	112	8
Generator Assembly x Adjusting Bar	18.5	189	14
Generator Assembly x Cylinder Head	54	551	40
Generator Wire x Generator Assembly	9.8	100	7

U340E AUTOMATIC TRANSMISSION

SERVICE DATA

AUTOMATIC TRANSMISSION ASSEMBLY

Line pressure (Wheel locked) AT stall (Throttle valve fully opened)	D position	1,107 to 1,225 kPa (11.3 to 12.5 kgf/cm^2, 161 to 178 psi)
	R position	1,695 to 1,813 kPa (17.3 to 18.5 kgf/cm^2, 246 to 263 psi)
Engine stall revolution	D positions	2,050 to 2,550 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	600 to 750 rpm
Drive plate runout	Maximum.	0.20 mm (0.0079 in.)
Differential oil seal drive in depth	LH side	5.4 to 6.4 mm (0.213 to 0.252 in.)
	RH side	1.5 to 2.5 mm (0.059 to 0.098 in.)
Shift point		
D position (Throttle valve fully opened)	1 → 2	50 to 55 km/h (31 to 34 mph)
	2 → 3	94 to 102 km/h (58 to 63 mph)
	3 → 4	147 to 156 km/h (91 to 97 mph)
	4 → 3	142 to 151 km/h (88 to 94 mph)
	3 → 2	89 to 96 km/h (55 to 60 mph)
	2 → 1	41 to 46 km/h (25 to 29 mph)
D position (Throttle valve fully closed)	3 → 4	40 to 44 km/h (25 to 27 mph)
	4 → 3	30 to 34 km/h (19 to 21 mph)
2 position (Throttle valve fully opened)	1 → 2	50 to 55 km/h (31 to 34 mph)
	3 → 2	89 to 96 km/h (55 to 60 mph)
	2 → 1	41 to 46 km/h (25 to 29 mph)
L position (Throttle valve fully opened)	3 → 2	89 to 96 km/h (55 to 60 mph)
	2 → 1	44 to 48 km/h (27 to 30 mph)
Lock-up point		
D position (Throttle valve opening 5 %)	Lock-up ON 3 → 3L	94 to 102 km/h (58 to 63 mph)
	Lock-up ON 4 → 4L	54 to 59 km/h (34 to 37 mph)
	Lock-up OFF 4L → 4	66 to 75 km/h (41 to 47 mph)
	Lock-up OFF 3L → 3	89 to 96 km/h (55 to 60 mph)

OIL PUMP

Body clearance	STD	0.10 to 0.15 mm (0.0039 to 0.0059 in.)
	Max.	0.15 mm (0.0059 in.)
Tip clearance	STD	0.07 to 0.15 mm (0.0028 to 0.0059 in.)
	Max.	0.15 mm (0.0059 in.)
Side clearance	STD	0.02 to 0.05 mm (0.0008 to 0.0020 in.)
	Max.	0.05 mm (0.0020 in.)

Drive gear thickness	Mark 1	9.44 to 9.45 mm (0.3709 to 0.3713 in.)
	Mark 2	9.45 to 9.46 mm (0.3713 to 0.3717 in.)
	Mark 3	9.46 to 9.47 mm (0.3717 to 0.3721 in.)
	Mark 4	9.47 to 9.48 mm (0.3721 to 0.3725 in.)
	Mark 5	9.48 to 9.49 mm (0.3725 to 0.3729 in.)
Driven gear thickness	Mark 1	9.44 to 9.45 mm (0.3709 to 0.3713 in.)
	Mark 2	9.45 to 9.46 mm (0.3713 to 0.3717 in.)
	Mark 3	9.46 to 9.47 mm (0.3717 to 0.3721 in.)
	Mark 4	9.47 to 9.48 mm (0.3721 to 0.3725 in.)
	Mark 5	9.48 to 9.49 mm (0.3725 to 0.3729 in.)
Pump body bushing inside diameter	STD	38.113 to 38.138 mm (1.50050 to 1.50149 in.)
	Max.	38.138 mm (1.50149 in.)
Oil seal in depth	STD	0 +- 0.5 mm (0 +- 0.020 in.)
Stator shaft bushing inside diameter	STD	21.500 to 21.526 mm (0.84646 to 0.84748 in.)
	Max	21.526 mm (0.84748 in.)

FORWARD CLUTCH

Pack clearance		1.406 to 1.806 mm (0.0553 to 0.0711 in.)
Piston return spring free length		21.69 mm (0.8540 in.)
Flange thickness	Mark -	3.00 mm (0.1181 in.)
	Mark 1	3.20 mm (0.1260 in.)
	Mark 2	3.40 mm (0.1339 in.)
	Mark 3	3.60 mm (0.1417 in.)

DIRECT AND REVERSE CLUTCH

Pack clearance	Direct clutch	0.62 to 1.02 mm (0.0244 to 0.0402 in.)
	Reverse clutch	0.86 to 1.26 mm (0.0339 to 0.0496 in.)
Piston return spring free length (Direct clutch)		32.9 mm (1.2953 in.)
Flange thickness (Direct clutch)	Mark -	3.0 mm (0.118 in.)
	Mark 1	3.2 mm (0.126 in.)
	Mark 2	3.4 mm (0.134 in.)
	Mark 3	3.6 mm (0.142 in.)
Flange thickness (Reverse clutch)	Mark -	3.0 mm (0.118 in.)
	Mark 1	3.2 mm (0.126 in.)
	Mark 2	3.4 mm (0.134 in.)
	Mark 3	3.6 mm (0.142 in.)

1ST AND REVERSE BRAKE

Pack clearance		0.8 to 1.206 mm (0.0317 to 0.0475 in.)
Piston return spring free length		13.96 mm (0.5496 in.)
Flange thickness	Mark -	3.4 mm (0.134 in.)
	Mark 1	3.6 mm (0.142 in.)
	Mark 2	3.8 mm (0.150 in.)
	Mark 3	4.0 mm (0.157 in.)

2ND COAST AND O/D BRAKE

Pack clearance	2.091 to 2.491 mm (0.0823 to 0.0981 in.)
Piston return spring free length (O/D brake)	18.99 mm (0.7476 in.)

Flange thickness	Mark 4	4.0 mm (0.157 in.)
	Mark 5	4.2 mm (0.165 in.)
	Mark 6	4.4 mm (0.173 in.)
	Mark 7	4.6 mm (0.181 in.)

2ND BRAKE

Pack clearance		0.847 to 1.247 mm (0.033 to 0.049 in.)
Piston return spring free length		14.65 mm (0.5768 in.)
Flange thickness	Mark -	3.0 mm (0.118 in.)
	Mark 1	3.2 mm (0.126 in.)
	Mark 2	3.4 mm (0.134 in.)
	Mark 3	3.6 mm (0.142 in.)

MANUAL VALVE LEVER SHAFT

Manual valve lever shaft oil seal in depth	0 +- 0.5 mm (0 +- 0.020 in.)

INTERMEDIATE SHAFT

Intermediate shaft clearance	0.204 to 0.966 mm (0.008 to 0.038 in.)

INPUT SHAFT

End play	0.37 to 1.29 mm (0.0146 to 0.0508 in.)

ACCUMULATOR

Spring	Free length / Outer diameter	Color
B2	66.90 mm (2.634 in.) / 15.50 mm (0.610 in.)	Green
C2	66.90 mm (2.6339 in.) / 15.50 mm (0.6102 in.)	-
C3	80.20 mm (3.158 in.) / 18.70 mm (0.736 in.)	-

TRANSAXLE REAR COVER ASSEMBLY

Needle roller bearing clearance	25.2 mm (0.992 in.)

TRANSMISSION VALVE BODY ASSEMBLY

Valve body assembly installation bolt length	32 mm (1.26 in.) for bolt A
	22 mm (0.87 in.) for bolt B
	55 mm (2.17 in.) for bolt C
	45 mm (1.77 in.) for bolt D
Detente spring installation bolt length	14 mm (0.55 in.) for bolt A
	45 mm (1.77 in.) for bolt B

COUNTER DRIVE GEAR

Rotating torque	0.20 to 0.49 N*m (2 to 5 kgf*cm, ^{2} to 4 in*lbf)

DIFFERENTIAL

Differential drive pinion plug drive in depth		2.5 to 2.6 mm (0.098 to 0.102 in.)
Side gear backlash		0.05 to 0.20 mm (0.002 to 0.008 in.)
Thrust washer thickness	Mark -	0.95 mm (0.0374 in.)
	Mark -	1.00 mm (0.0394 in.)
	Mark -	1.05 mm (0.0413 in.)
	Mark -	1.10 mm (0.0433 in.)
	Mark -	1.15 mm (0.0453 in.)
	Mark -	1.20 mm (0.0472 in.)
Preload (at starting)	New bearing	0.78 to 1.37 N*m (8.0 to 14.0 kgf*cm, 6.9 to 12.2 in*lbf)
	Using bearing	0.39 to 0.69 N*m (4.0 to 7.0 kgf*cm, 3.5 to 6.1 in*lbf)

Shim thickness	Mark 01	1.90 mm (0.0748 in.)
	Mark 02	1.95 mm (0.0768 in.)
	Mark 03	2.00 mm (0.0787 in.)
	Mark 04	2.05 mm (0.0807 in.)
	Mark 05	2.10 mm (0.0827 in.)
	Mark 06	2.15 mm (0.0846 in.)
	Mark 07	2.20 mm (0.0866 in.)
	Mark 08	2.25 mm (0.0885 in.)
	Mark 09	2.30 mm (0.0906 in.)
	Mark 10	2.35 mm (0.0925 in.)
	Mark 11	2.40 mm (0.0945 in.)
	Mark 12	2.45 mm (0.0965 in.)
	Mark 13	2.50 mm (0.0984 in.)
	Mark 14	2.55 mm (0.1004 in.)
	Mark 15	2.60 mm (0.1024 in.)
	Mark 16	2.65 mm (0.1043 in.)
	Mark 17	2.70 mm (0.1063 in.)
	Mark 18	2.75 mm (0.1082 in.)
	Mark 19	2.80 mm (0.1102 in.)
Transaxle housing side oil seal drive in depth		2 +- 0.5 mm (0.079 +- 0.020 in.)
Transaxle case side oil seal drive in depth		5.9 +- 0.5 mm (0.232 +- 0.020 in.)

CLUTCH

SERVICE DATA

Pedal height from dash panel		134.3 - 144.3 mm (5.287 - 5.681 in.)
Clutch pedal free play		5.0 - 15.0 mm (0.197 - 0591 in.)
Clutch pedal push rod play at pedal top		1.0 - 5.0 mm (0.039 - 0.197 in.)
Slotted spring pin protrusion		1.5 - 3.5 mm (0.059 - 0.138 in.)
Clutch release point from pedal full stroke end position		25 mm (0.98 in.) or more
Clutch disc rivet head depth	Maximum	0.3 mm (0.012 in.)
Clutch disc assembly runout	Minimum	0.8 mm (0.031 in.)
Diaphragm spring finger wear	Maximum depth	0.5 mm (0.020 in.)
	Maximum width	6.0 mm (0.236 in.)
Flywheel sub-assembly runout	Maximum	0.1 mm (0.004 in.)
Diaphragm spring tip non-alignment	Maximum depth	0.5 mm (0.020 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Clutch pedal sub-assembly x Clutch pedal support	37	375	27
Clutch pedal stopper bolt x Clutch pedal support	18	186	13
Clutch pedal support x Body	12	120	9
Clutch master cylinder push rod clevis lock nut	12	120	9
Clutch master cylinder x Flexible hose tube	15	155	11
Clutch master cylinder x Body	12	120	9
Clutch release cylinder bleeder plug	8.4	86	74 in.*lbf
Clutch release cylinder x Transaxle housing	12	120	9
Clutch release cylinder x Flexible hose tube	15	155	11
Clutch release cylinder x Clutch release union	25	250	18
Clutch cover assembly x Flywheel sub-assembly	19	195	14
Release fork support x Transaxle assembly	37	375	27

C50 MANUAL TRANSMISSION

SERVICE DATA

Manual transaxle assembly			
5th gear thrust clearance		STD	0.10 to 0.57 mm (0.0039 to 0.02244 in.)
		Max	0.57 mm (0.02244 in.)
5th gear radial clearance	KOYO made	STD	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
		Max	0.058 mm (0.0023 in.)
	NSK made	STD	0.015 to 0.056 mm (0.0006 to 0.0022 in.)
		Max	0.056 mm (0.0022 in.)
No. 3 synchronizer ring back and 5th gear spline end clearance		STD	0.75 to 1.65 mm (0.0295 to 0.0650 in.)
		Max	0.75 mm (0.0295 in.)
No. 3 transmission hub sleeve and No. 3 gear shift fork clearance		STD	0.3 to 0.5 mm (0.012 to 0.020 in.)
5th gear inner diameter		STD	29.915 to 29.931mm (1.1778 to 1.1784 in.)
		Max	29.931mm (1.1784 in.)
Reverse idler gear sub-assembly inner diameter		STD	18.040 to 18.058 mm (0.7102 to 0.7109 in.)
		Max	18.058 mm (0.7109 in.)
Reverse idler gear shaft outer diameter		STD	17.966 to 17.984 mm (0.7073 to 0.7080 in.)
		Min	17.966 mm (0.7073 in.)
Front transaxle case oil seal drive in depth			15.6 to 16.0 mm (0.6142 to 0.6299 in.)
Input shaft front bearing drive in depth			0 to 0.3 mm (0 to 0.012 in.)
Shift & Select lever shaft bimetal formed bush drive in depth			0 to 0.5 mm (0 to 0.020 in.)
Front differential case tapered roller bearing preload		New bearing	0.78 to 1.57 NVm (8 to 16 kgfVcm, 6.9 to 13.9 in.Vlbf)
Front differential case shim thickness		AA	2.10 mm (0.0827 in.)
		BB	2.15 mm (0.0846 in.)
		CC	2.20 mm (0.0866 in.)
		DD	2.25 mm (0.0886 in.)
		EE	2.30 mm (0.0906 in.)
		FF	2.35 mm (0.0925 in.)
		GG	2.40 mm (0.0945 in.)
		HH	2.45 mm (0.0965 in.)
		JJ	2.50 mm (0.0984 in.)
		KK	2.55 mm (0.1004 in.)
		LL	2.60 mm (0.1024 in.)
		MM	2.65 mm (0.1043 in.)
		NN	2.70 mm (0.1063 in.)
		PP	2.75 mm (0.1083 in.)
		QQ	2.80 mm (0.1102 in.)
		RR	2.85 mm (0.1122 in.)
		SS	2.90 mm (0.1142 in.)
		TT	2.95 mm (0.1161 in.)
		UU	3.00 mm (0.1181 in.)

Transmission case oil seal drive in depth		2.1 +- 2.7 mm (0.0827 +- 0.1063 in.)
Transaxle case oil seal drive in depth		1.6 +- 2.2 mm (0.0630 +- 0.0866 in.)
Reverse restrict pin slotted pin drive in depth		16.0 +- 17.0 mm (0.630 +- 0.670 in.)
No. 3 transmission clutch hub snap ring thickness	A	2.25 mm (0.0886 in.)
	B	2.31 mm (0.0909 in.)
	C	2.37 mm (0.0933 in.)
	D	2.43 mm (0.0957 in.)
	E	2.49 mm (0.0980 in.)
	F	2.55 mm (0.1004 in.)
	G	2.61 mm (0.1028 in.)

Input shaft assembly			
4th gear thrust clearance		STD	0.1 to 0.55 mm (0.0039 to 0.0217 in.)
		Max	0.55 mm (0.0217 in.)
3rd gear thrust clearance		STD	0.1 to 0.35 mm (0.0039 to 0.0138 in.)
		Max	0.35 mm (0.0138 in.)
4th gear radial clearance		STD	0.009 to 0.050 mm (0.0004 to 0.0020 in.)
		Max	0.050 mm (0.0023 in.)
3rd gear radial clearance	KOYO made	STD	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
		Max	0.058 mm (0.0023 in.)
	NSK made	STD	0.015 to 0.056 mm (0.0006 to 0.0022 in.)
		Max	0.056 mm (0.0022 in.)
Input shaft run out		Max	0.015 mm (0.0006 in.)
Input shaft outer diameter	STD	Part A	24.885 to 24.900 mm (0.9797 to 0.9803 in.)
		Part B	28.991 to 29.006 mm (1.1413 to 1.1419 in.)
		Part C	30.985 to 31.000 mm (1.2198 to 1.2204 in.)
		Part D	24.985 to 25.000 mm (0.9836 to 0.9842 in.)
	Max	Part A	24.885 mm (0.9797 in.)
		Part B	28.991 mm (1.1413 in.)
		Part C	30.985 mm (1.2198 in.)
		Part D	24.985 mm (0.9836 in.)
4th gear inside diameter		STD	34.015 to 34.031 mm (1.3391 to 1.3398 in.)
		Max	34.031 mm (1.3398 in.)
3rd gear inside diameter		STD	36.015 to 36.031 mm (1.4179 to 1.4185 in.)
		Max	36.031 mm (1.4185 in.)
3rd gear synchronizer ring back and 3rd gear spline end clearance		Min	0.75 mm (0.0295 in.)
4th gear synchronizer ring back and 3rd gear spline end clearance		Min	0.75 mm (0.0295 in.)
No. 2 gear shift fork claw and glove of the No. 2 transmission hub sleeve clearance			0.15 to 0.35 mm (0.0059 to 0.0137 in.)
No. 2 transmission hub sleeve clearance			0.15 to 0.35 mm (0.0059 to 0.0137 in.)

No. 2 transmission clutch hub snap ring thickness	0	2.30 mm (0.0906 in.)
	1	2.36 mm (0.0929 in.)
	2	2.42 mm (0.0953 in.)
	3	2.42 mm (0.0953 in.)
	4	2.54 mm (0.1000 in.)
	5	2.60 mm (0.1024 in.)
Input shaft rear bearing shaft snap ring clearance		0.1 mm (0.0039 in.) or less
Input shaft rear bearing shaft snap ring thickness	A	2.29 mm (0.0901 in.)
	B	2.35 mm (0.0925 in.)
	C	2.41 mm (0.0948 in.)
	D	2.47 mm (0.0972 in.)
	E	2.53 mm (0.0996 in.)
	F	2.59 mm (0.1019 in.)

Output shaft assembly		
1st gear thrust clearance	STD	0.10 to 0.40 mm (0.0039 to 0.0157 in.)
2nd gear thrust clearance	STD	0.10 to 0.45 mm (0.0039 to 0.0177 in.)
1st gear radial clearance	KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
	NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)
2nd gear radial clearance	KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
	NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)
Output shaft maximum run out		0.015 mm (0.0006 in.)
Output shaft outer diameter	Part A	31.985 mm (1.2592 in.)
	Part B	37.985 mm (1.4955 in.)
	Part C	32.985 mm (1.2986 in.)
2nd gear inside diameter	New	38.015 to 38.031 mm (1.4967 to 1.4972 in.)
	Max	38.031 mm (1.4972 in.)
1st gear inside diameter	New	44.015 to 44.031 mm (1.7329 to 1.7335 in.)
	Max	44.031 mm (1.7335 in.)
1st gear thrust washer thickness	New	5.975 to 6.025 mm (0.2352 to 0.2372 in.)
	Min	5.975 mm (0.2352 in.)
No. 2 synchronizer ring set back and 2nd gear spline end clearance		0.75 to 1.65 mm (0.0295 to 0.065 in.)
No. 1 synchronizer ring set back and 2nd gear spline end clearance		0.75 to 1.65 mm (0.0295 to 0.065 in.)
Reverse gear glove and reverse gear shift fork claw clearance		0.15 to 0.35 mm (0.0059 to 0.014 in.)
No. 1 clutch hub shaft snap ring clearance		0.1 mm (0.039 in.) or less
No. 1 clutch hub shaft snap ring thickness	A	2.50 mm (0.0984 in.)
	B	2.56 mm (0.1008 in.)
	C	2.62 mm (0.1031 in.)
	D	2.68 mm (0.1055 in.)
	E	2.74 mm (0.1079 in.)
	F	2.80 mm (0.1102 in.)

Shift & Select lever shaft assembly	
Control shaft cover oil seal drive in depth	0.2 to 1.2 mm (0.079 to 0.0472 in.)
Shift lever slotted pin (for select inner lever) drive in depth	3.0 to 4.0 mm (0.1181 to 0.1575 in.)
Shift lever slotted pin (for No. 1 shift lever inner) drive in depth	-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)
Shift lever slotted pin (for No. 2 shift lever inner) drive in depth	-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

Differential case assembly		
Front differential side gear backlash		0.05 to 0.20 mm (0.0020 to 0.0079 in.)
Front differential pinion thrust washer	Min	0.94 mm (0.03701 in.)
No. 1 front differential pinion shaft outer diameter	Min	16.982 mm (0.6685 in.)

DRIVE SHAFT

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel set nut	103	1,050	76
Tie rod end sub-assembly x Steering knuckle	49	500	36
Suspension arm sub-assembly lower No.1 x Steering knuckle	98	1,000	72
Stabilizer bar front x Suspension arm sub-assembly lower No.1	18	184	13
Flexible hose and speed sensor front x Shock absorber assembly front	29	300	22
Speed sensor front x Steering knuckle	8.0	82	71 in.*lbf
Front axle hub nut	216	2,200	159

AXLE

SERVICE DATA

Front axle hub bearing backlash	Maximum: 0.05 mm (0.0020 in.)
Front axle hub sub-assembly deviation	Maximum: 0.07 mm (0.0028 in.)
Rear axle hub & bearing assembly backlash	Maximum: 0.05 mm (0.0020 in.)
Rear axle hub & bearing assembly deviation	Maximum: 0.07 mm (0.0028 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel set nut	103	1,050	76
Rear wheel set nut	103	1,050	76
Tie rod end sub-assembly x Steering knuckle	49	500	36
Suspension arm sub-assembly lower No.1 x Steering knuckle	98	1,000	72
Stabilizer bar front x Suspension arm sub-assembly lower No.1	18	184	13
Flexible hose and speed sensor front x Shock absorber assembly front	29	300	22
Speed sensor front x Steering knuckle	8.0	82	71 in.*lbf
Front axle hub nut	216	2,200	159
Disc brake dust cover front x Steering knuckle	8.3	85	73 in.*lbf
Front axle assembly x Front shock absorber assembly	132	1,350	97
Front disc brake cylinder assembly x Steering knuckle	88	900	65
Rear axle hub and bearing assembly x Rear axle beam	61	622	45

SUSPENSION

SERVICE DATA

Front suspension

Front wheel alignment	Vehicle height	A - B: D - C:	91 mm (3.58 in.) 19 mm (0.75 in.)
	Toe-in (total) Rack end length difference		0°+-11' (0°+-0.19°), 0 +-2 mm (0 +-0.08 in.) 1.5 mm (0.0059 in.) or less
	Wheel angle	Inside wheel	33°37' (31°37' to 35°37') 33.62° (31.62° to 35.62°)
		Outside wheel: Reference	29°55' 29.92°
	Camber Right-left error		-0°39' +-45' (-0.65° +-0.75°) 45' (0.75°) or less
	Caster Right-left error		1°47' +-45' (1.78° +-0.75°) 45' (0.75°) or less
	Steering axis inclination Right-left error		10°13' +-45' (10.22° +-0.75°) 45' (0.75°) or less
Front suspension	Lower ball joint turning torque		5.0 N*m (51 kgf*cm, 44 in.*lbf) or less

A:
Ground clearance of front wheel center
B:
Ground clearance of lower suspension arm front bolt center
C:
Ground clearance of tire rod set bolt center
D:
Ground of rear wheel center

Rear suspension

Rear wheel alignment	**Toe-in (total)**	**0°21' +-20' (0.35°+-0.33°), 3.4 +-3.0 mm (0.13 +-0.12 in.)**
	Camber Right-left error	**-0°57' +-45' (-0.95° +-0.75°) 30' (0.5°) or less**

TORQUE SPECIFICATIONS

Front suspension

Part Tightened		N*m	kgf*cm	ft.*lbf
Tie rod end lock nut		74	750	54
Steering knuckle x Shock absorber		132	1,350	97
Front wheel hub nut		103	1,050	76
Suspension support x Piston rod		33	340	25
Suspension support x Body		39	400	29
ABS speed sensor wire harness bracket set bolt		29	300	22
Cowl top panel outer x Body		5.0	51	44 in.*lbf
Suspension crossmember x Body	Bolt A:	70	715	52
	Bolt B:	116	1,180	86
Suspension cross member x Transverse engine mounting insulator		80	816	59
Suspension cross member x Pressure feed tube		7.8	80	69 in.*lbf
Power steering link assembly x Suspension crossmember		74	755	55
Stabilizer bolt set nut		18	180	13
Steering knuckle x Lower ball joint		98	1,000	72
Lower suspension arm x Suspension crossmember	Bolt A:	88	900	65
	Bolt B:	132	1,350	97
Stabilizer bracket No. 1 x Suspension cross member		37	375	27

Rear suspension

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear wheel hub nut	103	1,050	76
Shock absorber x Body	25	250	18
Shock absorber x Rear axle beam	49	500	36
Parking brake cable set bolt	5.4	55	48 in.*lbf
Rear axle hub set bolt	61	622	45
Skid control sensor wire harness bracket set bolt	8.0	82	71 in.*lbf
Rear axle beam x Body	82	836	60
Flexible hose x Brake tube	15	155	11

TIRE AND WHEEL

SERVICE DATA

Cold tire inflation pressure	215/45ZR 17	Front: Rear:	200 kPa (2.0 kgf/cm^2, 29 psi)

Tire runout	3.0 mm (0.118 in.) or less
Imbalance after adjustment	8.0 g (0.018 lb) or less

BRAKE CONTROL

TORQUE SPECIFICATIONS

Brake actuator:

Part Tightened	N*m	kgf*cm	ft. *lbf
Brake actuator assembly x Brake actuator bracket	5.4	55	48 in. *lbf
Brake actuator assembly with bracket x Body	19	194	14
Brake actuator assembly x Brake tube (without SST)	15	155	11
Brake actuator assembly x Brake tube (with SST)	14	143	10

Front speed sensor:

Part Tightened	N*m	kgf*cm	ft. *lbf
Front speed sensor	8.0	82	71 in. *lbf

Skid control sensor:

Part Tightened	N*m	kgf*cm	ft. *lbf
Rear axle hub and bearing assembly (skid control sensor) x Body	61	622	45

Yaw rate sensor:

Part Tightened	N*m	kgf*cm	ft. *lbf
Yaw rate sensor x Body	14	143	10

Steering sensor:

Part Tightened	N*m	kgf*cm	ft. *lbf
Steering pad assembly x Steering wheel assembly	8.8	90	78 in. *lbf
Steering wheel assembly x Steering column shaft	50	510	37

BRAKE

SERVICE DATA

Brake pedal height from dash panel		124.5 to 134.5 mm (4.902 to 5.293 in.)
Brake pedal free play		1.0 to 6.0 mm (0.04 to 0.24 in.)
Stop light switch clearance		0.5 to 2.4 mm (0.020 to 0.094 in.)
Pedal reserve distance from dash panel at 490 N (50 kgf, 110 lbf)	w/ VSC	More than 55 mm (2.17 in.)
	w/o VSC	More than 50 mm (1.97 in.)
Brake booster push rod to piston clearance (w/ Tool)		0 mm (0 in.)
Front brake pad thickness	Standard	11.0 mm (0.433 in.)
	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	Standard	22.0 mm (0.866 in.)
	Minimum	20.0 mm (0.787 in.)
Front brake disc runout	Maximum	0.05 mm (0.0020 in.)
Rear brake drum inside diameter	Standard	200.0 mm (7.874 in.)
	Maximum	201.0 mm (7.913 in.)
Rear drum brake shoe lining thickness	Standard	4.0 mm (0.157 in.)
	Minimum	1.0 mm (0.039 in.)
Rear brake shoe lining to drum clearance		0.6 mm (0.024 in.)

TORQUE SPECIFICATIONS

Brake pedal

Part Tightened	N*m	kgf*cm	ft. *lbf
Brake pedal support sub-assembly x Brake booster	13	127	9
Brake pedal support sub-assembly x Instrument panel reinforcement	21	214	15
Brake pedal support sub-assembly x Brake pedal sub-assembly	37	375	27
Stop light switch lock nut	26	265	19

Brake master cylinder

Part Tightened		N*m	kgf*cm	ft. *lbf
Brake master cylinder sub-assembly x Brake booster		13	127	9
Brake line union nut	without SST	15	155	11
	with SST	14	143	10

Brake booster

Part Tightened		N*m	kgf*cm	ft. *lbf
Brake booster assembly x Body		13	127	9
Brake booster clevis lock nut		26	265	19
Brake actuator assembly with bracket x body		19	194	14
Brake line union nut	without SST	15	155	11
	with SST	14	143	10

Front brake

Part Tightened	N*m	kgf*cm	ft. *lbf
Front disc brake cylinder mounting x Steering knuckle	88	900	65
Front disc brake cylinder sub-assembly x Front disc brake cylinder mounting	34	347	25
Front disc brake cylinder sub-assembly x Flexible hose	30	310	22
Bleeder plug	8.3	85	73 in. *lbf
Wheel nut	103	1,050	76

Rear brake

Part Tightened	N*m	kgf*cm	ft. *lbf
Rear wheel brake cylinder assembly x Backing plate	9.8	100	87 in. *lbf
Bleeder plug	8.3	85	73 in. *lbf

PARKING BRAKE

SERVICE DATA

Parking brake lever travel at 196 N (20 kgf, 44 lbf):	6 to 9 clicks

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft. *lbf
Wheel nut	103	1,050	76
Parking brake lever sub-assembly x Body	13	127	9
Front floor heat insulator No. 2 x Body	5.5	55	48 in. *lbf
Floor panel brace front x Body	20	204	18
Parking brake cable assembly No. 3 x Body	5.4	55	48 in. *lbf
Parking brake cable assembly No. 3 x Backing plate	7.8	80	69 in. *lbf

STEERING COLUMN

SERVICE DATA

Steering wheel freeplay	Maximum	30 mm (1.18 in)

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Tie rod x Rack end	74	755	55
Steering column assembly set bolt	21	210	15
Intermediate shaft assembly x Main shaft	28	286	21
Intermediate shaft assembly x Sliding yoke	28	286	21
Steering wheel set nut	50	510	37
Steering wheel pad set screw ("Torx" screw)	8.8	90	78 in.*lbf

POWER STEERING

SERVICE DATA

POWER STEERING SYSTEM		
fluid level rise	Maximum	5 mm (0.20 in)
Fluid pressure at idle speed with valve closed		5,900 kPa (60 kgf/cm2, 852 psi)
Steering effort at idle speed (Reference)	(Reference)	6 N*m (60 kgf*cm, 53 in.*lbf)
VANE PUMP ASSEMBLY		
Vane pump shaft and vane pump housing oil clearance	Maximum	0.07 mm (0.0028 in)
Clearance between the roter groove and plate	Minimum	1.404 to 1.411 mm(0.05531 to 0.05555 in.)
Spring free length	Maximum	0.03 mm (0.0012 in.)
Vane pump rotating torque	Minimum	29.2 mm (1.150 in.)
Vane pump rotating torque		0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf)
POWER STEERING LINK ASSEMBLY		
Power steering rack runout	Maximum	0.1 mm (0.004 in.)
Tie rod rotating torque	(Turning)	0.8-34.7 kgf*cm, 7.1 - 30.1 in.*lbf
Total preload (Control valve rotating torque)	(Turning)	1.2 - 1.5 N*m (12 - 15 kgf*cm, 10.6 - 13.3in.*lbf)

TORQUE SPECIFICATIONS

Part tightened		N*m	kgf*cm	ft.*lbf
VANE PUMP ASSEMBLY				
Vane pump housing rear x Vane pump housing front		22	224	16
Power steering oil pressure sensor		21	214	15
Pressure port union		69	704	51
Pump bracket front x Vane pump bracket rear		44	449	32
Oil reservoir set bolt		9.0	92	80 in.*lbf
Vane pump assembly set bolt		44	449	32
Vane pump housing rear x Power steering pump heat insulator		44	449	32
Pressure feed tube assembly x Vane pump assembly		44.1 (41)	450 (414)	33 (30)
POWER STEERING LINK ASSEMBLY				
Control vane housing x Rack housing		21	214	15
Rack guide spring cap lock nut		28 (39)	286 (398)	21 (29)
Power steering rack x Steering rack end sub-assembly		60 (83.4)	614 (850)	44 (61)
Tie rod end sub-assembly lock nut		74	750	54
Steering right and left turn pressure tubes		12 (13)	118 (133)	9 (10)
Power steering link assembly set bolt		74	749	54
Steering intermediate shaft set bolt		28	290	21
Power steering rack housing heat insulator set bolt	(a):	18	178	13 in.*lbf
	(b):	35	360	26 in.*lbf
Front suspension crossmember sub-assembly set bolt	A:	116	1,183	86
	B:	70	714	52
Engine mounting insulator RR x Front suspension crossmember sub-assembly		72	734	53
Front suspension member reinforcement LH and RH set bolt		47	479	35
Pressure feed tube assembly x Power steering link assembly		27 (25)	273 (255)	20 (18)
Pressure feed assembly clamp set bolt		7.8	80	69 in.*lbf
Steering sliding yoke sub-assembly x Steering intermediate shaft		28	290	21

(): For use without SST

SS

AIR CONDITIONING

SERVICE DATA

Refrigerant charge volume	Standard	460 +-30 g (16.2 +-1.1 oz.)

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Suction hose sub-assembly x Body	9.8	100	7
Suction hose sub-assembly x Condenser with receiver assembly	5.4	55	47 in.*lbf
Suction hose sub-assembly x Compressor with pulley assembly	9.8	100	7
Liquid tube sub-assembly x Condenser with receiver assembly	5.4	55	47 in.*lbf
No. 1 cooler refrigerant discharge hose x Compressor with pulley assembly	9.8	100	7
Air conditioning tube assembly x Body	5.4	55	47 in.*lbf
No. 1 condenser bracket collar x Condenser with receiver assembly	3.9	40	35 in.*lbf
Condenser with receiver assembly x Body	9.8	100	7

SUPPLEMENTAL RESTRAINT SYSTEM

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Steering pad assembly x Steering wheel assembly	8.8	90	78 in.*lbf
Steering wheel assembly x Steering column assembly	50	510	37
Front passenger airbag x Instrument panel reinforcement	18	190	15
Curtain shield airbag assembly x Body	14	143	10
Center airbag sensor assembly x Body	20	204	15
Front airbag sensor x Body	17.5	178	13
Side airbag sensor x Boby	9.0	92	80 in.*lbf
Rear airbag sensor x Body	9.0	92	80 in.*lbf
Seat position airbag sensor x Front seat	8.0	82	71 in.*lbf

SEAT BELT

TORQUE SPECIFICATIONS

FRONT SEAT BELT

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat inner belt assembly x Front seat	42	428	31
Front seat outer belt assembly (Upper part of retractor) x Body	5.0	51	44
Front seat outer belt assembly (Lower part of retractor) x Body	42	428	31
Front seat outer belt assembly (shoulder anchor) x Body	42	428	31
Front seat outer belt assembly (floor anchor) x Body	42	428	31
Front shoulder belt anchor adjuster assembly x Body	42	428	31

REAR SEAT BELT

Part Tightened	N*m	kgf*cm	ft.*lbf
Child restraint seat tether anchor bracket x Body	42	428	31
Rear seat inner with center belt assembly RH x Body	42	428	31
Rear seat inner with center belt assembly LH x Body	42	428	31
Rear seat outer belt assembly center (floor anchor) x Body	42	428	31
Rear seat outer belt assembly (retractor) x Body	42	428	31
Rear seat outer belt assembly (shoulder anchor) x Body	42	428	31
Rear seat outer belt assembly (floor anchor) x Body	42	428	31

WIPER AND WASHER

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft*lbf
Wiper motor x Wiper link	7.5	76	66 in lbf
Wiper motor x Wiper arm LH	26	265	228 in lbf
Wiper motor x Wiper arm RH	26	265	228 in lbf
Rear wiper motor x Body	5.5	56	49 in lbf
Rear wiper motor x Rear wiper arm	5.5	56	49 in lbf

AUDIO / VISUAL

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft*lbf
Front No. 2 speaker assembly x Front door	8.0	82	71
Amplifier assembly x Body	5.0	51	44 in lbf

HORN

TORQUE SPECIFICATIONS

HORN

Part Tightened	N*m	kgf*cm	ft.*lbf
Low pitched horn x Body	19.5	199	14
High pitched horn x Body	19.5	199	14

WINDSHIELD / WINDOWGLASS

TORQUE SPECIFICATIONS

MIRROR

Part Tightened	N*m	kgf*cm	ft.*lbf
Wiper arm x Body	20	204	15

MIRROR

TORQUE SPECIFICATIONS

MIRROR

Part Tightened	N*m	kgf*cm	ft.*lbf
Outer rear view mirror assembly x Door panel	8.0	82	71 in.*lbf

INSTRUMENT PANEL

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Front passenger airbag x Instrument panel reinforcement	18	184	13

SEAT

TORQUE SPECIFICATIONS

FRONT SEAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Inner belt x Seat adjuster	41	418	30
Front seatback x Seat adjuster	43	440	32
Front seat x Body	37	375	27

REAR SEAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear seatback hinge x Rear seatback	37	377	27
Rear seatback hinge x Body	42	428	31
Child restraint seat anchor bracket x Rear seatback	37	377	27
Child restraint seat anchor bracket x Body	42	428	31
Rear seatback lock striker x Body	21	214	15
Rear seat belt assembly outer center x Rear seatback frame	42	428	31

ENGINE HOOD / DOOR

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	in.*lbf
HOOD			
Hood x Hood hinge	13	133	10
Hood x Hood lock	8.0	82	71 in.*lbf
FRONT DOOR			
Door check x Body	30	306	22
Door check x Door panel	5.5	56	49 in.*lbf
Door frame sub-assembly front lower x Door panel	6.2	63	55 in.*lbf
Door frame sub-assembly rear lower x Door panel	6.2	63	55 in.*lbf
Door glass x Front door regulator sub-assembly	8.0	82	72 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	26	265	19
Door lock x Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Door outside handle cover x Door panel	4.0	41	35 in.*lbf
Door outside handle frame x Door panel	40	41	35 in.*lbf
Outer rear view mirror x Door panel	8.0	82	71 in.*lbf
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator x Door panel	8.0	82	71 in.*lbf
REAR DOOR			
Door check x Body	30	306	22
Door check x Door panel	5.5	56	49 in.*lbf
Door window frame sub-assembly rear lower x Door panel	6.2	63	55 in.*lbf
Door glass x Front door regulator sub-assembly	8.0	82	72 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	26	265	19
Door lockx Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Door outside handle cover x Door panel	4.0	41	35 in.*lbf
Door outside handle frame x Door panel	40	41	35 in.*lbf
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator motor x Door panel	8.0	82	71 in.*lbf
BACK DOOR			
Back door hinge assembly x Body	26	265	19
Back door hinge assembly x Door panel	11.5	117	8
Back door lock assembly x Door panel	7.0	71	62 in.*lbf

Part Tightened	N*m	kgf*cm	in.*lbf
Back door stay sub-assembly x Body	19.5	200	14
Back door stay sub-assembly x Body	8.0	82	71 in.*lbf
Back door stay sub-assembly x Door panel	8.0	82	71 in.*lbf
Rear wiper arm x Wiper motor	5.5	56	49 in.*lbf

EXTERIOR

TORQUE SPECIFICATIONS

FRONT BUMPER

Part Tightened	N*m	kgf*cm	ft.*lbf
Front bumper reinforcement x Body	20	204	15

REAR BUMPER

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear bumper reinforcement x Body	20	204	15

BACK DOOR OUTSIDE GARNISH

Part Tightened	N*m	kgf*cm	ft.*lbf
Back door garnish x Body	8.0	82	71

SLIDING ROOF

TORQUE SPECIFICATIONS

Part tightened		N*m	kgf*cm	ft.*lbf
Sliding roof housing assembly x Sliding roof drive gear		5.4	55	48 in.*lbf
Sliding roof housing assembly x Frame	Bolt	5.5	56	49 in.*lbf
	Nut	4.0	41	35 in.*lbf

OUTSIDE VEHICLE

GENERAL MAINTENANCE

Performing the following maintenance checks on the vehicle is the owner's responsibility. The owner may perform the maintenance or take the vehicle to a service center. Check the parts of the vehicle described below on a daily basis. In most cases, special tools are not required. It is recommended that the owner performs these checks. The procedures for general maintenance are as follows.

1. GENERAL NOTES

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

2. TIRES

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

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

3. WHEEL NUTS

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

4. TIRE ROTATION (See page TW-3)

5. WINDSHIELD WIPER BLADES

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

6. FLUID LEAKS

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

NOTICE:

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

7. DOORS AND ENGINE HOOD

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

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

INSIDE VEHICLE

GENERAL MAINTENANCE

Performing the following maintenance checks on the vehicle is the owner's responsibility. The owner may perform the maintenance or take the vehicle to a service center. Check the parts of the vehicle described below on a daily basis. In most cases, special tools are not required. It is recommended that the owner performs these checks. The procedures for general maintenance are as follows.

1. GENERAL NOTES

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

2. LIGHTS

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

(b) Check that the headlights are aimed properly.

3. WARNING LIGHTS AND BUZZERS

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

4. HORNS

(a) Check that the horn is working.

5. WINDSHIELD GLASS

(a) Check for scratches, pits or abrasions.

6. WINDSHIELD WIPERS AND WASHER

(a) Check that the windshield washers are aimed properly. Also, check that the center stream of washer fluid sprays on the windshield within the operating range of the wipers.

(b) Check if the wipers streak or not.

7. WINDSHIELD DEFROSTER

(a) When the heater or air conditioning is on the defroster setting, check if air comes out of the defroster outlet.

8. REAR VIEW MIRROR

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

9. SUN VISORS

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

10. STEERING WHEEL

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

11. SEATS

(a) Check that the seat adjusters, seatback recliner and other front seat controls operate smoothly.
(b) Check that all the latches lock securely in all positions.
(c) Check that the locks hold securely in all latched positions.
(d) Check that the headrests move up and down smoothly and that the locks hold securely in all latched positions.
(e) When the rear seatbacks are folded down, check that the latches lock securely.

12. SEAT BELTS

(a) Check that the seat belt system such as the buckles, retractors and anchors operate properly and smoothly.
(b) Check that the belt webbing is not cut, frayed, worn or damaged. Replace if necessary.

13. ACCELERATOR PEDAL

(a) Check that the accelerator pedal operates smoothly. In other words, check that the pedal does not have uneven pedal resistance or become stuck in certain positions.

14. BRAKE PEDAL

(a) Check that the brake pedal operates smoothly.
(b) Check that the pedal has the proper reserve distance and free play.
(c) Start the engine and check the brake booster function.

15. BRAKES

(a) In a safe place, check that the vehicle remains straight when applying the brakes.

16. PARKING BRAKE

(a) Check that the parking brake lever has the proper amount of travel (see page PB-1).
(b) On a safe incline, check that the vehicle is held securely with only the parking brake applied.

17. AUTOMATIC TRANSAXLE "PARK" MECHANISM

(a) Check the lock release button of the shift lever for proper and smooth operation.
(b) When the shift lever is in the P position and all brakes are released on a low incline, check that the vehicle is stable.

UNDER HOOD

GENERAL MAINTENANCE

1. GENERAL NOTES

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

2. WINDSHIELD WASHER FLUID

(a) Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

(a) Check that the coolant level is between the "FULL" and "LOW" lines on the see-through reservoir.

4. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and not blocked by leaves, dirt or bugs.

(b) Check the hoses for cracks, kinks, rot or loose connections.

5. BATTERY ELECTROLYTE LEVEL

(a) Check that the electrolyte level of all the battery cells is between the upper and lower level lines on the case.
HINT:
If the electrolyte level is difficult to see, lightly shake the vehicle.

6. BRAKE FLUID LEVEL

(a) Check that the brake fluid levels are near the upper level lines on the see-through reservoirs.

7. ENGINE DRIVE BELT

(a) Check the drive belt for fraying, cracks, wear or oiliness.

8. ENGINE OIL LEVEL

(a) Check the level on the dipstick with the engine stopped.

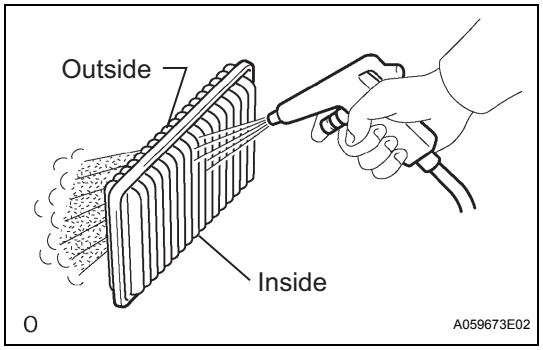
9. AUTOMATIC TRANSAXLE FLUID LEVEL (See page AX-82)

10. EXHAUST SYSTEM

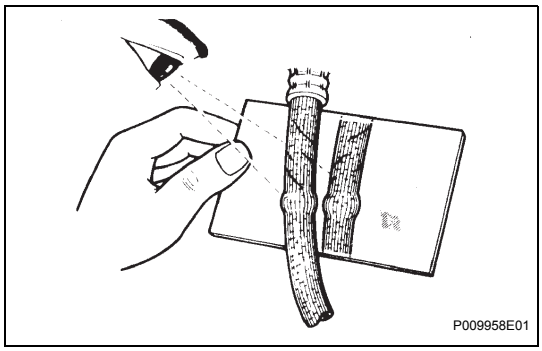
(a) Check for unusual exhaust sounds or abnormal exhaust fumes. Inspect the cause and repair it.

ENGINE

GENERAL MAINTENANCE



1. **INSPECT DRIVE BELT (See page EM-6)**
2. **REPLACE SPARK PLUGS**
   (a) Check the spark plugs (see page IG-5).
3. **INSPECT AIR CLEANER FILTER**
   (a) Remove the air filter.
   (b) Visually check that the air filter is not excessively damaged or oily. If necessary, replace the air filter.
   (c) Reinstall the air filter.
   (d) Clean the filter with compressed air.
   HINT:
   First blow from the inside of the filter thoroughly, and then repeat from the outside.
4. **REPLACE AIR CLEANER FILTER**
   (a) Replace the air filter with a new one.
5. **REPLACE ENGINE OIL AND OIL FILTER (See page LU-1)**
6. **REPLACE ENGINE COOLANT (See page CO-1)**
7. **INSPECT GASKET IN FUEL TANK CAP (See page EC-6)**
8. **INSPECT FUEL LINES AND CONNECTIONS, FUEL TANK VAPOR VENT SYSTEM HOSES**
   (a) Visually check the fuel lines for cracks, leakage, loose connections, deformation.
9. **INSPECT EXHAUST PIPES AND MOUNTINGS**
   (a) Visually check the pipes, hangers and connections for severe corrosion, leaks or damage.
10. **INSPECT VALVE CLEARANCE (See page EM-10)**



MA

BRAKE

GENERAL MAINTENANCE

1. INSPECT BRAKE LINES AND HOSES

HINT:

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

(a) Using a mirror, check the entire circumference and length of the brake lines and hoses for:
- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

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

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

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

2. INSPECT FRONT BRAKE

(a) Check the front brake pads and discs (see page BR-26).

3. INSPECT REAR BRAKE LININGS AND DRUMS

(a) Check the brake linings and drums. Also check the brake linings of parking brake.

4. INSPECT OR CHANGE BRAKE FLUID

(a) Check the fluid level. Add fluid if necessary (see page BR-3).

FLUID:

SAE J1703 or FMVSS No. 116 DOT3

CHASSIS

GENERAL MAINTENANCE

1. INSPECT STEERING LINKAGE AND GEAR HOUSING

(a) Check the steering wheel free play.

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

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

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

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

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

(5) Check that the connectors are properly connected to the steering gear housing.

2. INSPECT BALL JOINTS AND DUST COVERS

(a) Inspect the ball joints for excessive looseness.

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

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

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

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

Maximum ball joint vertical play:
0 mm (0 in.)

If there is any play, replace the ball joint.

(b) Check the dust cover for damage.

3. INSPECT DRIVE SHAFT BOOTS

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

4. INSPECT AUTOMATIC TRANSAXLE FLUID LEVEL (See page AX-82)

5. INSPECT MANUAL TRANSAXLE OIL (See page MX-2)

6. ROTATE TIRES (See page TW-3)

BODY

GENERAL MAINTENANCE

1. TIGHTEN BOLTS AND NUTS

(a) Tighten the bolts and nuts on the chassis parts listed below, if necessary.
- Front axle and suspension
- Drive train
- Rear axle and suspension
- Brake system
- Engine mounting
- Other chassis parts

(b) Tighten the bolts and nuts on the body parts listed below, if necessary.
- Seat belt system
- Seats
- Doors and hood
- Body mountings
- Fuel tank
- Exhaust pipe system
- Other body parts

2. CLEAN AIR CONDITIONING FILTER

(a) Visually inspect the surface of the filter.

(b) If the filter is contaminated with foreign matter, clean or replace the filter.

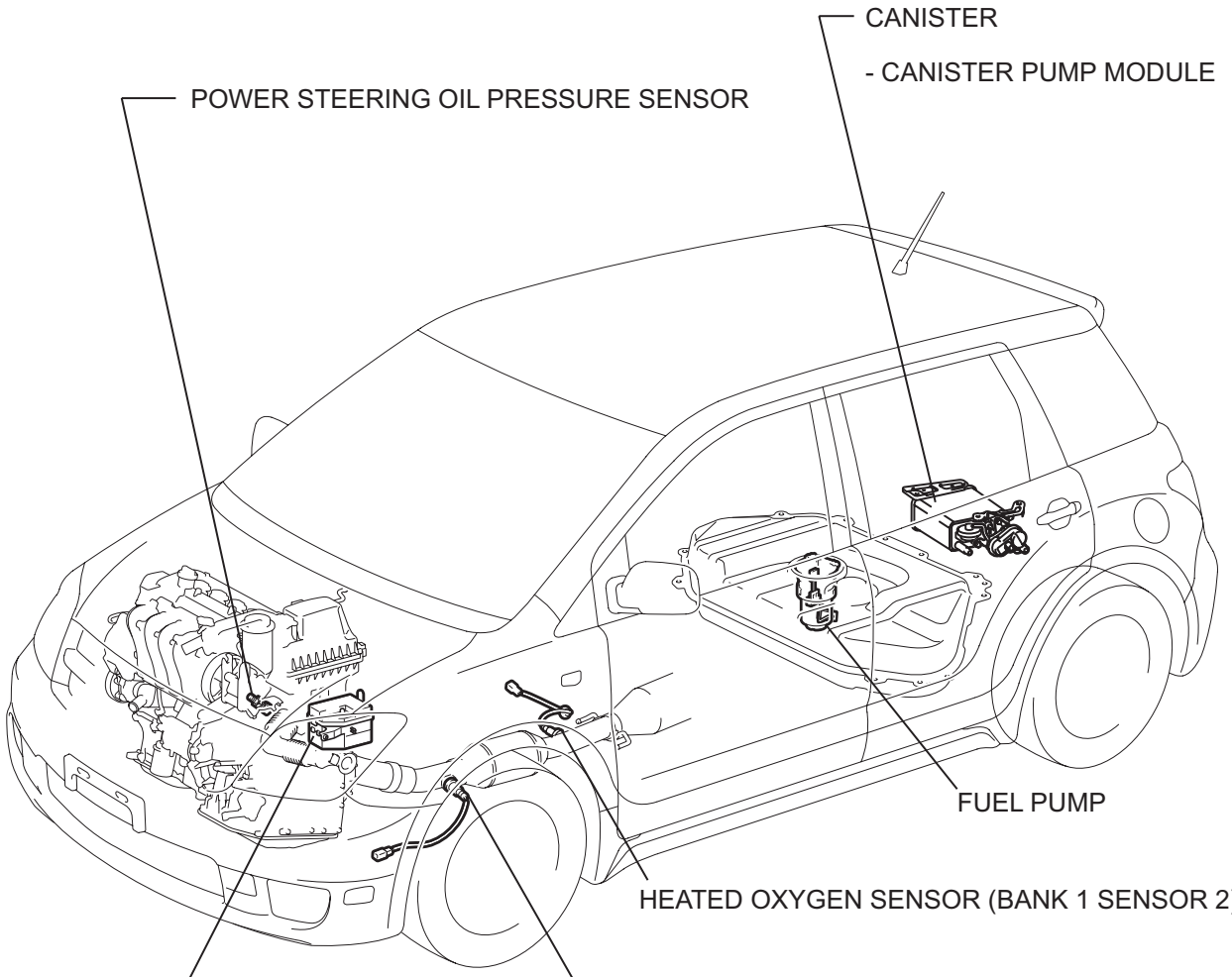
PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable valve timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift	Camshaft timing and lift control
Crankshaft position sensor "A"	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control valve
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
HO2 sensor	Heated oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo pressure sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor "A", Speed sensor for stability control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor "A"	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic transaxle
Intermediate shaft speed sensor "A"	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor

TOYOTA/LEXUS name	Definition
Input speed sensor, Input turbine speed sensor "A", Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobiliser system, Immobiliser system	Vehicle anti-theft system

PARTS LOCATION

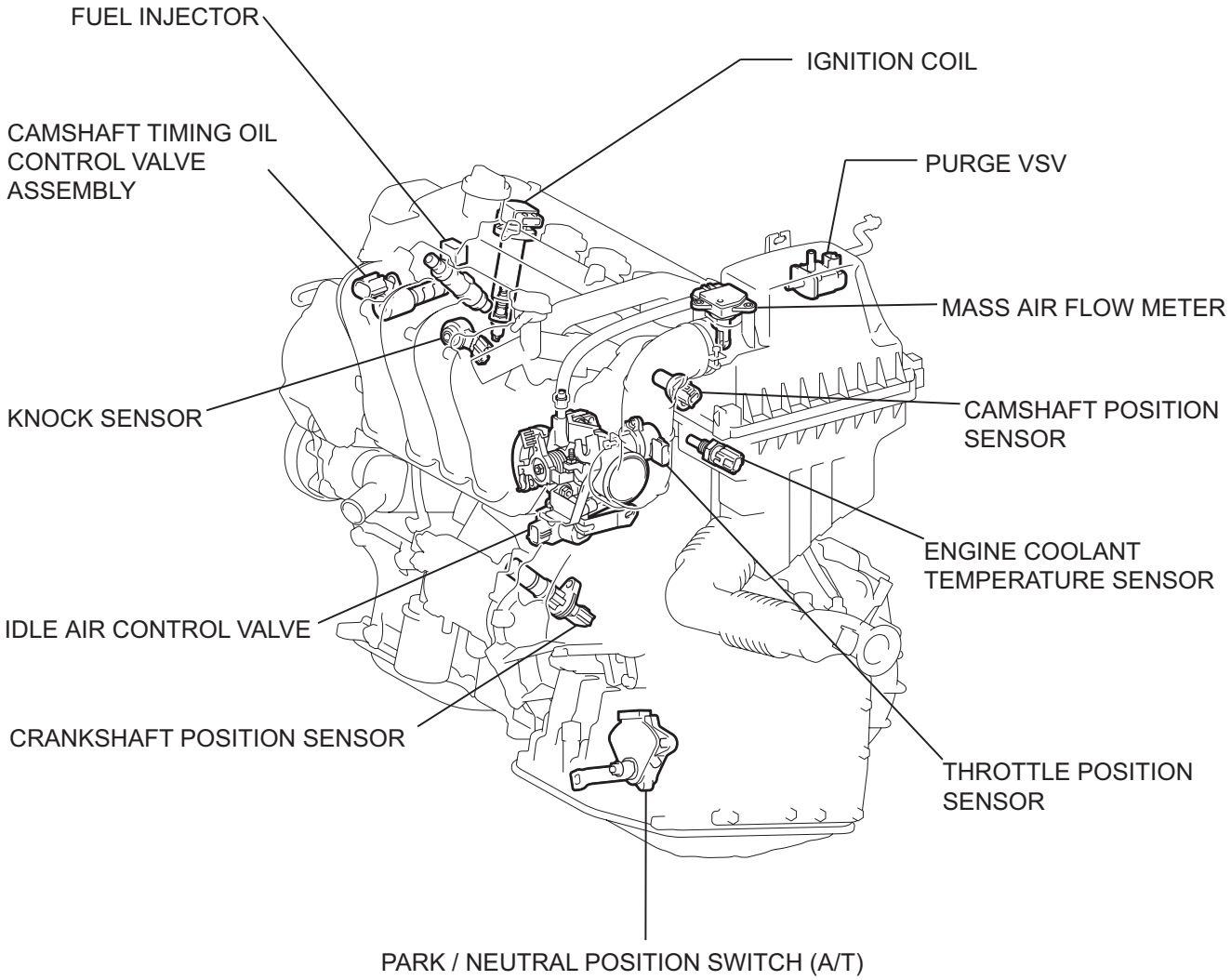


P

A119247E01

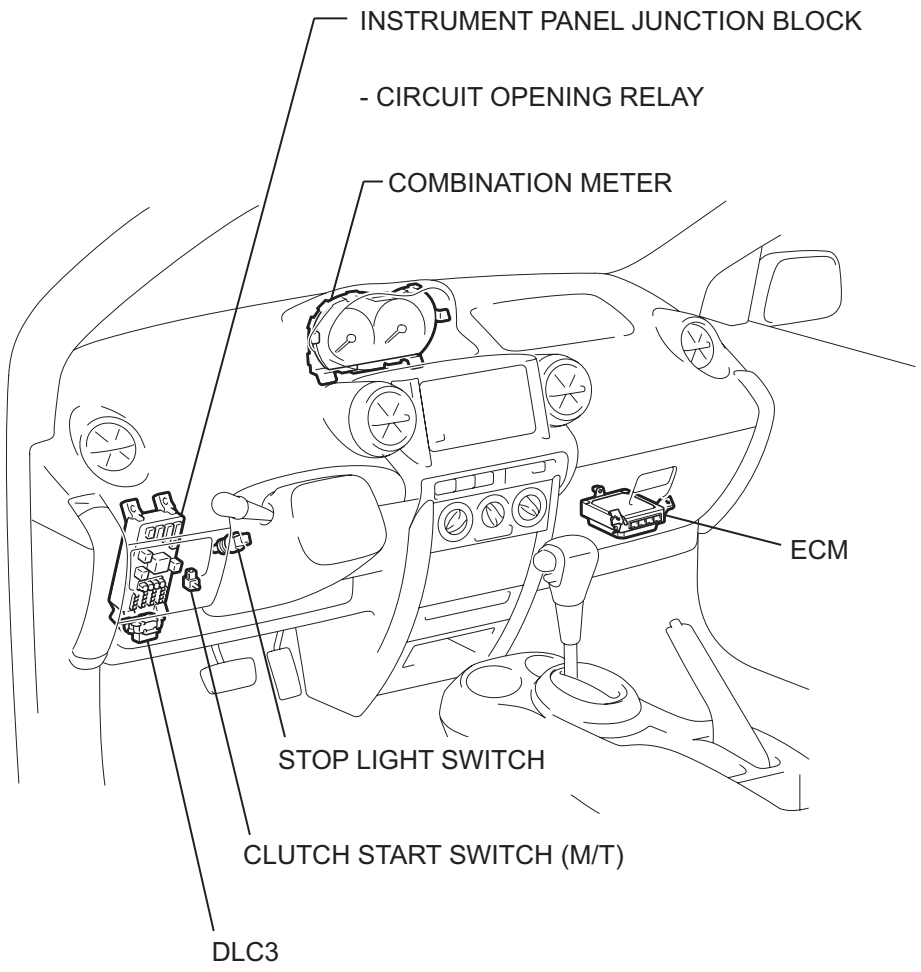
ES

ES



P

A119248E01

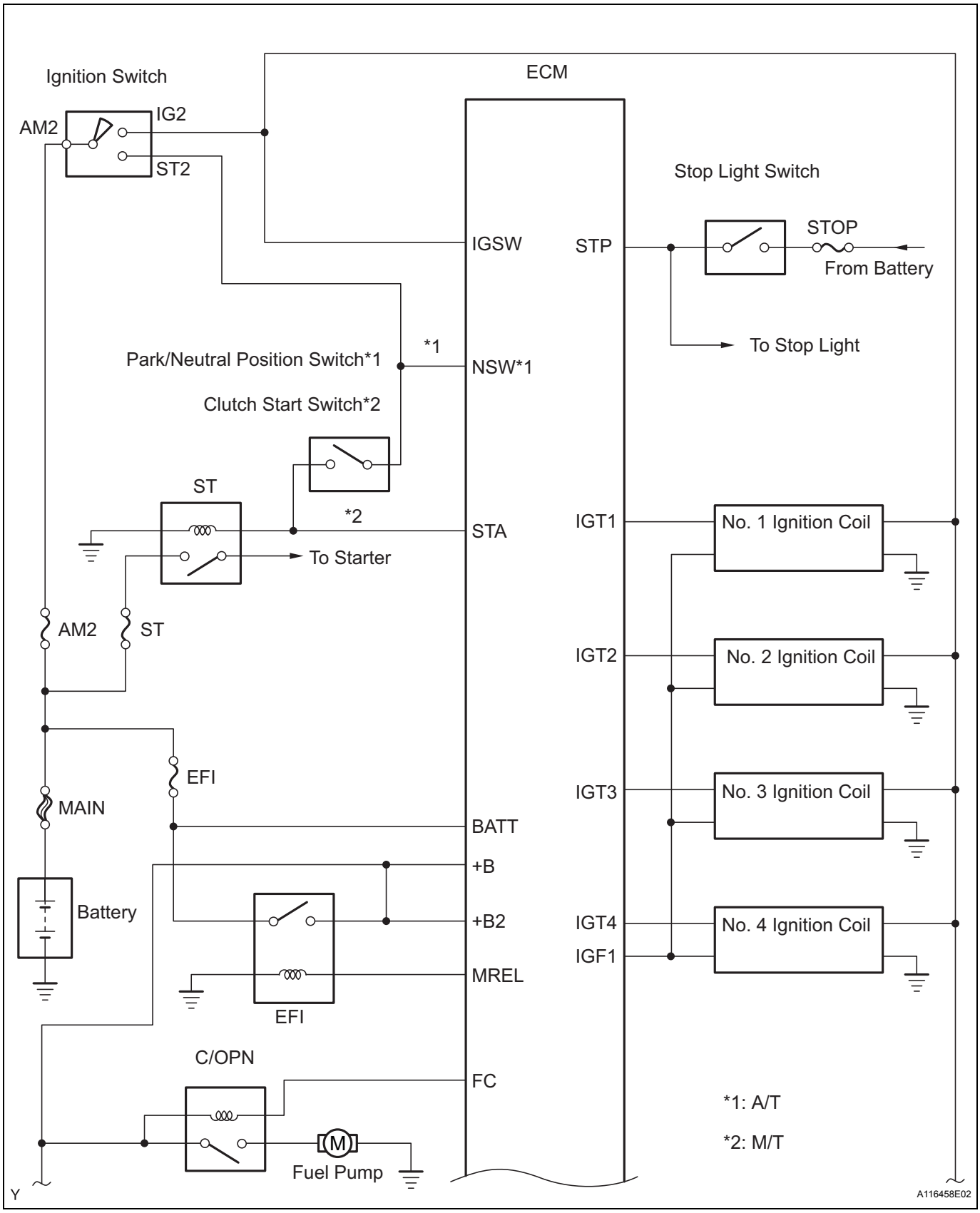


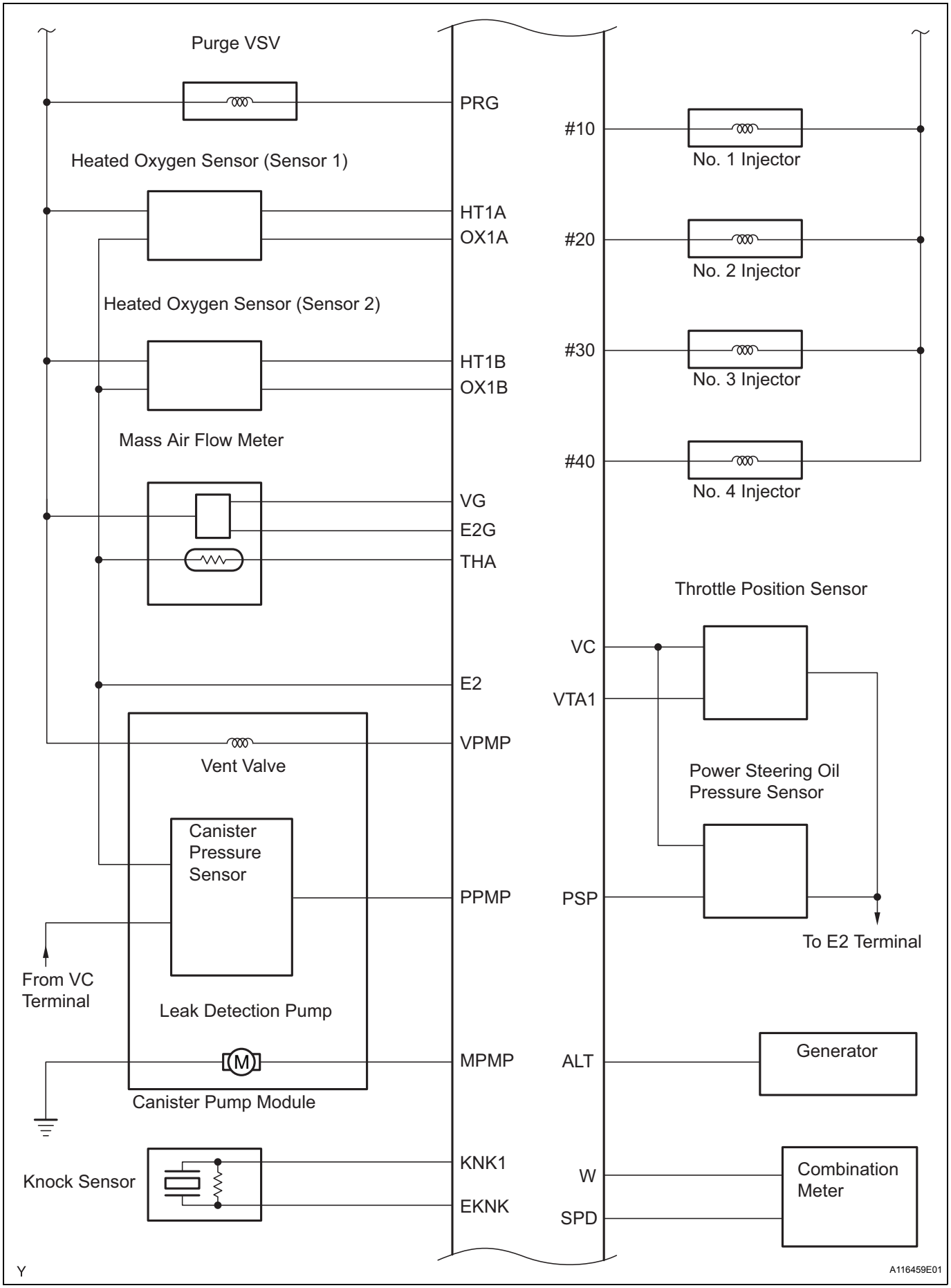
P

A119249E01

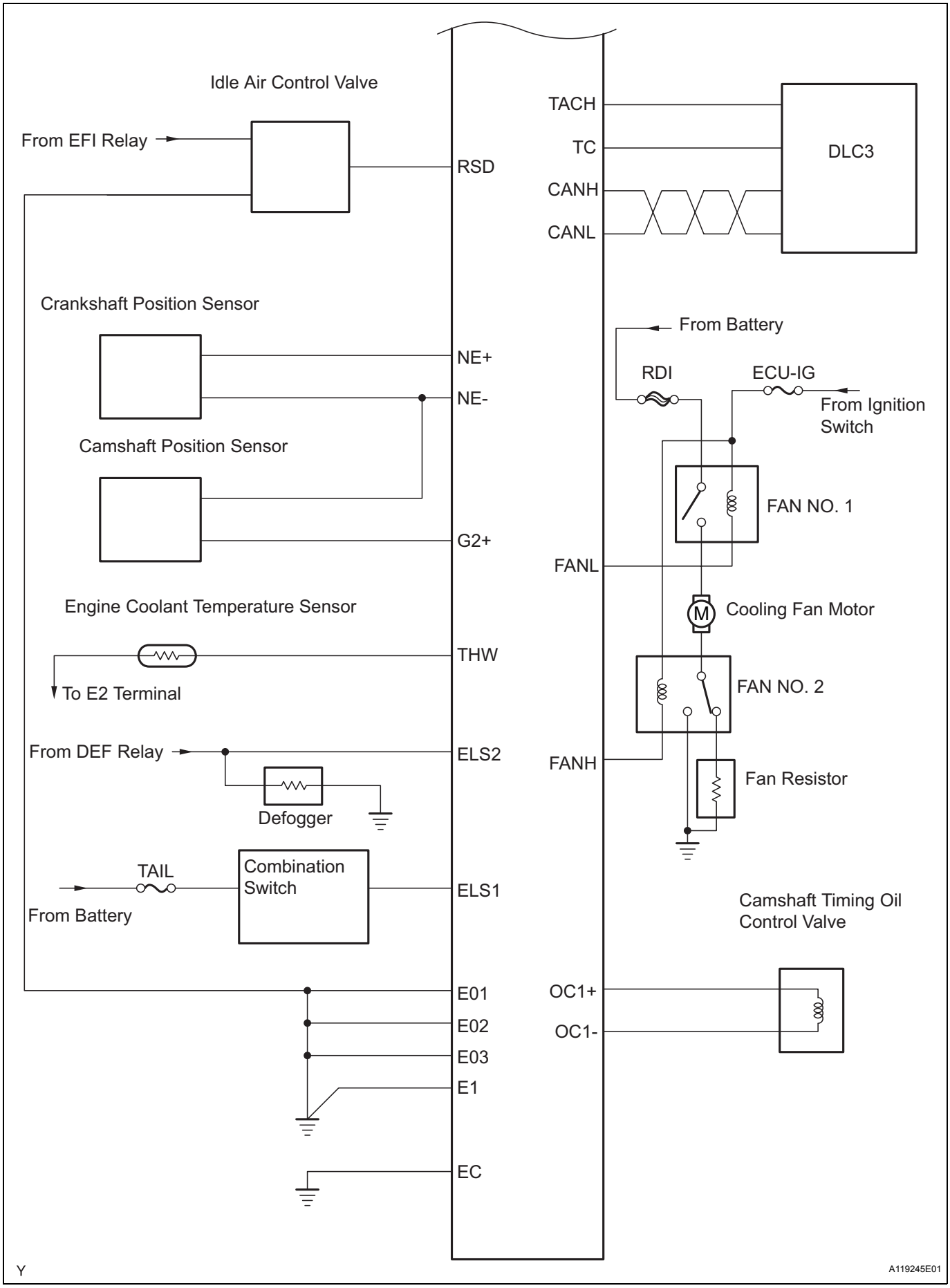
ES

SYSTEM DIAGRAM




Purge VSV
PRG
Heated Oxygen Sensor (Sensor 1)
HT1A
OX1A
Heated Oxygen Sensor (Sensor 2)
HT1B
OX1B
Mass Air Flow Meter
VG
E2G
THA
E2
VPMP
Vent Valve
Canister Pressure Sensor
PPMP
From VC Terminal
Leak Detection Pump
MPMP
Canister Pump Module
Knock Sensor
KNK1
EKNK
#10
No. 1 Injector
#20
No. 2 Injector
#30
No. 3 Injector
#40
No. 4 Injector
Throttle Position Sensor
VC
VTA1
Power Steering Oil Pressure Sensor
PSP
To E2 Terminal
ALT
Generator
W
SPD
Combination Meter
Y
A116459E01

ES


Idle Air Control Valve
From EFI Relay
RSD
TACH
TC
CANH
CANL
DLC3
Crankshaft Position Sensor
NE+
NE-
From Battery
RDI
ECU-IG
From Ignition Switch
Camshaft Position Sensor
G2+
FAN NO. 1
FANL
Engine Coolant Temperature Sensor
M
Cooling Fan Motor
THW
To E2 Terminal
FAN NO. 2
From DEF Relay
ELS2
FANH
Fan Resistor
Defogger
TAIL
Combination Switch
ELS1
From Battery
Camshaft Timing Oil Control Valve
E01
E02
E03
E1
OC1+
OC1-
EC
Y
A119245E01

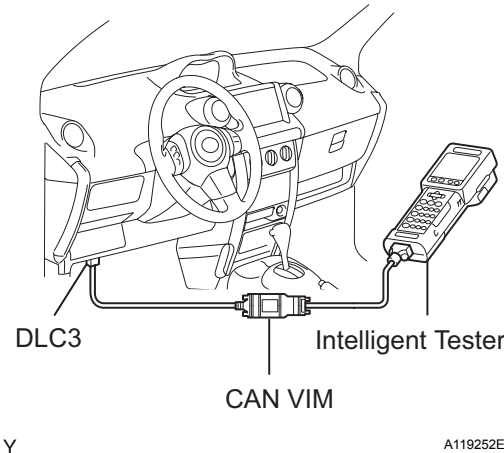
ES

DTC CHECK / CLEAR

NOTICE:
When the diagnosis system is changed from normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode are erased. Before changing modes, always check and make a note of DTCs and freeze frame data.

HINT:

- DTCs which are stored in the ECM can be displayed on the intelligent tester. The intelligent tester can display current and pending DTCs.
- Some DTCs are not set if the ECM does not detect the same malfunction again during a second consecutive driving cycle. However, malfunctions detected on only 1 occasion are stored as pending DTCs.



1. CHECK DTC (Using the intelligent tester)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Check the DTC(s) and freeze frame data, and then write them down.
(e) See page ES-47 to check the details of the DTC(s).

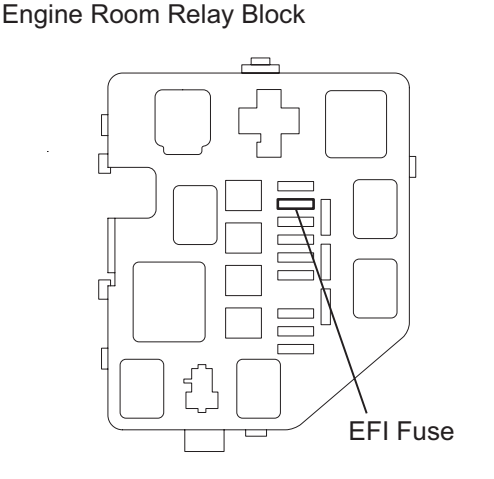
2. CLEAR DTC (Using the intelligent tester)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
(d) Press the YES button.

3. CLEAR DTC (Without using the intelligent tester)

(a) Perform either one of the following operations.
(1) Disconnect the negative (-) battery cable for more than 1 minute.

(2) Remove the EFI fuse from the engine room relay block located inside the engine compartment for more than 1 minute.
NOTICE:
When disconnecting the battery cable, perform the initialization procedure.



FREEZE FRAME DATA

1. DESCRIPTION

Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

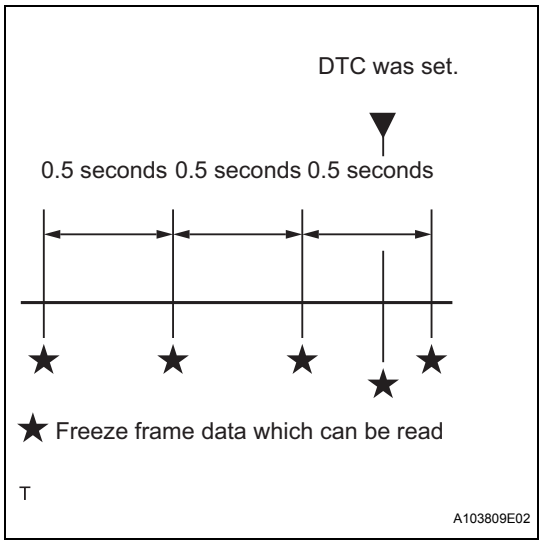
HINT:

If it is impossible to replicate the problem even though a DTC is detected, confirm the freeze frame data.

The ECM records engine conditions in the form of freeze frame data every 0.5 seconds. Using the intelligent tester, 5 separate sets of freeze frame data, including the data values at the time when the DTC was set, can be checked.

– 3 data sets before the DTC was set.
– 1 data set when the DTC was set.
– 1 data set after the DTC was set.

These data sets can be used to simulate the condition of the vehicle around the time of the occurrence of the malfunction. The data may assist in identifying of the cause of the malfunction, and in judging whether it was temporary or not.



2. LIST OF FREEZE FRAME DATA

LABEL (Intelligent Tester Display)	Measure Item/Range	Diagnostic Note
INJECTOR	Injector	-
IGN ADVANCE	Ignition advance	-
CALC LOAD	Calculated load	Calculated load by ECM
VEHICLE LOAD	Vehicle load	-
MAF	Mass air flow volume	If value approximately 0.0 g/sec.: • Mass air flow meter power source circuit open or short • VG circuit open or short If value 160.0 g/sec. or more: • E2G circuit open
ENGINE SPD	Engine speed	-
VEHICLE SPD	Vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature	If value -40°C, sensor circuit open If value 140°C or more sensor circuit shorted
INTAKE AIR	Intake air temperature	If value -40°C, sensor circuit open If value 140°C or more sensor circuit shorted
AIR-FUEL PATIO	Air-fuel ratio	-
PURGE DENSITY	Learning value of purge density	-
EVAP PURGE FLOW	EVAP purge flow	-
EVAP PURGE VSV	EVAP purge VSV duty ratio	-
KNOCK CRRT VAL	Correction learning value of knocking	-
KNOCK FB VAL	Feedback value of knocking	-

LABEL (Intelligent Tester Display)	Measure Item/Range	Diagnostic Note
THROTTLE POS	Throttle position	Read value with ignition switch ON (Do not start engine)
THROTTLE POS	Throttle sensor positioning	Read value with ignition switch ON (Do not start engine)
O2S B1 S1	Heated oxygen sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
O2S B1 S2	Heated oxygen sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
TOTAL FT #1	Total fuel trim	-
SHORT FT #1	Short-term fuel trim	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim	Overall fuel compensation carried out in long-term to compensate a continual deviation of short-term fuel trim from central valve
FUEL SYS #1	Fuel system status (bank 1)	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control malfunctioning
O2FT B1 S1	Fuel trim at heated oxygen sensor	Same as SHORT FT #1
O2FT B1 S2	Fuel trim at heated oxygen sensor	Same as SHORT FT #1
O2 LR B1 S1	Heated oxygen sensor response time (lean to rich)	-
O2 RL B1 S1	Heated oxygen sensor response time (rich to lean)	-
CAT TEMP B1 S1	Catalyst temperature	-
CAT TEMP B1 S2	Catalyst temperature	-
INI COOL TEMP	Initial engine coolant temperature	-
INI INTAKE TEMP	Initial intake air temperature	-
INJ VOL	Injection volume	-
PS PRESSURE	Power steering signal (history)	This signal status usually ON until ignition switch turned OFF
STARTER SIG	Starter signal	-
PS SW	Power steering switch signal	-
PS SIGNAL	Power steering signal (history)	-
CTP SW	Closed throttle position switch	-
A/C SIGNAL	A/C signal	-
PNP SW [NSW]	Neutral position switch signal	-
ELECT LOAD SIG	Electrical load signal	-
STOP LIGHT SW	Stop light switch	-
BATTERY VOLTAGE	Battery voltage	-
ATM PRESSURE	Atmospheric pressure	-
EVAP (Purge) VSV	EVAP purge VSV	-
FUEL PUMP / SPD	Fuel pump/speed status	-
VVT CTRL B1	VVT control status (bank 1)	-
VACUUM PUMP	Key-off EVAP system pump status	See page ES-272

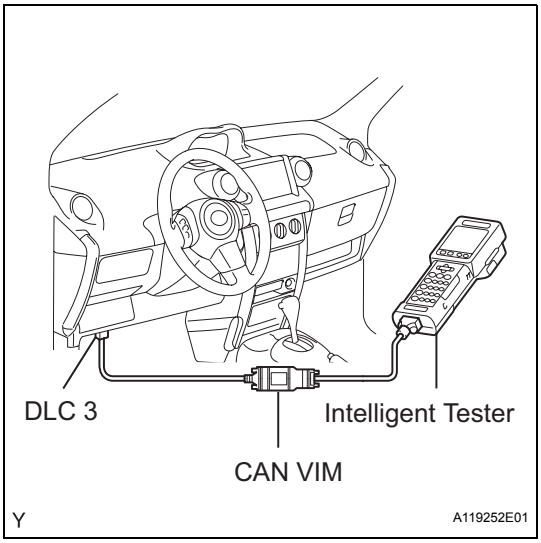
LABEL (Intelligent Tester Display)	Measure Item/Range	Diagnostic Note
EVAP VENT VAL	Key-off EVAP system vent valve status	-
FAN MOTOR	Electric fan motor	-
TC/TE1	TC and TE1 terminals of DLC3	-
FC IDL	Idle fuel cut	ON: when throttle valve fully closed and engine speed over 1,500 rpm
FC TAU	FC TAU	Fuel cut being performed under very light load to prevent engine combustion from becoming incomplete
VVTL AIM ANGL#1	VVT aim angle (bank 1)	-
VVT CHNG ANGL#1	VVT change angle (bank 1)	-
VVT OCV DUTY B1	VVT OCV operation duty (bank 1)	-
IGNITION	Ignition	-
CYL #1	Cylinder #1 misfire rate	Displayed only when idling
CYL #2	Cylinder #2 misfire rate	Displayed only when idling
CYL #3	Cylinder #3 misfire rate	Displayed only when idling
CYL #4	Cylinder #4 misfire rate	Displayed only when idling
CYL ALL	All cylinder misfire rate	Displayed only when idling
MISFIRE RPM	Misfire RPM	-
MISFIRE LOAD	Misfired load	-
MISFIRE MARGIN	Misfire monitoring	-
ENG RUN TIME	Accumulated engine running time	-
TIME DTC CLEAR	Cumulative time after DTC cleared	-
DIST DTC CLEAR	Accumulated distance after DTC cleared	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared	-

CHECK MODE PROCEDURE

HINT:
Compared to normal mode, check mode is more sensitive to malfunctions and can detect the malfunctions that cannot be detected by normal mode.

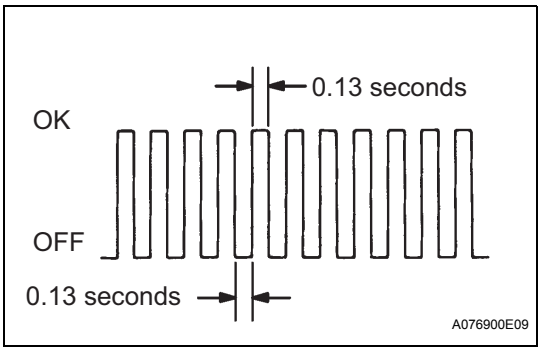
NOTICE:
All the stored DTCs and freeze frame data are erased if: 1) the ECM is changed from normal mode to check mode or vice versa; or 2) the ignition switch is turned from ON to ACC or OFF while in check mode.
Before changing modes, always check and make a note of any DTCs and freeze frame data.

ES



1. CHECK MODE PROCEDURE

(a) Check and ensure the following conditions:
  (1) Positive (+) battery voltage 11 V or more
  (2) Throttle valve fully closed
  (3) Transmission in the P or N positions
  (4) A/C switch OFF
(b) Turn the ignition switch OFF.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.
(f) Switch the ECM from normal mode to check mode.



(g) Make sure the MIL flashes as shown in the illustration.
(h) Start the engine.
(i) Make sure the MIL turns off.
(j) Simulate the conditions of the malfunction described by the customer.
(k) Check DTCs and freeze frame data using the tester.

FAIL-SAFE CHART

If any of the following DTCs are set, the ECM enters fail-safe mode to allow the vehicle to be driven temporarily.

DTC	Component	Fail-safe Operation	Fail-safe Deactivation Condition
P0031, P0032, P0037 and P0038	Heated Oxygen (HO2) Sensor Heater	ECM turns off HO2 sensor heater	Ignition switch OFF
P0100, P0102 and P0103	Mass Air Flow (MAF) Meter	ECM calculates ignition timing in accordance with engine RPM and throttle valve position	Pass condition detected
P0110, P0112 and P0113	Intake Air Temperature (IAT) Sensor	ECM estimates IAT to be 20°C (68°F)	Pass condition detected
P0115, P0117 and P0118	Engine Coolant Temperature (ECT) Sensor	ECM estimates ECT to be 80°C (176°F)	Pass condition detected
P0120, P0122 and P0123	Throttle Position (TP) Sensor	ECM cuts fuel intermittently	Pass condition detected and ignition switch OFF
P0121	TP Sensor	ECM cuts fuel intermittently	Pass condition detected and ignition switch OFF
P0327 and P0328	Knock Sensor	ECM sets ignition timing to maximum retard	Ignition switch OFF
P0351 to P0354	Igniter	ECM cuts fuel	Pass condition detected

SFI SYSTEM

PRECAUTION

NOTICE:
When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

System Name	See Procedure
Sliding Roof System	IN-23

HINT:
Initialization cannot be completed by only removing the battery.

DEFINITION OF TERMS

Terms	Definitions
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by ECM based on same malfunction detection logic.
Typical enabling condition	Preconditions that allow ECM to detect malfunctions. With all preconditions satisfied, ECM sets DTC when monitored value(s) exceeds malfunction threshold(s).
Sequence of operation	Order of monitor priority, applied if multiple sensors and components are involved in single malfunction detection process. Each sensor and component monitored in turn and not monitored until previous detection operation completed.
Required sensor/components	Sensors and components used by ECM to detect each malfunction.
Frequency of operation	Number of times ECM checks for each malfunction during each driving cycle. "Once per driving cycle" means ECM only performs checks for that malfunction once during single driving cycle. "Continuous" means ECM performs checks for that malfunction whenever enabling conditions are met.
Duration	Minimum time for which ECM must detect continuous deviation in monitored value(s) in order to set DTC. Timing begins when Typical Enabling Conditions are met.
Malfunction thresholds	Value beyond which ECM determines malfunctions exist and sets DTCs.
MIL operation	Timing of MIL illumination after malfunction detected. "Immediate" means ECM illuminates MIL as soon as malfunction detected. "2 driving cycle" means ECM illuminates MIL if same malfunction detected second time during next sequential driving cycle.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(f) According to the display on the tester, use the DATA LIST.

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder: Min.: 0, Max: 32.64 ms	1.0 to 3.0 ms: Idling	-
IGN ADVANCE	Ignition timing advance for No. 1 cylinder: Min.: -64, Max.: 63.5 deg.	BTDC 2 to 14 deg: Idling	-
CALC LOAD	Calculated load by ECM: Min.: 0, Max.: 100%	10 to 30%: Idling 10 to 30%: Running without load (2,500 rpm)	-
VEHICLE LOAD	Vehicle load: Min.: 0, Max.: 25700%	Actual vehicle load	-
MAF	Air flow rate from Mass Air Flow (MAF) meter: Min.: 0, Max.: 665.35 g/sec.	• 0.54 to 4.33 g/sec. for Manual Transaxle (M/T): Idling 0.58 to 4.67 g/sec. for Automatic Transaxle (A/T): Idling • 3.33 to 9.17 g/sec.: Running without load (2,500 rpm)	If value approximately 0.0 g/sec.: • MAF meter power source circuit open • VG circuit open or short If value 160.0 g/sec. or more: • E2G circuit open
ENGINE SPD	Engine speed: Min.: 0, Max.: 16,383 rpm	600 to 700 rpm: Idling (M/T) 650 to 750 rpm: Idling (A/T)	-
VEHICLE SPD	Vehicle speed: Min.: 0, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature (ECT): Min.: -40°C (-40°F), Max.: 140°C (284°F)	80 to 100°C (176 to 203°F): After warming up engine	• If value -40°C (-40°F): ECT sensor circuit open • If value 140°C (284°F) or more: ECT sensor circuit shorted
INTAKE AIR	Intake air temperature: Min.: -40°C (-40°F), Max.: 140°C (284°F)	Equivalent to ambient air temperature	• If value -40°C (-40°F): IAT sensor circuit open. • If value 140°C (284°F) or more: IAT sensor circuit shorted
AIR-FUEL RATIO	Air-fuel ratio: Min.: 0, Max.: 1.999	0.8 to 1.2: During idling	-
PURGE DENSITY	Learning value of purge density: Min.: -50, Max.: 350	-40 to 10%: Idling	Service data

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
EVAP PURGE FLOW	Purge flow: Min. : 0, Max.: 102.4%	0 to 10%: Idling	Service data
EVAP PURGE VSV	Purge VSV control duty: Min.: 0, Max.: 100%	10 to 50%: During Idling	Order signal from ECM
VAPOR PRES PUMP	Vapor pressure: Min.: -4.125, Max.: 2.125 kPa	0 kPa: Fuel tank cap removed	Pressure inside fuel tank monitored by vapor pressure sensor
VAPOR PRES CALC	Vapor pressure (calculated): Min.: -5.632, Max.: 715.3264 kPa	0 kPa: Fuel tank cap removed	Pressure inside fuel tank monitored by vapor pressure sensor
KNOCK CRRT VAL	Correction learning value of knocking: Min.: -64, Max.: 1,984 CA	4 to 25°CA: Driving at 70 km/h (44 mph)	Service data
KNOCK FB VAL	Feedback value of knocking: Min.: -64, Max.: 1,984 CA	-22 to 0°CA: Driving at 70 km/h (44 mph)	Service data
THROTTLE POS	Throttle position sensor: Min.: 0, Max.: 100%	• 10 to 20%: Throttle valve fully closed • 66 to 98%: Throttle fully open	• Calculated value based on VTA1 • Read value with ignition switch ON (Do not start engine)
THROTTLE POS	Absolute throttle position sensor: Min.: 0, Max.: 100%	0%: Throttle valve fully closed 70 to 100%: Throttle valve fully open	Read value with ignition switch ON (Do not start engine) • Recognition value for throttle opening angle on ECM • Read value with ignition switch ON (Do not start engine)
O2S B1 S1	Heated oxygen (HO2) sensor output voltage for bank 1 sensor 1: Min.: 0, Max.: 1.0 V	0 to 1.0 V: Idling	Performing either Active Test, INJ VOL or A/F CONTROL enables front HO2 sensor output voltage to be checked.
O2S B1 S2	HO2 sensor output voltage for bank 1 sensor 2: Min.: 0, Max.: 1.0 V	0 to 1.0 V: Idling	Performing either Active Test, INJ VOL or A/F CONTROL enables rear HO2 sensor output voltage to be checked.
TOTAL FT #1	Total fuel trim of bank 1: Average value for fuel trim system of bank 1: Min.: 0.5, Max.: 1.496	0.5 to 1.4: Idling	-
SHORT FT #1	Short-term fuel trim of bank 1: Min.: -100, Max.: 100%	-20 to 20%	-
LONG FT #1	Long-term fuel trim of bank 1: Min.: -100, Max.: 100%	-20 to 20%	Overall long-term fuel compensation that helps maintain air-fuel ratio at stoichiometric levels (moderates long-term deviations of short-term fuel trim from central value)
FUEL SYS #1	Fuel system status (Bank 1): OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling with warm engine	• OL (Open Loop): Conditions for closed loop not yet satisfied • CL (Closed Loop): Using HO2 sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but HO2 sensor used for fuel control malfunctioning

ES

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
O2FT B1 S1	Short-term fuel trim associated with bank 1 sensor 1: Min.: -100, Max.: 100%	-20 to 20%	Same as SHORT FT #1
O2FT B1 S2	Short-term fuel trim associated with bank 1 sensor 2: Min.: -100, Max.: 100%	-20 to 20%	Same as SHORT FT #2
O2 LR B1 S1	Response time of HO2 sensor, from lean to rich (bank 1 sensor 1): Min.: 0, Max.: 16,711 ms	0 to 1,000 ms: Idling with warm engine	Service data
O2 RL B1 S1	Response time of HO2 sensor, from rich to lean (bank 1 sensor 1): Min.: 0, Max.: 16,711 ms	0 to 1,000 ms: Idling with warm engine	Service data
CAT TEMP B1S1	Catalyst temperature (bank 1, sensor 1): Min.: -40, Max.: 6,513.5°C	-	-
CAT TEMP B1S2	Catalyst temperature (bank 1, sensor 2): Min.: -40, Max.: 6,513.5°C	-	-
INI COOL TEMP	Initial engine coolant temperature: Min.: -40, Max.: 120°C	Close to ambient air temperature	Service data
INI INTAKE TEMP	Initial intake air temperature: Min.: -40, Max.: 120°C	Close to ambient air temperature	Service data
INJ VOL	Injection volume (cylinder 1): Min.: 0, Max.: 2.048 ml	0.05 to 0.15 ml: Idling	Quantity of fuel injection volume for 10 times
STARTER SIG	Starter signal: ON or OFF	ON: Cranking	-
PS SW	Power steering signal: ON or OFF	ON: Power steering operation	-
PS SIGNAL	Power steering signal: ON or OFF	ON: When steering wheel first turned after ignition switch turned ON	This signal usually ON until ignition switch turned OFF
CTP SW	Closed throttle position switch: ON or OFF	• ON: Throttle fully closed • OFF: Throttle open	-
A/C SIGNAL	A/C signal: ON or OFF	ON: A/C ON	-
PNP SW [NSW]*2	Park/neutral position switch signal: ON or OFF	ON: P or N position	-
ELECT LOAD SIG	Electrical load signal: ON or OFF	ON: Defogger switch ON	-
STOP LIGHT SW	Stop light switch: ON or OFF	• ON: Brake pedal depressed • OFF: Brake pedal released	-
BATTERY VOLTAGE	Battery voltage: Min.: 0, Max.: 65.535 V	9 to 14 V: Idling	-
ATM PRESSURE	Atmosphere pressure Min.: 0, Max.: 255 kPa	Equivalent to atmospheric pressure (absolute pressure)	-
EVAP(Purge)VSV	Purge VSV status: ON or OFF	-	-
FUEL PUMP / SPD	Fuel pump / speed status: ON/H or OFF/M, L	ON: Idling	Active Test support data
VVT CTRL B1	VVT control status (bank 1): ON or OFF	ON: VVT system operation	-
VACUUM PUMP	Key-off EVAP system pump status: ON or OFF	-	Active Test support data

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
EVAP VENT VAL	Key-off EVAP system vent valve status: ON or OFF	-	Active Test support data
FAN MOTOR	Electric fan motor: ON or OFF	ON: Electric fan motor operating	-
TC/TE1	TC and TE1 terminal of DLC3: ON or OFF	-	Active Test support data
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operation	FC IDL = "ON" when throttle valve fully closed and engine speed over 2,800 rpm
FC TAU	Fuel cut TAU (Fuel cut during very light load): ON or OFF	ON: Fuel cut operation	Fuel cut performed under very light load to prevent incomplete engine combustion
IGNITION	Ignition counter: Min.: 0, Max.: 400	0 to 400	-
CYL #1, #2, #3, #4	Misfire ratio of cylinder 1 to 4: Min.: 0, Max.: 50%	0%	This item displayed only when idling
CYL ALL	All cylinders misfire rate: Min.: 0, Max.: 255	0 to 35	-
MISFIRE RPM	Engine RPM for first misfire range: Min.: 0, Max.: 6,375 rpm	0 rpm: Misfire 0	-
MISFIRE LOAD	Engine load for first misfire range: Min.: 0, Max.: 3.98 g/rev	0 g/rev: Misfire 0	-
MISFIRE MARGIN	Misfire monitoring: Min.: -100, Max.: 99.22%	-100 to 99.22%	Misfire detecting margin
# CODES	#Code: Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode: ON or OFF	ON: Check mode ON	See page ES-40
SPD TEST	Check mode result for vehicle speed sensor: 0: COMPL, 1: INCMPL	-	-
MISFIRE TEST	Check mode result for misfire monitor: 0: COMPL, 1: INCMPL	-	-
OXS1 TEST	Check mode result for HO2 sensor (bank 1): 0: COMPL, 1: INCMPL	-	-
MIL	MIL status: ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance: Min.: 0, Max.: 65,535 km	Distance after DTC detected	-
MIL ON RUN TIME	Running time from MIL ON: Min.: 0, Max.: 65,535 minutes	Equivalent to running time after MIL ON	-
ENG RUN TIME	Engine run time: Min.: 0, Max.: 65,535 seconds	Time after engine start	-
TIME DTC CLEAR	Time after DTC cleared: Min.: 0, Max.: 65,535 minutes	Equivalent to time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared: Min.: 0, Max.: 65,535 km	Equivalent to drive distance after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared: Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
MODEL CODE	Model code	-	Identifying model code: NCP6#
ENGINE TYPE	Engine type	-	Identifying engine type: 1NZFE

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
CYLINDER NUMBER	Number of cylinders: Min.: 0, Max.: 255	-	Identifying number of cylinders: 4
TRANSMISSION	Transmission type	-	Identifying transmission type: MT or 4AT
DESTINATION	Destination	-	Identifying destination: A (America)
MODEL YEAR	Model year: Min.: 1900, Max.: 2155	-	Identifying model year: 2006MY
SYSTEM	System identification	-	Identifying engine system: GASOLIN (gasoline engine)

ES

*1: If no idling conditions are specified, the transmission gear selector lever should be in the N or P position, and the A/C switch and all accessory switches should be OFF.
*2: A/T only

2. ACTIVE TEST

HINT:
Performing the intelligent tester's ACTIVE TEST allows relay, Vacuum Switching Valve (VSV), actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(f) According to the display on the tester, perform the ACTIVE TEST.

Intelligent Tester Display	Test Detail	Control Range	Diagnostic Note
INJ VOL	Change injection volume	Between -12 and 24.8%	• All injectors tested at the same time • Perform test at less than 3,000 rpm • Injection volume can be changed in 1% graduations within control range
A/F CONTROL	Change injection volume	Lower by 12.5% or increase by 24.8%	• Perform test at less than 3,000 rpm • A/F CONTROL enables checking and graphing of front and rear Heated Oxygen (HO2) sensor voltage outputs • To conduct test, select following menu items: ACTIVE TEST / A/F CONTROL / USER DATA / O2S B1S1 and O2S B1S2; then press YES and ENTER followed by F4
IAC STEP POS	Change IAC step position	Between 0 and 100%	Test possible during vehicle stopping and engine idling
EVAP VSV (ALONE)	Activate purge VSV control	ON/OFF	-

Intelligent Tester Display	Test Detail	Control Range	Diagnostic Note
VVT CTRL B1	Turn on and off OCV (Oil Control Valve)	ON/OFF	• Engine stalls or idles roughly when OCV turned ON • Normal engine running or idling when OCV off
FUEL PUMP / SPD	Turn on and off fuel pump (C/OPN Relay)	ON/OFF	Test possible when following conditions met: • Ignition switch ON • Engine is stopped
TC/TE1	Turn on and off TC and TE1 connection	ON/OFF	• ON: TC and TE1 connected • OFF: TC and TE1 disconnected
FC IDL PROHBT	Turn on and off idling fuel cut control	ON/OFF	-
COOLING FAN	Control electric cooling fan	ON/OFF	Test possible when following conditions met: • Ignition switch ON • Engine is stopped
FUEL CUT #1	Cylinder #1 injector fuel cut	ON/OFF	Test possible during vehicle stopping and engine idling
FUEL CUT #2	Cylinder #2 injector fuel cut	ON/OFF	Same as above
FUEL CUT #3	Cylinder #3 injector fuel cut	ON/OFF	Same as above
FUEL CUT #4	Cylinder #4 injector fuel cut	ON/OFF	Same as above
VVT B1	Control VVT (bank 1)	-128 to 127% This valve added to present OCV control duty 100%: Maximum advance -100%: Maximum retard	• Engine stall or rough idle when VVT actuator operated by 100% • Test possible during idle
VACUUM PUMP	Activate leak detection pump (built into canister pump module)	ON/OFF	-
VENT VALUE	Activate vent valve (built into canister pump module)	ON/OFF	-

ES

3. SYSTEM CHECK

HINT:

Performing a SYSTEM CHECK enables the system, which consists of multiple actuators, to be operated without removing any parts. In addition, it can show whether or not any DTCs are set, and can detect potential malfunctions in the system. The SYSTEM CHECK can be performed with the intelligent tester.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK.
(d) Perform the SYSTEM CHECK by referring to the table below.

Intelligent Tester Display	Test Details	Recommended Fuel Temperatures	Diagnostic Notes
EVAP SYS CHECK (AUTOMATIC)	Perform 5 steps in order to operate EVAP key-off monitor automatically	35°C (95°F) or less	• If no DTCs in PENDING CODES menu after performing this test, system functioning normally • Refer to EVAP system
EVAP SYS CHECK (MANUAL)	Perform 5 steps in order to operate EVAP key-off monitor manually	35°C (95°F) or less	• Used to detect malfunctioning parts • Refer to EVAP system

DIAGNOSTIC TROUBLE CODE CHART

HINT:
The parameters listed in the chart are for reference only. Factors such as instrument type may cause readings to differ slightly from stated values. If any DTCs are displayed during a check mode DTC check, check the circuit for the DTCs listed in the table below. For details of each DTC, refer to the page indicated.

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P0010	Camshaft Position "A" Actuator Circuit (Bank 1)	- Open or short in Oil Control Valve (OCV) circuit - OCV - ECM	Comes on	DTC stored	ES-57
P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)	- Valve timing - OCV - OCV filter - Camshaft timing gear assembly - ECM	Comes on	DTC stored	ES-61
P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)	- Valve timing - OCV - OCV filter - Camshaft timing gear assembly - ECM	Comes on	DTC stored	ES-61
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)	- Mechanical system (timing chain has jumped tooth or chain stretched) - ECM	Comes on	DTC stored	ES-66
P0031	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	- Open or short in Heated Oxygen (HO2) sensor heater circuit - HO2 sensor heater - EFI relay - ECM	Comes on	DTC stored	ES-68
P0032	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)	- Short in Heated Oxygen (HO2) sensor heater circuit - HO2 sensor heater - EFI relay - ECM	Comes on	DTC stored	ES-68
P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	- Open or short in Heated Oxygen (HO2) sensor heater circuit - HO2 sensor heater - EFI relay - ECM	Comes on	DTC stored	ES-68
P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	- Short in Heated Oxygen (HO2) sensor heater circuit - HO2 sensor heater - EFI relay - ECM	Comes on	DTC stored	ES-68
P0100	Mass or Volume Air Flow Circuit	- Open or short in Mass Air Flow (MAF) meter circuit - MAF meter - ECM	Comes on	DTC stored	ES-74

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P0101	Mass Air Flow Circuit Range / Performance Problem	- MAF meter	Comes on	DTC stored	ES-81
P0102	Mass or Volume Air Flow Circuit Low Input	- Open or short in MAF meter circuit - MAF meter - ECM	Comes on	DTC stored	ES-74
P0103	Mass or Volume Air Flow Circuit High Input	- Open or short in MAF meter circuit - MAF meter - ECM	Comes on	DTC stored	ES-74
P0110	Intake Air Temperature Circuit Malfunction	- Open or short in Intake Air Temperature (IAT) sensor circuit - IAT sensor (built into Mass Air Flow [MAF] meter) - ECM	Comes on	DTC stored	ES-83
P0112	Intake Air Temperature Circuit Low Input	- Short in Intake Air Temperature (IAT) sensor circuit - IAT sensor (built into Mass Air Flow [MAF] meter) - ECM	Comes on	DTC stored	ES-83
P0113	Intake Air Temperature Circuit High Input	- Open in Intake Air Temperature (IAT) sensor circuit - IAT sensor (built into Mass Air Flow [MAF] meter) - ECM	Comes on	DTC stored	ES-83
P0115	Engine Coolant Temperature Circuit Malfunction	- Open or short in Engine Coolant Temperature (ECT) sensor circuit - ECT sensor - ECM	Comes on	DTC stored	ES-89
P0116	Engine Coolant Temperature Circuit Range / Performance Problem	- ECT sensor - Thermostat	Comes on	DTC stored	ES-94
P0117	Engine Coolant Temperature Circuit Low Input	- Short in ECT sensor circuit - ECT sensor - ECM	Comes on	DTC stored	ES-89
P0118	Engine Coolant Temperature Circuit High Input	- Open in ECT sensor circuit - ECT sensor - ECM	Comes on	DTC stored	ES-89
P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit	- Throttle Position (TP) sensor - ECM	Comes on	DTC stored	ES-97
P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem	- TP sensor	Comes on	DTC stored	ES-102
P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input	- TP sensor - Short in VTA circuit - Open in VC circuit - ECM	Comes on	DTC stored	ES-97

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input	- TP sensor - Open in VTA circuit - Open in E2 circuit - Short between VC and VTA circuit - ECM	Comes on	DTC stored	ES-97
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	- Cooling system - ECT sensor - Thermostat	Comes on	DTC stored	ES-104
P0128	Thermostat Malfunction	- Thermostat - Cooling system - ECT sensor - ECM	Comes on	DTC stored	ES-107
P0130	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	- Open or short in Heated Oxygen (HO2) sensor (bank 1 sensor 1) circuit - HO2 sensor (bank 1 sensor 1) - HO2 sensor heater (bank 1 sensor 1) - EFI relay - Air induction system - Fuel pressure - Injector - ECM	Comes on	DTC stored	ES-110
P0133	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	- Open or short in Heated Oxygen (HO2) sensor (bank 1 sensor 1) circuit - HO2 sensor (bank 1 sensor 1) - HO2 sensor heater (bank 1 sensor 1) - EFI relay - Air induction system - Fuel pressure - Injector - ECM	Comes on	DTC stored	ES-120
P0134	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	- HO2S (bank 1 sensor 1) - Fuel pressure - Air induction system - Ventilation hose - Ventilation valve - Injector - Exhaust gas leakage	Comes on	DTC stored	ES-130
P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	- Open or short in Heated Oxygen (HO2) sensor (bank 1 sensor 2) circuit - HO2 sensor (bank 1 sensor 2) - HO2 sensor heater (bank 1 sensor 2) - EFI relay	Comes on	DTC stored	ES-139
P0138	Heated Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	- HO2 sensor (bank 1 sensor 2) - Short in HO2 sensor (bank 1 sensor 2) circuit	Comes on	DTC stored	ES-139

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P0139	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 2)	- HO2 sensor (bank 1 sensor 2) - Short in HO2 sensor (bank 1 sensor 2) circuit	Comes on	DTC stored	ES-139
P0171	System Too Lean (Bank 1)	- Air induction system - Injector blockage - Mass Air Flow (MAF) meter - Engine Coolant Temperature (ECT) sensor - Fuel pressure - Gas leakage from exhaust system - Open or short in HO2 sensor (bank 1 sensor 1) circuit - HO2 sensor (bank 1 sensor 1) - HO2 sensor heater (bank 1 sensor 1) - EFI relay - Ventilation valve and hose - Ventilation hose connections - ECM	Comes on	DTC stored	ES-148
P0172	System Too Rich (Bank 1)	- Injector leak, blockage - MAF meter - ECT sensor - Ignition system - Fuel pressure - Gas leakage from exhaust system - Open or short in Heated Oxygen (HO2) sensor (bank 1 sensor 1) circuit - HO2 sensor (bank 1 sensor 1) - HO2 sensor heater (bank 1 sensor 1) - EFI relay - ECM	Comes on	DTC stored	ES-148
P0300	Random / Multiple Cylinder Misfire Detected	- Open or short in engine wire harness - Connector connections - Vacuum hose connections - Ignition system - Injector - Fuel pressure - MAF meter - ECT sensor - Compression pressure - Valve clearance - Valve timing - Ventilation hose connections - Ventilation valve and hose - ECM	Blinks	DTC stored	ES-160

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P0301	Cylinder 1 Misfire Detected	- Same as P0300	Blinks	DTC stored	ES-160
P0302	Cylinder 2 Misfire Detected	- Same as P0300	Blinks	DTC stored	ES-160
P0303	Cylinder 3 Misfire Detected	- Same as P0300	Blinks	DTC stored	ES-160
P0304	Cylinder 4 Misfire Detected	- Same as P0300	Blinks	DTC stored	ES-160
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	- Short in knock sensor 1 circuit - Knock sensor 1 - ECM	Comes on	DTC stored	ES-171
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	- Open in knock sensor 1 circuit - Knock sensor 1 - ECM	Comes on	DTC stored	ES-171
P0335	Crankshaft Position Sensor "A" Circuit	- Open or short in Crankshaft Position (CKP) sensor circuit - CKP sensor - Crankshaft (sensor plate) - ECM	Comes on	DTC stored	ES-175
P0339	Crankshaft Position Sensor "A" Circuit Intermittent	- Same as P0335	-	DTC stored	ES-175
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	- Open or short in Camshaft Position (CMP) sensor circuit - CMP sensor - Camshaft - Timing chain has jumped tooth - ECM	Comes on	DTC stored	ES-180
P0351	Ignition Coil "A" Primary / Secondary Circuit	- Ignition system - Open or short in IGF or IGT circuit (1 to 4) between ignition coil with igniter and ECM - Ignition coils with igniters - ECM	Comes on	DTC stored	ES-184
P0352	Ignition Coil "B" Primary / Secondary Circuit	- Same as P0351	Comes on	DTC stored	ES-184
P0353	Ignition Coil "C" Primary / Secondary Circuit	- Same as P0351	Comes on	DTC stored	ES-184
P0354	Ignition Coil "D" Primary / Secondary Circuit	- Same as P0351	Comes on	DTC stored	ES-184
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	- Gas leakage from exhaust system - Heated Oxygen (HO2) sensor (bank 1 sensor 1, 2) - Three-way Catalytic Converter (TWC)	Comes on	DTC stored	ES-193

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM - Leakage from EVAP system	Comes on	DTC stored	ES-199
P043F	Evaporative Emission System Reference Orifice High Flow	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM - Leakage from EVAP system	Comes on	DTC stored	ES-199
P0441	Evaporative Emission Control System Incorrect Purge Flow	- Purge VSV - Connector/Wire harness (Purge VSV - ECM) - ECM - Canister pump module - Leakage from EVAP line (Purge VSV - intake manifold) - Leakage from EVAP system	Comes on	DTC stored	ES-207
P0450	Evaporative Emission Control System Pressure Sensor Malfunction	- Canister pump module - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	Comes on	DTC stored	ES-215
P0451	Evaporative Emission Control System Pressure Sensor Range / Performance	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	Comes on	DTC stored	ES-215

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	Comes on	DTC stored	ES-215
P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	Comes on	DTC stored	ES-215
P0455	Evaporative Emission Control System Leak Detected (Gross Leak)	- Fuel cap (loose) - Leakage from EVAP line (Canister - Fuel tank) - Leakage from EVAP line (Purge VSV - canister) - Canister pump module - Leakage from fuel tank - Leakage from canister	Comes on	DTC stored	ES-225
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	- Same as P0445	Comes on	DTC stored	ES-225
P0500	Vehicle Speed Sensor "A"	- Open or short in speed sensor circuit - Vehicle speed sensor - Combination meter - ECM - Skid control ECU	Comes on	DTC stored	ES-231
P0505	Idle Control System Malfunction	- Open or short in Idle Air Control (IAC) valve circuit - IAC valve stuck or closed - A/C switch circuit - Air induction system - Ventilation valve and hose - ECM	Comes on	DTC stored	ES-234
P0511	Idle Air Control Circuit	- Open or short in Idle Air Control (IAC) valve circuit - IAC valve stuck or closed - ECM	Comes on	DTC stored	ES-234

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P0550	Power Steering Pressure Sensor Circuit Malfunction	- Open or short in power steering pressure sensor circuit - Power steering pressure sensor - ECM	Comes on	DTC stored	ES-241
P0552	Power Steering Pressure Sensor Circuit Low Input	- Open or short in power steering pressure sensor circuit - Power steering pressure sensor - ECM	Comes on	DTC stored	ES-241
P0553	Power Steering Pressure Sensor Circuit High Input	- Open or short in power steering pressure sensor circuit - Power steering pressure sensor - ECM	Comes on	DTC stored	ES-241
P0560	System Voltage	- Open in back-up power source circuit - EFI fuse - ECM	Comes on	DTC stored	ES-244
P0606	ECM / PCM Processor	- ECM	-	-	ES-248
P0617	Starter Relay Circuit High	- Short in Park/ Neutral Position (PNP) switch circuit - PNP switch - Clutch start switch - ECM	Comes on	DTC stored	ES-249
P0630	VIN not Programmed or Mismatch - ECM / PCM	- ECM	Comes on	DTC stored	ES-253
P2195	Oxygen Sensor Signal Stuck Lean (Bank 1 Sensor 1)	- Open or short in Heated Oxygen (HO2) sensor (bank 1 sensor 1) circuit - HO2 sensor (bank 1 sensor 1) - HO2 sensor heater (bank 1 sensor 1) - EFI relay - Air induction system - Fuel pressure - Injector - ECM	Comes on	DTC stored	ES-110
P2196	Oxygen Sensor Signal Stuck Rich (Bank 1 Sensor 1)	- Same as P2195	Comes on	DTC stored	ES-110
P2401	Evaporative Emission Leak Detection Pump Stuck OFF	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	Comes on	DTC stored	ES-255

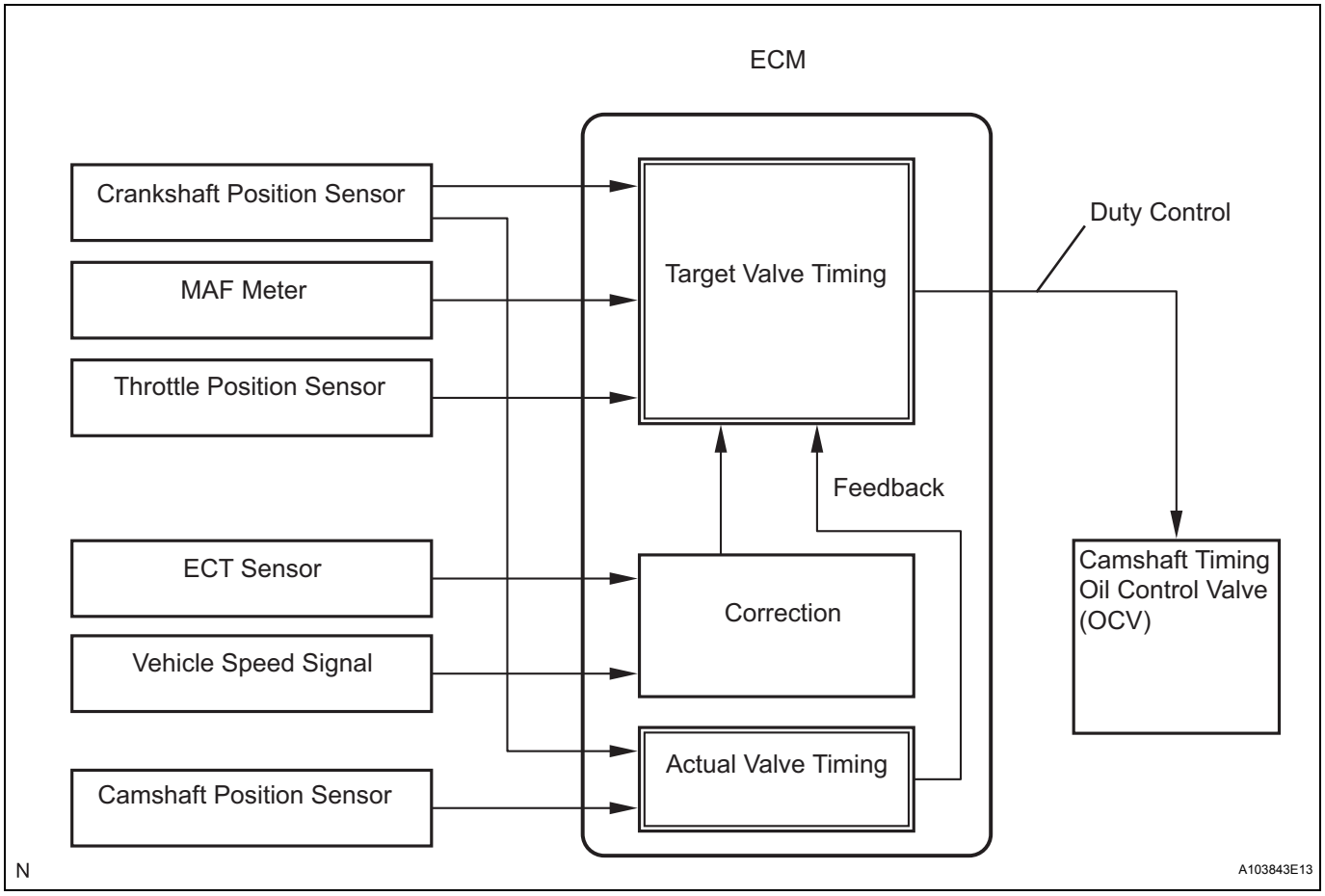
ES

DTC No.	Detection Item	Trouble Areas	MIL	Memory	See page
P2402	Evaporative Emission Leak Detection Pump Stuck ON	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	Comes on	DTC stored	ES-255
P2419	Evaporative Emission Pressure Switching Valve Stuck ON	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	Comes on	DTC stored	ES-263
P2420	Evaporative Emission Pressure Switching Valve Stuck OFF	- Canister pump module - Connector/Wire harness (Canister pump module - ECM) - ECM	Comes on	DTC stored	ES-263
P2610	ECM / PCM Internal Engine Off Timer Performance	- ECM	Comes on	DTC stored	ES-270

DTC	P0010	Camshaft Position "A" Actuator Circuit (Bank 1)

DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, Oil Control Valve (OCV) and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as the intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV based on the signals transmitted by several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual intake valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0010	Open or short in Oil Control Valve (OCV) circuit (1 trip detection logic)	• Open or short in Oil Control Valve (OCV) circuit • OCV • ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT system to control the intake camshaft. The VVT system includes the ECM, the OCV and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.

After the ECM sends the target duty-cycle signal to the OCV, the ECM monitors the OCV current to establish an actual duty-cycle. The ECM determines the existence of a malfunction and sets the DTC when the actual duty-cycle ratio varies from the target duty-cycle ratio.

MONITOR STRATEGY

Related DTCs	P0010: VVT OCV range check
Required sensors / components (Main)	VVT OCV
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediate
Sequence of operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever these following DTCs not present	None
Battery voltage	11 to 13 V
Target duty ratio for OCV	70% or less
Starter	OFF
Current cut status for OCV	Not cut

TYPICAL MALFUNCTION THRESHOLDS

Either of following conditions set:	-
OCV duty ratio	100% (always ON) despite target duty ratio being less than 70%
OCV duty ratio when ECM supplies current to OCV	3% or less despite ECM supplying current to the OCV

COMPONENT OPERATING RANGE

VVT OCV duty ratio	3 to 100%

WIRING DIAGRAM

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

ES

OK

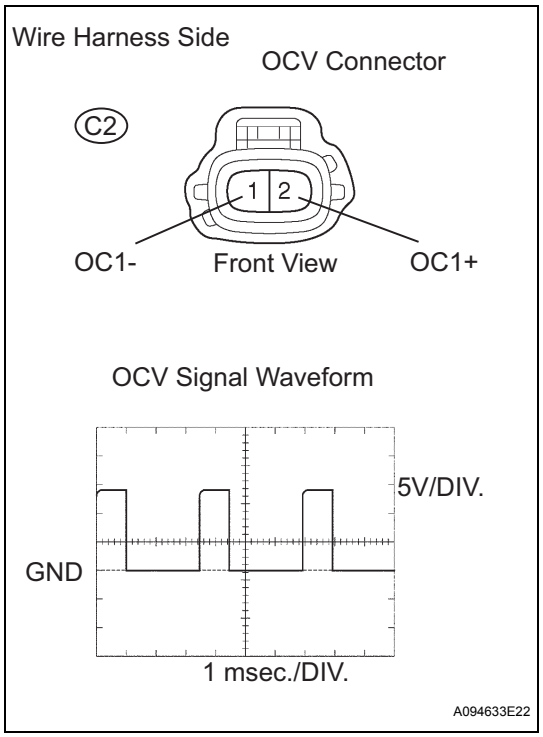
Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → **Go to step 2**

OK →

CHECK FOR INTERMITTENT PROBLEMS

2	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (OCV SIGNAL)



(a) Disconnect the C2 OCV connector.
(b) While idling, check the waveform between the terminals of the C2 OCV connector using an oscilloscope.
Standard voltage

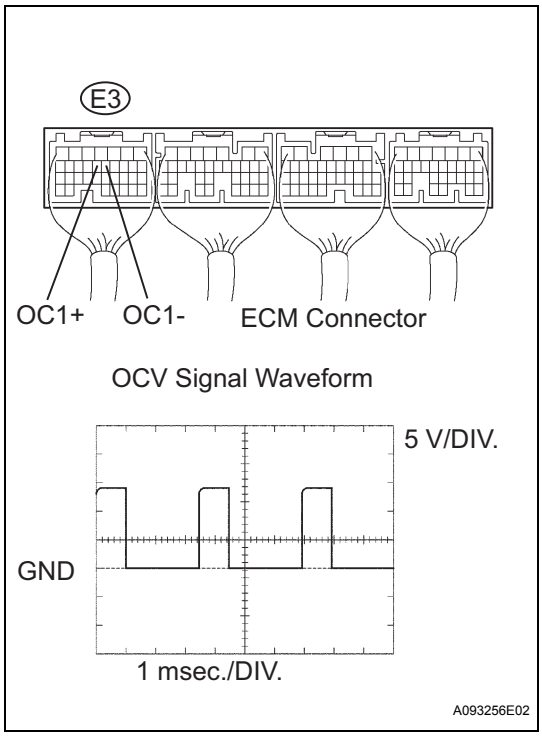
Tester Connection	Specified Condition
OC1+ (C2-2) - OC1- (C2-1)	Correct waveform is as shown

NG → **Go to step 3**

OK

REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

3	INSPECT ECM (OCV SIGNAL)



(a) Inspect the ECM using an oscilloscope.
(b) While idling, check the waveform between the terminals of the E3 ECM connector.
Standard voltage

Tester Connection	Specified Condition
OC1+ (E3-13) - OC1- (E3-12)	Correct waveform is as shown

NG → **REPLACE ECM**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

DTC	P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)

DTC	P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)

DESCRIPTION

HINT:
If DTC P0011 or P0012 is present, check the Variable Valve Timing (VVT) system.
Refer to DTC P0010 (see page ES-57).

DTC No.	DTC Detection Condition	Trouble Area
P0011	Advanced cam timing: With warm engine and engine speed between 450 rpm and 4,000 rpm, all conditions (a), (b) and (c) met (1 trip detection logic): (a) Difference between target and actual intake valve timings more than 5°CA (Crankshaft Angle) for 4.5 seconds (b) Current intake valve timing fixed (timing changes less than 5°CA in 5 seconds) (c) Variations in VVT controller timing more than 19°CA of maximum delayed timing (advanced)	• Valve timing • Oil control valve (OCV) • OCV filter • Camshaft timing gear assembly • ECM
P0012	Retarded cam timing: With warm engine and engine speed between 450 rpm and 4,000 rpm, all conditions (a), (b) and (c) met (2 trip detection logic): (a) Difference between target and actual intake valve timings more than 5°CA (Crankshaft Angle) for 4.5 seconds (b) Current intake valve timing fixed (timing changes less than 5°CA in 5 seconds) (c) Variations in VVT controller timing 19°CA or less of maximum delayed timing (retarded)	• Valve timing • OCV • OCV filter • Camshaft timing gear assembly • ECM

ES

MONITOR DESCRIPTION

The ECM optimizes the intake valve timing using the Variable Valve Timing (VVT) system to control the intake camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft. If the difference between the target and actual intake valve timings is large, and changes in actual intake valve timing are small, the ECM interprets this as the VVT controller stuck malfunction and sets a DTC.
Example:
A DTC is set when the following conditions 1), 2) and 3) are met:
1) The difference between the target and actual intake valve timings is more than 5°CA (Crankshaft Angle) and the condition continues for more than 4.5 seconds.
2) It takes 5 seconds or more to change the valve timing by 5°CA.
3) After above conditions 1) and 2) are met, the OCV is forcibly activated 63 times or more.
DTC P0011 (Advanced Cam Timing) is subject to 1 trip detection logic.
DTC P0012 (Retarded Cam Timing) is subject to 2 trip detection logic.
These DTCs indicate that the VVT controller cannot operate properly due to OCV malfunctions or the presence of foreign objects in the OCV.
The monitor will not run unless the following conditions are met:

- The engine is warm (the engine coolant temperature is 75°C [167°F] or more).
- The vehicle has been driven at more than 64 km/h (40 mph) for 3 minutes.
- The engine has idled for 3 minutes.

MONITOR STRATEGY

Related DTCs	P0011: Advanced camshaft timing P0012: Retarded camshaft timing
Required sensors/ components (Main)	VVT OCV and VVT Actuator
Required sensors/ components (Related)	Crankshaft position sensor, Camshaft position sensor and Engine coolant temperature sensor
Frequency of operation	Once per driving cycle
Duration	Within 10 seconds
MIL operation	P0011: Immediate P0012: 2 driving cycles
Sequence of operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF sensor) P0115 - P0118 (ECT sensor) P0125 (insufficient ECT for closed loop) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0351 - P0354 (igniter)

P0011 and P0012 (Advance/retard malfunction):

Battery voltage	11 V or more
Engine RPM	450 to 4,000 rpm
Engine coolant temperature	75 to 100°C (167 and 212°F)

TYPICAL MALFUNCTION THRESHOLDS

P0011 and P0012 (Advance/retard malfunction)

When both conditions below are met:	-
Difference between target and actual of valve timings	5°CA (Crankshaft Angle) or more
Valve timing	No change

If the difference between the target and actual camshaft timings is greater than the specified value, the ECM operates the Variable Valve Timing (VVT) actuator.
Then, the ECM monitors the camshaft timing change for 5 seconds.

WIRING DIAGRAM

Refer to DTC P0010 (see page ES-58).

INSPECTION PROCEDURE

NOTICE:

DTC P0011 or P0012 may be set when foreign objects in the engine oil are caught in some parts of the system. The DTC will remain set even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

HINT:

Reed freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0011 OR P0012)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0011 or P0012	A
P0011 or P0012 and other DTCs	B

HINT:
If any DTCs other than P0011 or P0012 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → Go to step 4

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P0011 OR P0012)

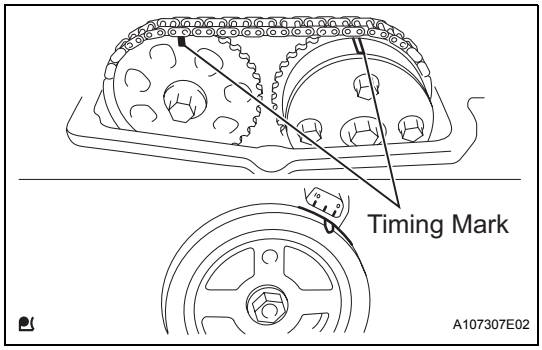
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Clear DTCs (see page ES-36).
(d) Start the engine and warm it up.
(e) Switch the ECM from normal mode to check mode using the tester (see page ES-40).
(f) Drive the vehicle for more than 10 minutes.
(g) Read DTCs using the tester.
OK:
No DTC output.

NG → Go to step 4

OK

END

4	CHECK VALVE TIMING (CHECK TIMING CHAIN FOR LOOSENESS AND JUMPED TOOTH)

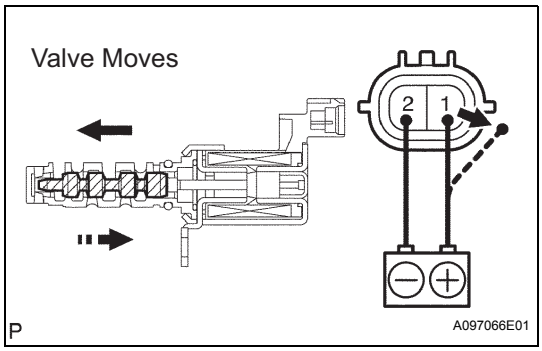


(a) Remove the cylinder head cover (see page EM-25).
(b) Turn the crankshaft pulley, then align its groove with the timing mark "0" of the timing chain cover.
(c) Check that both timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
OK:
The timing marks on the camshaft timing gears are aligned with the timing chain cover surface.

NG → **ADJUST VALVE TIMING**

OK

5	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (OCV)

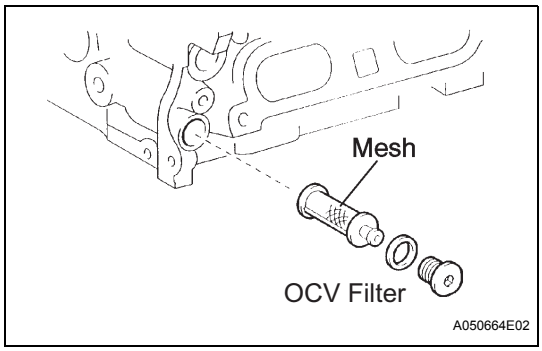


(a) Remove the OCV (see page ES-332).
(b) Measure the resistance between the terminals of the OCV.
Standard resistance:
6.9 to 7.9 Ω at 20°C (68°F)
(c) Apply the positive battery voltage to terminal 1 and negative battery voltage to terminal 2. Check the valve operation.
OK:
Valve moves quickly.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

OK

6	INSPECT OIL CONTROL VALVE FILTER



(a) Remove the generator (see page CH-9).
(b) Remove the OCV filter (see page EM-43).
(c) Check that the filter is not clogged.
OK:
Filter is not clogged.

NG → **CLEAN OIL CONTROL VALVE FILTER**

OK

7	REPLACE CAMSHAFT TIMING GEAR ASSEMBLY

(a) Replace the camshaft timing gear assembly (see page EM-40).

NEXT

8	CHECK IF DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Clear DTCs (see page ES-36).
(d) Start the engine and warm it up.
(e) Switch the ECM from normal mode to check mode using the tester (see page ES-40).
(f) Drive the vehicle for more than 10 minutes.
(g) Confirm that no DTC is set using the tester.
Standard:
No DTC output.
HINT:
DTC P0011 or P0012 is output when foreign objects in engine oil are caught in some parts of the system. These codes will stay registered even if the system returns to normal after a short time. These foreign objects are then captured by the oil filter, thus eliminating the source of the problem.

OK → **SYSTEM OK**

NG

REPLACE ECM

ES

DTC	P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

DESCRIPTION

Refer to DTC P0335 (see page ES-175).

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (2 trip detection logic)	• Mechanical system (timing chain has jumped tooth or chain stretched) • ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing by using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller.
The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.
The ECM calibrates the intake valve timing by setting the intake camshaft to the most retarded angle while the engine is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as the VVT learning value. When the difference between the target and actual intake valve timings is 5°CA (Crankshaft Angle) or less, the ECM stores it.
If the learned value meets both of the following conditions, the ECM interprets this as a defect in the VVT system and set a DTC.

- VVT learning value: Less than 25°CA, or more than 51°CA.
- Above condition continues for 18 seconds or more.

This DTC indicates that the intake camshaft has been installed toward the crankshaft at an incorrect angle, caused by factors such as the timing chain having jumped a tooth.
This monitor begins to run after the engine has idled for 5 minutes.

MONITOR STRATEGY

Related DTCs	P0016: Camshaft timing misalignment at idling
Required sensors/ components (Main)	VVT actuator
Required sensors/ components (Related)	Camshaft position sensor, Crankshaft position sensor
Frequency of operation	Once per driving cycle
Duration	1 minute
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0011 (VVT system 1 - advance) P0012 (VVT system 1 - retard) P0115 - P0118 (ECT sensor)
Engine RPM	450 to 1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

When either condition below is met:	-
VVT learning value	Less than 25°CA
VVT learning value	More than 51°CA

WIRING DIAGRAM

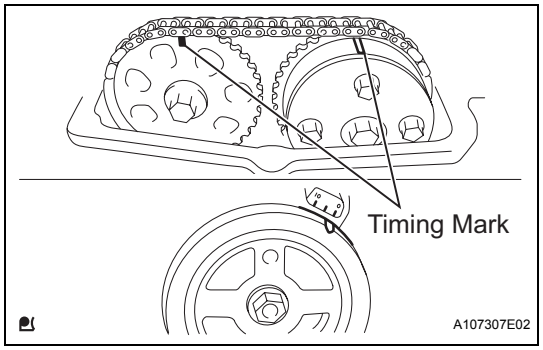
Refer to DTC P0335 (see page ES-177).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK VALVE TIMING (CHECK TIMING CHAIN FOR LOOSENESS AND JUMPED TOOTH)



(a) Remove the cylinder head cover (see page EM-25).
(b) Turn the crankshaft pulley, then align its groove with the timing mark "0" on the timing chain cover.
(c) Check that both timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.

OK:

The timing marks on the camshaft timing gears are aligned with the timing chain cover surface.

NG → **ADJUST VALVE TIMING**

OK

2 REPLACE ECM

After replacing the ECM or adjusting intake valve timing, confirm that the DTC output does not recur.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Clear DTCs (see page ES-36).
(d) Switch the ECM from normal mode to check mode (see page ES-40).
(e) Start the engine and warm it up.
(f) Allow the engine to idle for 1 minute or more, and then drive the vehicle for 1 minute or more.
(g) Confirm that no DTC is set using the tester.

NEXT

END

DTC	P0031	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)
DTC	P0032	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)
DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)
DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)

ES

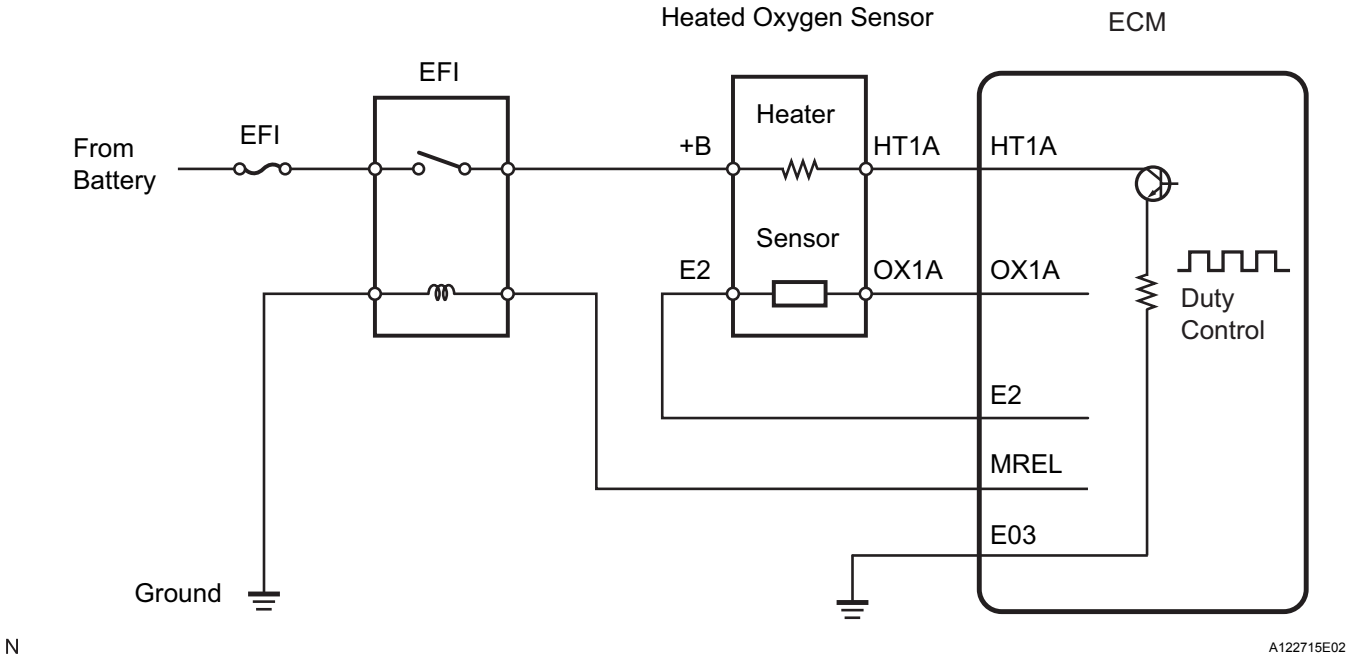
DESCRIPTION

Refer to DTC P0130 (see page ES-110).

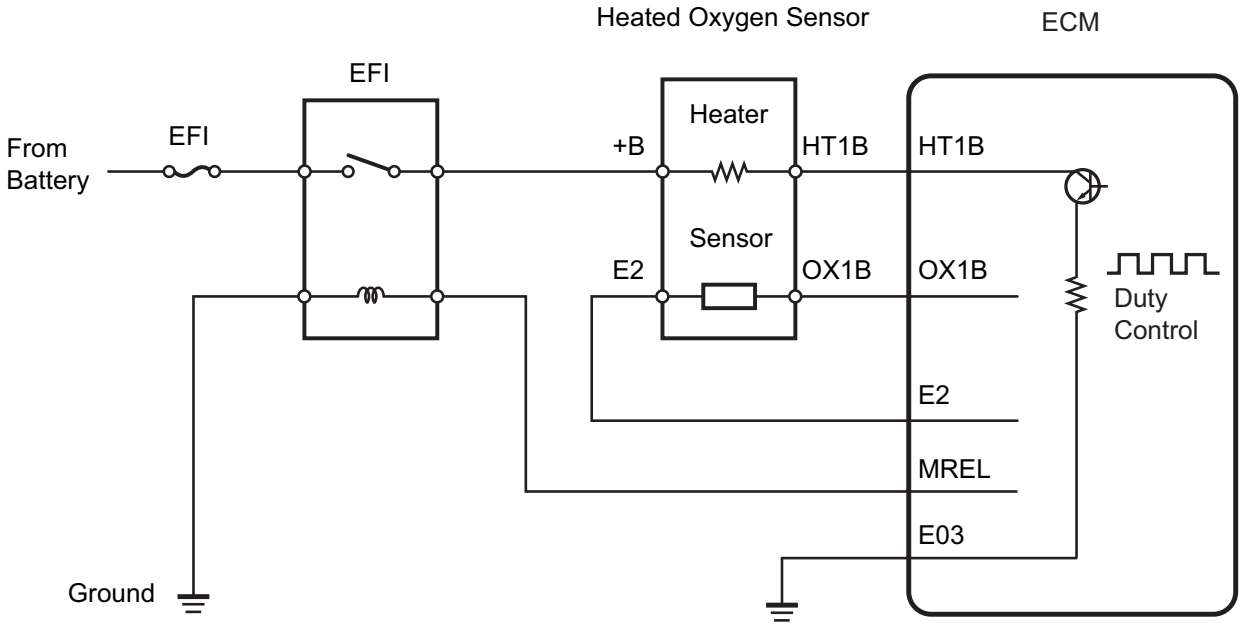
HINT:

- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC), and located near the engine assembly.
- Sensor 2 refers to the sensor mounted behind the TWC, and located far from the engine assembly.
- When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM turns off the Heated Oxygen (HO2) sensor heater. Fail-safe mode continues until the ignition switch is turned OFF.
- The ECM provides a pulse width modulated control circuit to adjust current through the heater. The sensor heater circuit uses a relay on the +B side of the circuit.

Reference (System Diagram of Bank 1 Sensor 1)



Reference (System Diagram of Bank 1 Sensor 2)



DTC No.	DTC Detection Condition	Trouble Area
P0031 P0037	Heated current 0.3 A or less when heater operates with +B greater than 11.5 V (1 trip detection logic)	• Open or short in Heated Oxygen (HO2) sensor heater circuit • HO2 sensor heater • EFI relay • ECM
P0032 P0038	Heated current exceeds 2 A when heater operates (1 trip detection logic)	• Short in HO2 sensor • HO2 sensor heater • EFI relay • ECM

MONITOR DESCRIPTION

The ECM uses information from the Heated Oxygen (HO2) sensor to regulate the air-fuel ratio and keep it close to the stoichiometric level. This maximizes the ability of the Three-Way Catalytic Converter (TWC) to purify the exhaust gases.

The HO2 sensor detects oxygen levels in the exhaust gas and transmits the information to the ECM. The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to the exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element.

The zirconia element generates a small voltage when there is a large difference in the oxygen concentrations between the exhaust gas and outside air. The platinum coating amplifies the voltage generation.

The HO2 sensor is more efficient when heated. When the exhaust gas temperature is low, the sensor cannot generate useful voltage signals without supplementary heating. The ECM regulates the supplementary heating using a duty-cycle approach to adjust the average current in the sensor heater element. If the heater current is outside the normal range, the signal transmitted by the HO2 sensor will be inaccurate. As a result, the ECM will be unable to regulate air-fuel ratio properly.

When the current in the HO2 sensor heater is outside the normal operating range, the ECM interprets this as a malfunction in the sensor heater and sets a DTC.

Example:

The ECM sets either DTC P0032 or P0038 when the current in the HO2 sensor heater is more than 2 A despite the heater being OFF. Conversely, when the heater current is less than 0.3 A despite the heater being ON, DTC P0031 or P0037 is set.

MONITOR STRATEGY

Related DTCs	P0031: HO2S heater (bank 1 sensor 1) range check (low current) P0032: HO2S heater (bank 1 sensor 1) range check (high current) P0037: HO2S heater (bank 1 sensor 2) range check (low current) P0038: HO2S heater (bank 1 sensor 2) range check (high current)
Required sensors/components (Main)	HO2S heater
Required sensors/components (Related)	Vehicle Speed Sensor (VSS)
Frequency of operation	Continuous
Duration	0.3 seconds
MIL operation	Immediate
Sequence of operation	None

ES

TYPICAL ENABLING CONDITIONS

Battery voltage	10.5 V or more
Engine	Running
Starter	OFF
Intrusive heating	Not operating

P0031 and P0037:

Duration of following conditions	0.5 seconds or more
Learned heater current during heater OFF	Completed
Heater current	Less than 0.3 A
Intrusive heating for high current monitor	Not operating
Time after all heaters are OFF	1 second or more

P0032 and P0038:

Duration of following conditions	0.3 seconds or more
Learned heater current during heater OFF	Completed
Heater current	2 A or more
Time after all heaters are OFF	1 second or more

TYPICAL MALFUNCTION THRESHOLDS

P0031 and P0037:

HO2 sensor heater current when heated oxygen sensor heater ON	Less than 0.3 A

P0032 and P0038:

HO2 sensor heater current when heated oxygen sensor heater OFF	More than 2 A

COMPONENT OPERATING RANGE

HO2 sensor heater current	0.3 to 2 A (when idling with warm engine and battery voltage 11 to 14 V)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

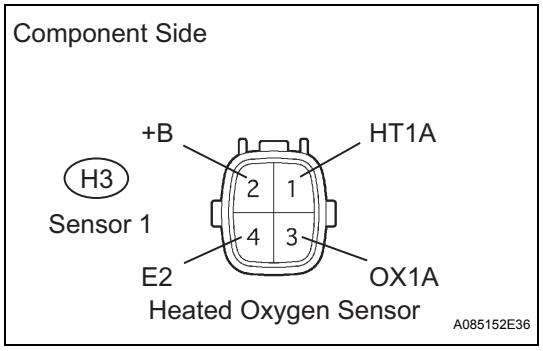
WIRING DIAGRAM

Refer to DTC P0130 (see page ES-113).

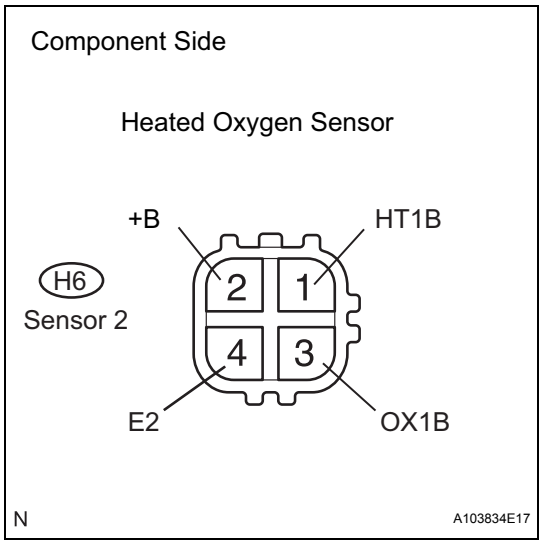
INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



(a) Disconnect the H3 or H6 Heated Oxygen (HO2) sensor connector.



(b) Measure the resistance of the HO2 sensor connector.
Standard resistance (Sensor 1)

Tester Connection	Specified Condition
HT1A (1) - +B (2)	11 to 16 Ω at 20°C (68°F)
HT1A (1) - E2 (4)	10 kΩ or higher

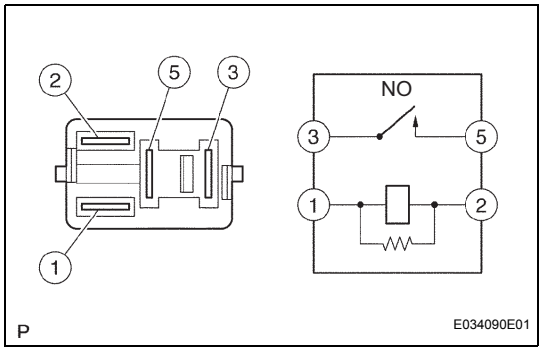
Standard resistance (Sensor 2)

Tester Connection	Specified Condition
HT1B (1) - +B (2)	11 to 16 Ω at 20°C (68°F)
HT1B (1) - E2 (4)	10 kΩ or higher

NG → REPLACE HEATED OXYGEN SENSOR

OK

2 INSPECT EFI RELAY (Marking: EFI)



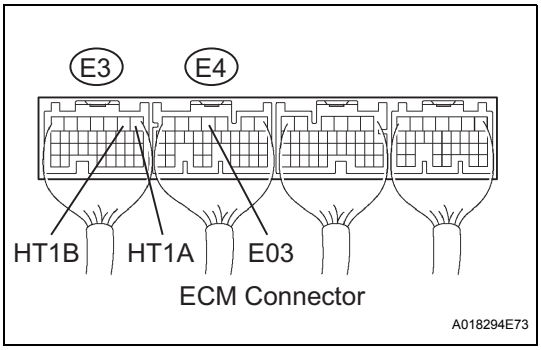
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the EFI relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → REPLACE EFI RELAY

OK

3	INSPECT ECM (HT1A, HT1B VOLTAGE)



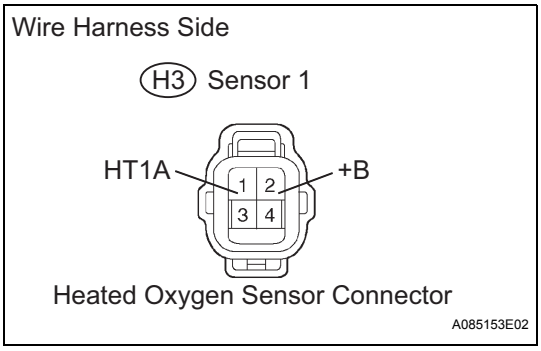
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard voltage

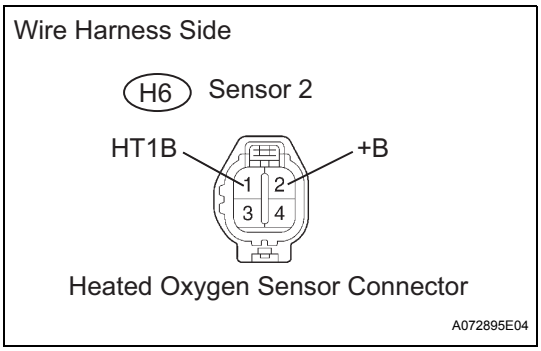
Tester Connection	Specified Condition
HT1A (E3-1) - E03 (E4-4)	9 to 14 V
HT1B (E3-2) - E03 (E4-4)	9 to 14 V

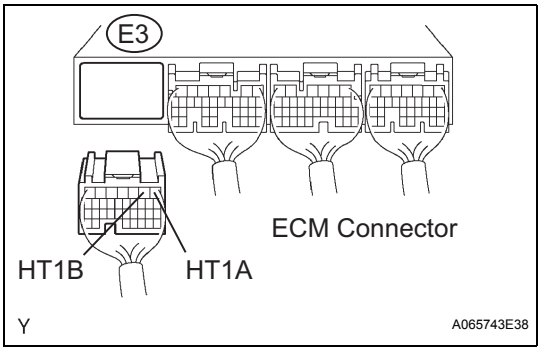
OK → **REPLACE ECM**

NG

4	CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM, HEATED OXYGEN SENSOR - EFI RELAY)







(a) Check the harness and connectors between the ECM and HO2 sensor.
(1) Disconnect the H3 or H6 HO2 sensor connector.

(2) Disconnect the E3 ECM connector.
(3) Measure the resistance of the wire harness side connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
HT1A (H3-1) - HT1A (E3-1)	Below 1 Ω
HT1B (H6-1) - HT1B (E3-2)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HT1A (H3-1) or HT1A (E3-1) - Body ground	10 kΩ or higher

Tester Connection	Specified Condition
HT1B (H6-1) or HT1B (E3-2) - Body ground	10 kΩ or higher

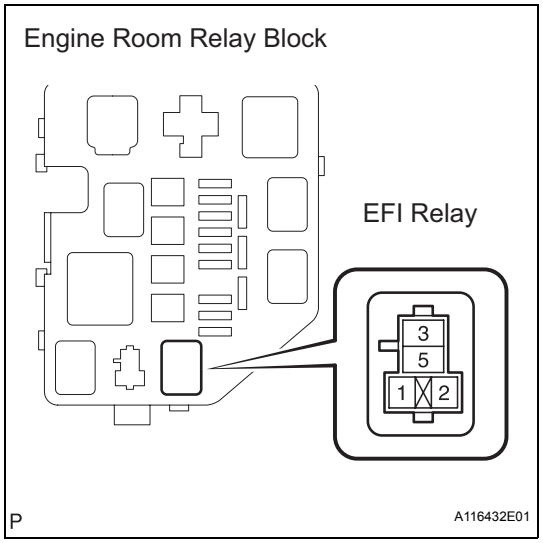
(b) Check the harness and connectors between the HO2 sensor and EFI relay.
  (1) Disconnect the H3 or H6 HO2 sensor connector.
  (2) Remove the EFI relay from the engine room relay block.
  (3) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (H3-2) - Engine room relay block (EFI relay terminal 3)	Below 1 Ω
+B (H6-2) - Engine room relay block (EFI relay terminal 3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
+B (H3-2) or Engine room relay block (EFI relay terminal 3) - Body ground	10 kΩ or higher
+B (H6-2) or Engine room relay block (EFI relay terminal 3) - Body ground	10 kΩ or higher



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM

DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

DTC	P0103	Mass or Volume Air Flow Circuit High Input

DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air-fuel ratio.

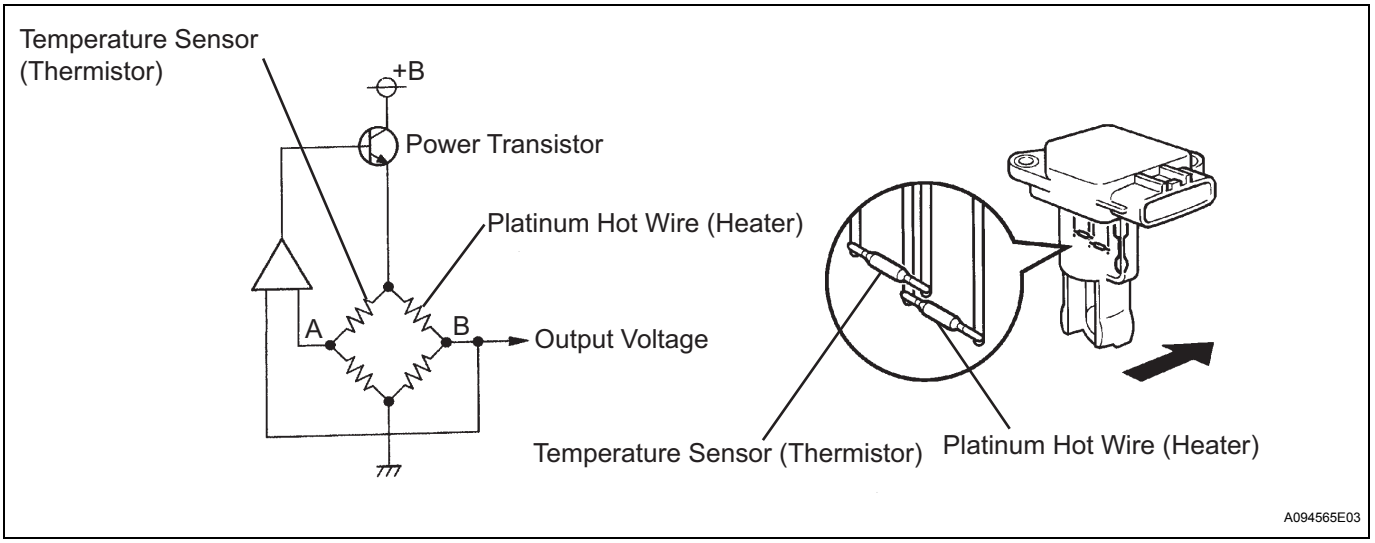
ES

Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.

The circuit is constructed so that the platinum hot wire and the temperature sensor provide a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.

HINT:

When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM according to the engine RPM and throttle valve position. Fail-safe mode continues until a pass condition is detected.



DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in Mass Air Flow (MAF) meter circuit for more than 3 seconds at engine speed of less than 4,000 rpm	• Open or short in Mass Air Flow (MAF) meter circuit • MAF meter • ECM
P0102	Open in Mass Air Flow (MAF) meter circuit for more than 3 seconds at engine speed of less than 4,000 rpm	• Open in MAF meter circuit • Short in MAF meter circuit • MAF meter • ECM
P0103	Short in Mass Air Flow (MAF) meter circuit for more than 3 seconds at engine speed of less than 4,000 rpm	• Short in MAF meter circuit (+B circuit) • MAF meter • ECM

HINT:
When any of these DTCs are set, check the air-flow rate by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.

Mass Air Flow Rate (g/sec.)	Malfunctions
Approximately 0.0	• Open in Mass Air Flow (MAF) meter power source circuit • Open or short in VG circuit
271.0 or more	• Open in EVG circuit

MONITOR DESCRIPTION

If there is a defect in the MAF meter or an open short circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets a DTC.
Example:
When the sensor output voltage remains at less than 0.2 V or more than 4.9 V for more than 3 seconds, the ECM sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 3 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0100: Mass air flow meter range check (Fluctuating) P0102: Mass air flow meter range check (Low voltage) P0103: Mass air flow meter range check (High voltage)
Required Sensors/Components (Main)	MAF meter
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate: Engine RPM less than 4,000 rpm 2 driving cycles: Engine RPM 4,000 rpm or more
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0100:

Mass air flow meter voltage	Less than 0.2 V or more than 4.9 V

P0102:

Mass air flow meter voltage	Less than 0.2 V

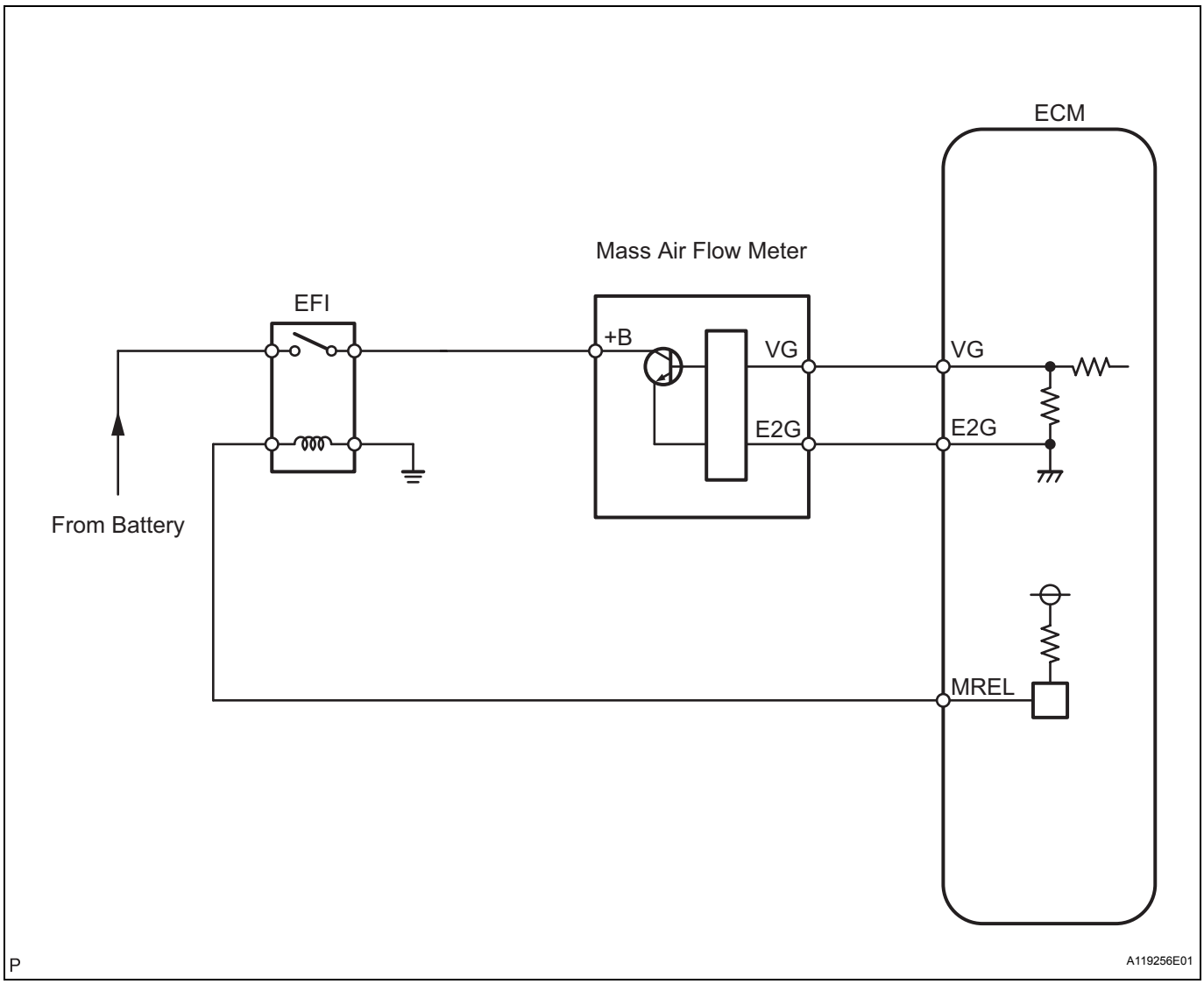
P0103:

Mass air flow meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

Mass air flow meter voltage	0.2 to 4.9 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF INTELLIGENT TESTER (MASS AIR FLOW RATE)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.
(e) Read the values displayed on the tester.

Result

Mass Air Flow Rate (g/sec.)	Proceed to
0.0	A

Mass Air Flow Rate (g/sec.)	Proceed to
271.0 or more	B
Between 1.0 and 270.0*	C

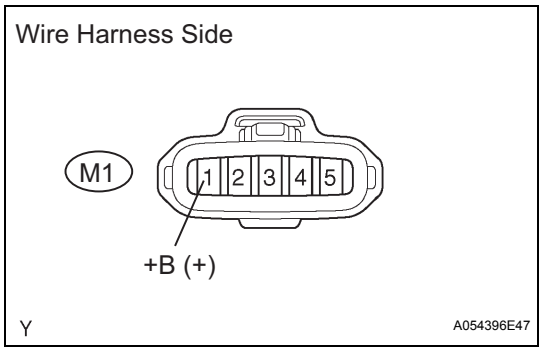
*: The value must change when the throttle valve is open or closed.

B → Go to step 6

C → CHECK FOR INTERMITTENT PROBLEMS

A

2 INSPECT MASS AIR FLOW METER (POWER SOURCE VOLTAGE)



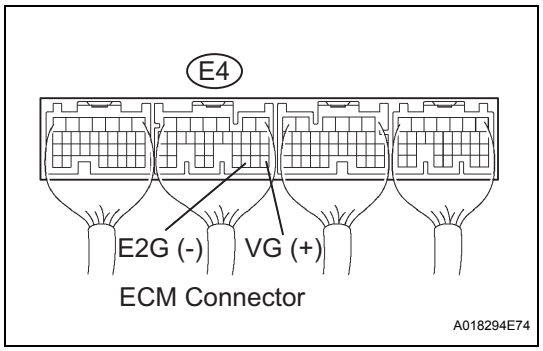
(a) Disconnect the M1 Mass Air Flow (MAF) meter connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the wire harness side connector and body ground.
Standard voltage

Tester Connection	Specified Condition
+B (M1-1) - Body ground	9 to 14 V

NG → Go to step 5

OK

3 INSPECT ECM (VG VOLTAGE)



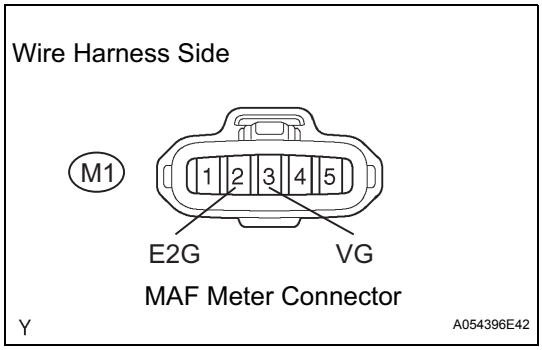
(a) Start the engine.
(b) Measure the voltage of the ECM connector.
HINT:
The transmission gear selector lever should be in the P or N position and the A/C switch should be turned OFF.
Standard voltage

Tester Connection	Condition	Specified Condition
VG (E4-28) - E2G (E4-30)	Engine idling	0.5 to 3.0 V

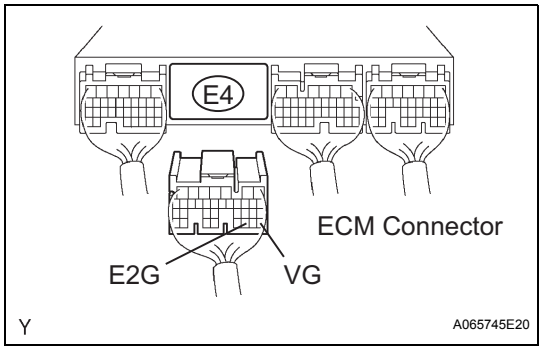
OK → REPLACE ECM

NG

4	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)



(a) Disconnect the M1 MAF meter connector.
(b) Disconnect the E4 ECM connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VG (M1-3) - VG (E4-28)	Below 1 Ω
E2G (M1-2) - E2G (E4-30)	Below 1 Ω

Standard resistance (Check for short)

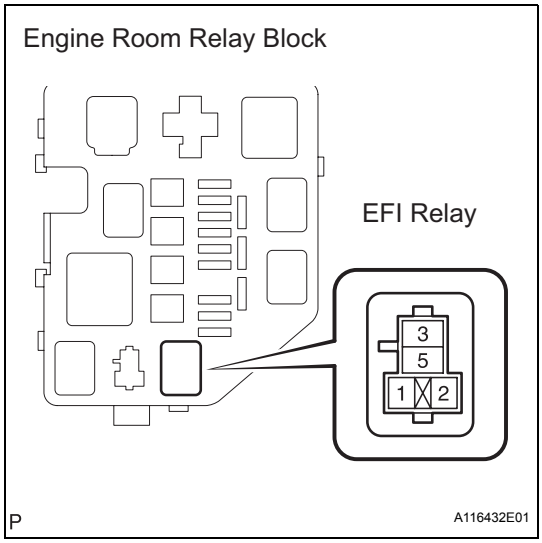
Tester Connection	Specified Condition
VG (M1-3) or VG (E4-28) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

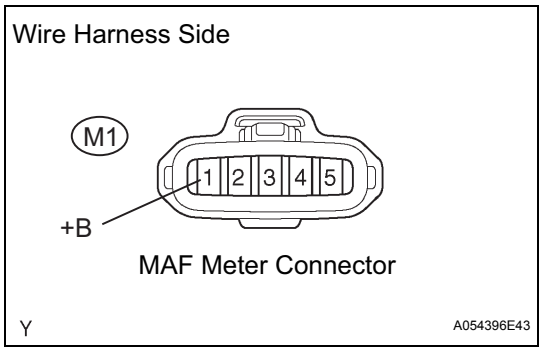
OK

REPLACE MASS AIR FLOW METER

5	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - EFI RELAY)



(a) Remove the EFI relay from the engine room relay block.
(b) Disconnect the M1 MAF meter connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (M1-1) - Engine room relay block (EFI relay terminal 3)	Below 1 Ω

Standard resistance (Check for short)

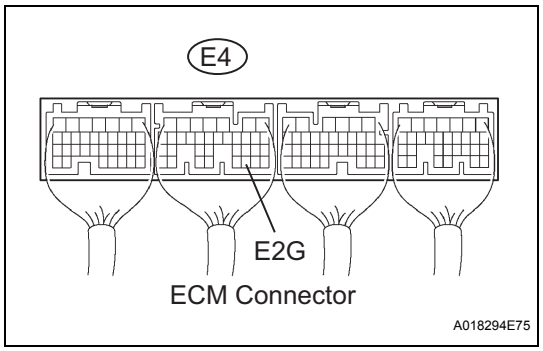
Tester Connection	Specified Condition
+B (M1-1) or Engine room relay block (EFI relay terminal 3) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

INSPECT ECM POWER SOURCE CIRCUIT

6 INSPECT ECM (SENSOR GROUND)



(a) Measure the resistance of the ECM connector and body ground.

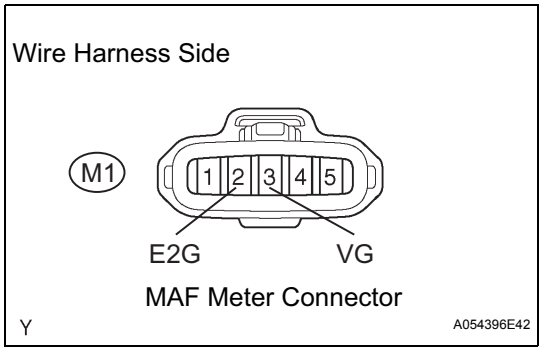
Standard resistance

Tester Connection	Specified Condition
E2G (E4-30) - Body ground	Below 1 Ω

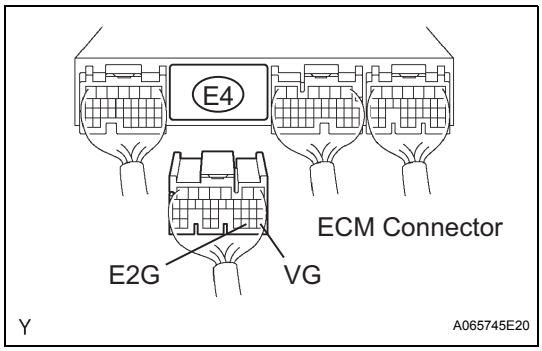
NG → **REPLACE ECM**

OK

7 CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)



(a) Disconnect the M1 MAF meter connector.
(b) Disconnect the E4 ECM connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VG (M1-3) - VG (E4-28)	Below 1 Ω
E2G (M1-2) - E2G (E4-30)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
VG (M1-3) or VG (E4-28) - Body ground	10 kΩ or higher

ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

DTC	P0101	Mass Air Flow Circuit Range / Performance Problem

DESCRIPTION

Refer to DTC P0100 (see page ES-74).

DTC No.	DTC Detection Condition	Trouble Area
P0101	• High voltage: Conditions (a), (b) and (c) continue for more than 10 seconds (2 trip detection logic): (a) Engine speed less than 2,000 rpm (b) Engine coolant temperature 70°C (158°F) or higher (c) Output voltage of Mass Air Flow (MAF) meter more than specified value example 2.2 V at throttle position equal to 0 (varies with throttle position sensor voltage) • Low voltage: Conditions (a) and (b) continue for more than 10 seconds (2 trip detection logic): (a) Engine speed more than 300 rpm (b) Output voltage of MAF meter less than specified value example 0.65 V at throttle position equal to 0 (varies with throttle position sensor voltage)	Mass Air Flow (MAF) meter

ES

MONITOR DESCRIPTION

The MAF meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components of the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume. If there is a defect in the sensor, or an open or short in the circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets the DTC.
Example:
If the voltage is more than 2.2 V, or less than 0.65 V while idling, the ECM determines that there is a malfunction in the MAF meter and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0101: Mass air flow meter rationality
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Related)	Engine speed sensor, engine coolant temperature sensor and throttle position sensor
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0335 (crankshaft position sensor) P0340 (camshaft position sensor)

Mass Air Flow Meter Rationality (High Voltage):

Engine speed	Less than 2,000 rpm
Engine coolant temperature	70°C (158°F) or more

Mass Air Flow Meter Rationality (Low Voltage):

Engine speed	More than 300 rpm
Fuel cut	OFF

TYPICAL MALFUNCTION THRESHOLDS

Mass Air Flow Meter Rationality (High Voltage):

Mass air flow meter voltage	More than 2.2 V (varies with throttle position sensor voltage)

Mass Air Flow Meter Rationality (Low Voltage):

Mass air flow meter voltage	Less than 0.65 V (varies with throttle position sensor voltage)

WIRING DIAGRAM

Refer to DTC P0100 (see page ES-76).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0101)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0101 and other DTCs	A
P0101	B

HINT:
If any DTCs other than P0101 are output, troubleshoot those DTCs first.

B → REPLACE MASS AIR FLOW METER

A → GO TO DTC CHART

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CONNECT INTELLIGENT TESTER TO DLC3*

HINT:
If the display indicates a communication fault in the tester, inspect the DLC3.

NEXT

4	CHECK DTC AND FREEZE FRAME DATA*

HINT:
Record or print DTCs and freeze frame data, if necessary.

NEXT

5	CLEAR DTC AND FREEZE FRAME DATA*

NEXT

6	CONDUCT VISUAL INSPECTION

NEXT

7	SET CHECK MODE DIAGNOSIS*

NEXT

8	CONFIRM PROBLEM SYMPTOMS

HINT:
If the engine does not start, first perform the "check DTC" procedures and "conduct basic inspection" procedures below.

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 10

ES

A

9	SIMULATE SYMPTOMS

NEXT

10	CHECK DTC*

Result	Proceed to
Malfunction code	A
No code	B

B → GO TO STEP 12

A

11	REFER TO DTC CHART

NEXT

GO TO STEP 14

12	CONDUCT BASIC INSPECTION

Result	Proceed to
Malfunctioning parts not confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 17

A

13 REFER TO PROBLEM SYMPTOMS TABLE

Result	Proceed to
Malfunctioning circuit confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 17

A

14 CHECK ECM POWER SOURCE CIRCUIT

NEXT

15 CONDUCT CIRCUIT INSPECTION

Result	Proceed to
Malfunction not confirmed	A
Malfunction confirmed	B

B → GO TO STEP 18

A

16 CHECK FOR INTERMITTENT PROBLEMS

NEXT

GO TO STEP 18

17 CONDUCT PARTS INSPECTION

NEXT

18 IDENTIFY PROBLEM

NEXT

19 ADJUST, REPAIR OR REPLACE

NEXT

20	CONDUCT CONFIRMATION TEST

NEXT

END

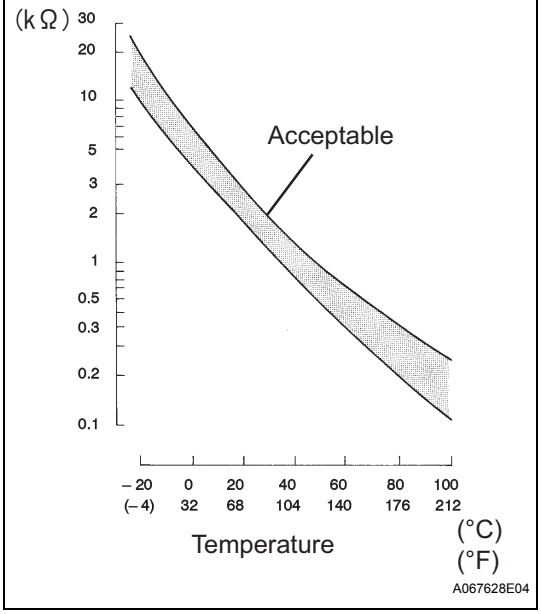
DTC	P0110	Intake Air Temperature Circuit Malfunction

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

DESCRIPTION

Fig. 1



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT is low, the resistance of the thermistor increases. When the temperature is high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (see Fig. 1).

The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R.

Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

HINT:

When any of DTCs P0110, P0112 and P0113 are set, the ECM enters fail-safe mode. During fail-safe mode, the IAT is estimated to be 20°C (68°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	DTC Detection Condition	Trouble Area
P0110	Open or short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM
P0112	Short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM
P0113	Open in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM

HINT:
When any of these DTCs are set, check the IAT by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the Intake Air Temperature (IAT). When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a malfunction in the IAT sensor and sets a DTC.

Example:
If the sensor output voltage is 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the IAT sensor circuit, and sets DTC P0113. Conversely, if the output voltage is more than 0.18 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0112.
If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0110: Intake air temperature sensor range check (Fluctuating) P0112: Intake air temperature sensor range check (Low resistance) P0113: Intake air temperature sensor range check (High resistance)
Required Sensors/Components (Main)	Intake Air Temperature (IAT) sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0110:

IAT sensor voltage	Less than 0.18 V, or more than 4.91 V

P0112:

IAT sensor voltage	Less than 0.18 V

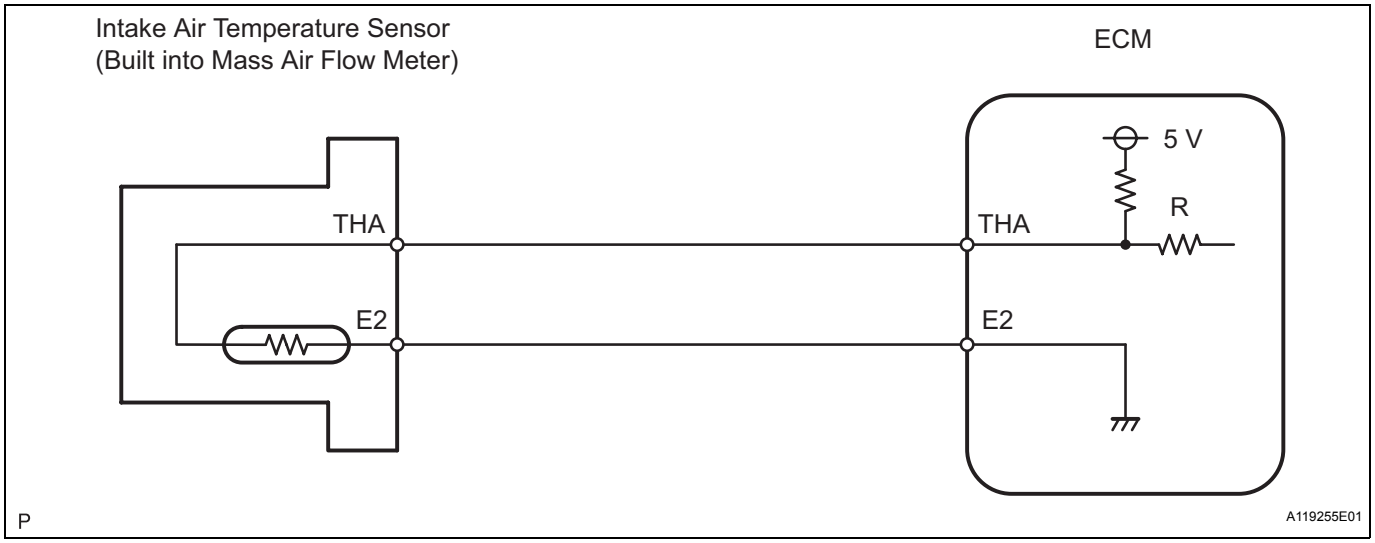
P0113:

IAT sensor voltage	More than 4.91 V

COMPONENT OPERATING RANGE

IAT sensor voltage	0.18 to 4.91 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF INTELLIGENT TESTER (INTAKE AIR TEMPERATURE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(d) Read the value displayed on the tester.

Standard:

Same as actual Intake Air Temperature (IAT).

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Same as actual IAT	C

HINT:

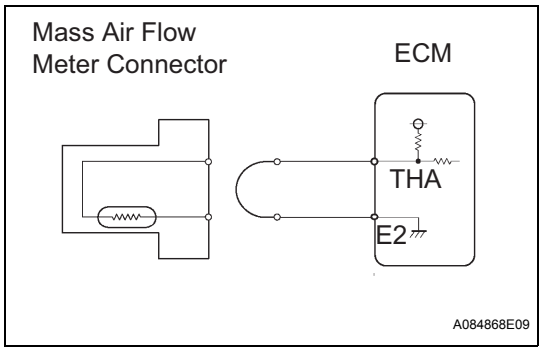
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

B	Go to step 4
C	CHECK FOR INTERMITTENT PROBLEMS

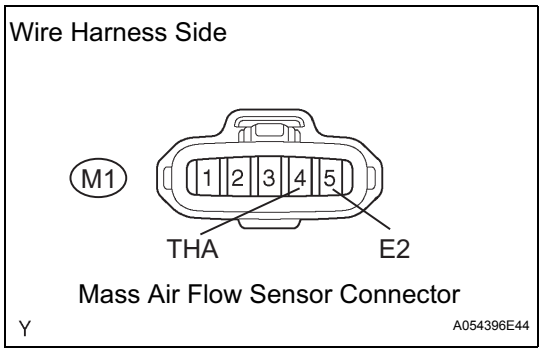
ES

A

2	READ VALUE OF INTELLIGENT TESTER (CHECK FOR OPEN IN WIRE HARNESS)



(a) Disconnect the M1 Mass Air Flow (MAF) meter connector.

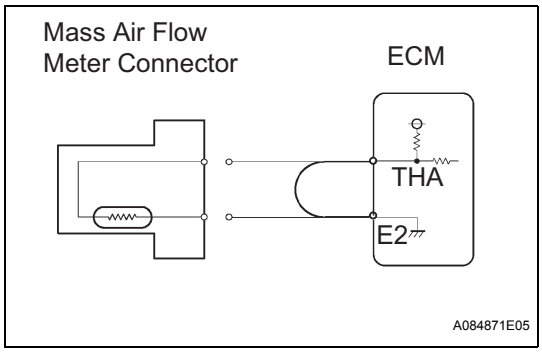


(b) Connect terminals THA and E2 of the MAF meter wire harness side connector.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(f) Read the value displayed on the tester.
Standard:
140°C (284°F) or higher

OK	CONFIRM GOOD CONNECTION TO SENSOR. IF OK, REPLACE MASS AIR FLOW METER

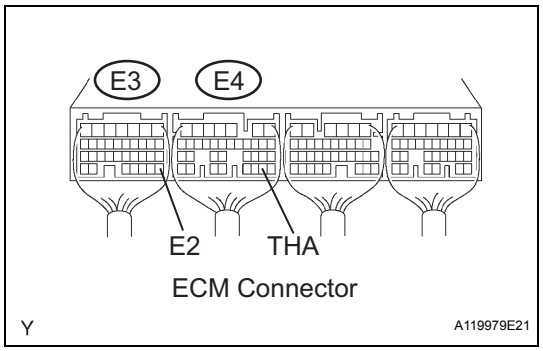
NG

3	READ VALUE OF INTELLIGENT TESTER (CHECK FOR OPEN IN ECM)



(a) Disconnect the M1 MAF meter connector.

ES



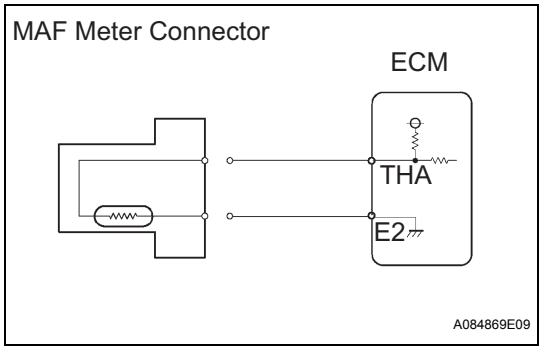
(b) Connect terminals THA and E2 of the E3 and E4 ECM connectors.
HINT:
Before checking, perform visual and contact pressure checks on the ECM connector.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(f) Read the value displayed on the tester.
Standard:
140°C (284°F) or higher

OK	**REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

CONFIRM GOOD CONNECTION TO ECM. IF OK, REPLACE ECM

4 READ VALUE OF INTELLIGENT TESTER (CHECK FOR SHORT IN WIRE HARNESS)

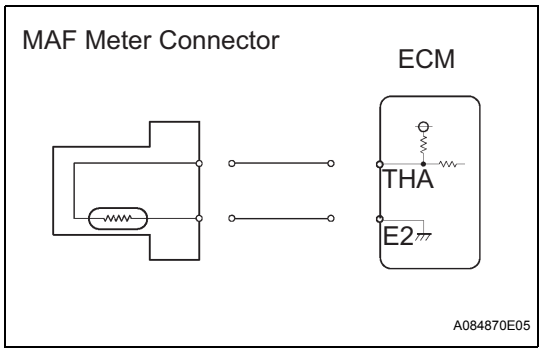


(a) Disconnect the M1 MAF meter connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON and turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(e) Read the value displayed on the tester.
Standard:
-40°C (-40°F)

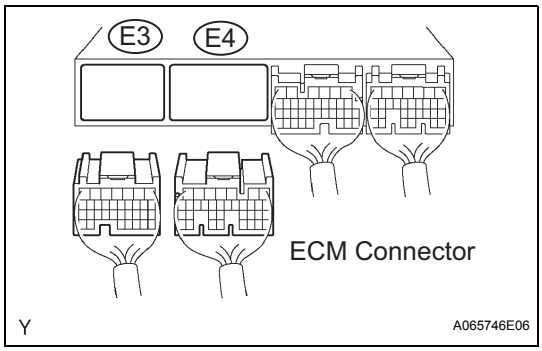
OK	**REPLACE MASS AIR FLOW METER**

NG

5 READ VALUE OF INTELLIGENT TESTER (CHECK FOR SHORT IN ECM)



(a) Disconnect the E3 and E4 ECM connectors.



(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON and turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(e) Read the value displayed on the tester.
Standard:
-40°C (-40°F)

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

REPLACE ECM

DTC	P0115	Engine Coolant Temperature Circuit Malfunction

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor, of which the resistance value varies according to the ECT.

The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

HINT:

When any of DTCs P0115, P0117 and P0118 are set, the ECM enters fail-safe mode. During fail-safe mode, the ECT is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	DTC Detection Condition	Trouble Area
P0115	Open or short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in ECT sensor circuit • ECT sensor • ECM
P0117	Short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	• Short in ECT sensor • ECT sensor • ECM
P0118	Open in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open in ECT sensor circuit • ECT sensor • ECM

HINT:

When any of these DTCs are set, check the ECT by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the ECT. The ECT sensor has a thermistor with a resistance that varies according to the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. These variations in resistance are reflected in the output voltage from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the ECT. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

If the sensor output voltage is 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the ECT sensor circuit, and sets DTC P0118. Conversely, if the voltage output is more than 0.14 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0117. If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0115: Engine coolant temperature sensor range check (Fluctuating) P0117: Engine coolant temperature sensor range check (Low resistance) P0118: Engine coolant temperature sensor range check (High resistance)
Required sensors/components (Main)	Engine coolant temperature (ECT) sensor
Required sensors/components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0115:

ECT sensor voltage	Less than 0.14 V, or more than 4.91 V

P0117:

ECT sensor voltage	Less than 0.14 V

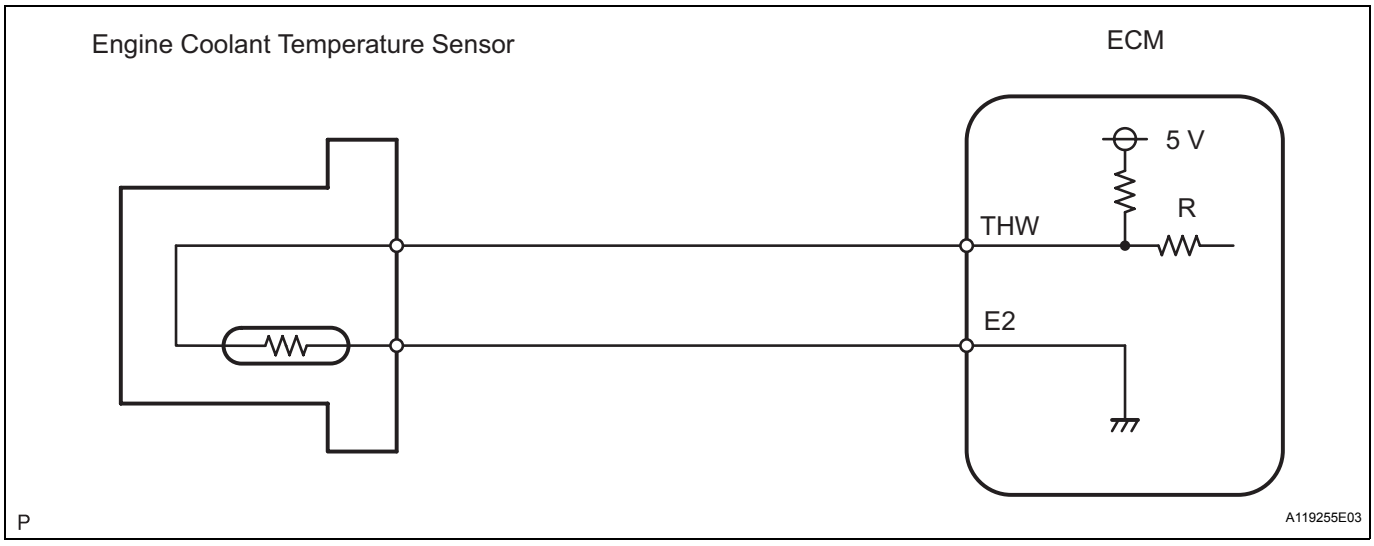
P0118:

ECT sensor voltage	More than 4.91 V

COMPONENT OPERATING RANGE

ECT sensor voltage	0.14 to 4.91 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF INTELLIGENT TESTER (ENGINE COOLANT TEMPERATURE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(d) Read the value displayed on the tester.
Standard:
Between 80°C and 97°C (176°F and 207°F) with warm engine.

ES

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Between 80°C and 97°C (176°F and 207°F)	C

HINT:

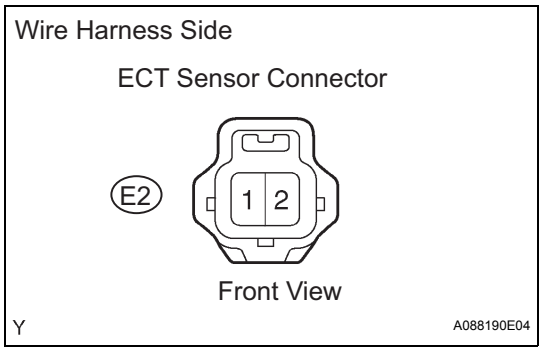
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

B → Go to step 4

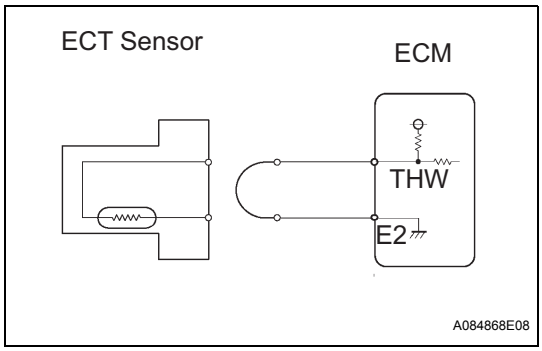
C → CHECK FOR INTERMITTENT PROBLEMS

A

2	READ VALUE OF INTELLIGENT TESTER (CHECK FOR OPEN IN WIRE HARNESS)



(a) Disconnect the E2 Engine Coolant Temperature (ECT) sensor connector.



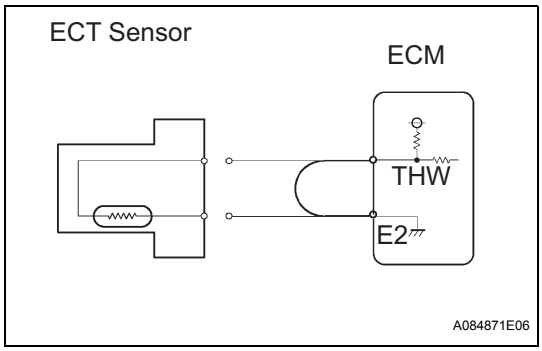
(b) Connect terminals 1 and 2 of the ECT sensor connector on the wire harness side.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(f) Read the value displayed on the tester.
Standard:
140°C (284°F) or higher.

OK → **CONFIRM GOOD CONNECTION TO SENSOR. IF OK, REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

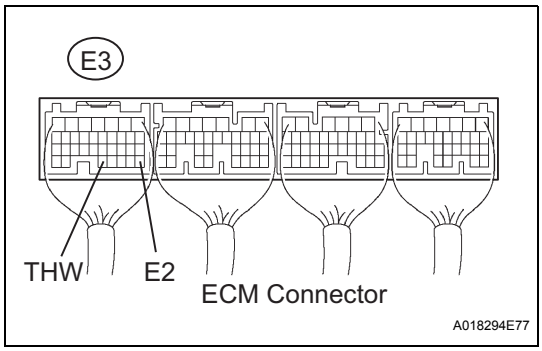
ES

NG

3	READ VALUE OF INTELLIGENT TESTER (CHECK FOR OPEN IN ECM)



(a) Disconnect the E2 ECT sensor connector.



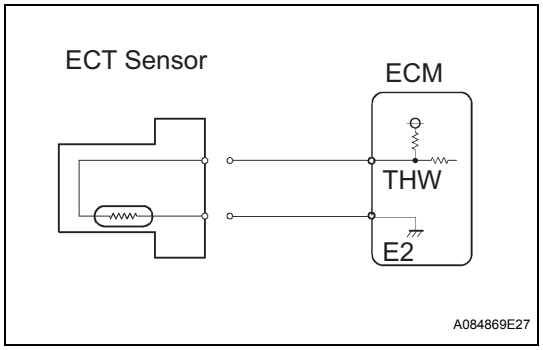
(b) Connect terminals THW and E2 of the ECM connector.
HINT:
Before checking, perform visual and contact pressure checks on the ECM connector.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(f) Read the value displayed on the tester.
Standard:
140°C (284°F) or higher.

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

CONFIRM GOOD CONNECTION TO ECM. IF OK, REPLACE ECM

4	READ VALUE OF INTELLIGENT TESTER (CHECK FOR SHORT IN WIRE HARNESS)

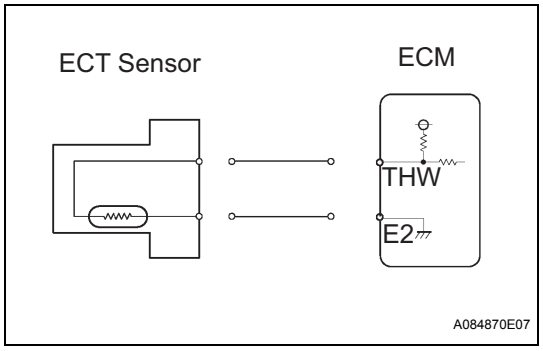


(a) Disconnect the E2 ECT sensor connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON and turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(e) Read the value displayed on the tester.
Standard:
-40°C (-40°F)

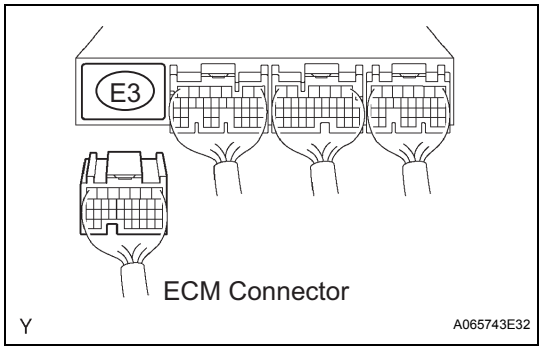
OK → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

NG

5	READ VALUE OF INTELLIGENT TESTER (CHECK FOR SHORT IN ECM)



(a) Disconnect the E3 ECM connector.



(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON and turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(e) Read the value displayed on the tester.
Standard:
-40°C (-40°F)

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

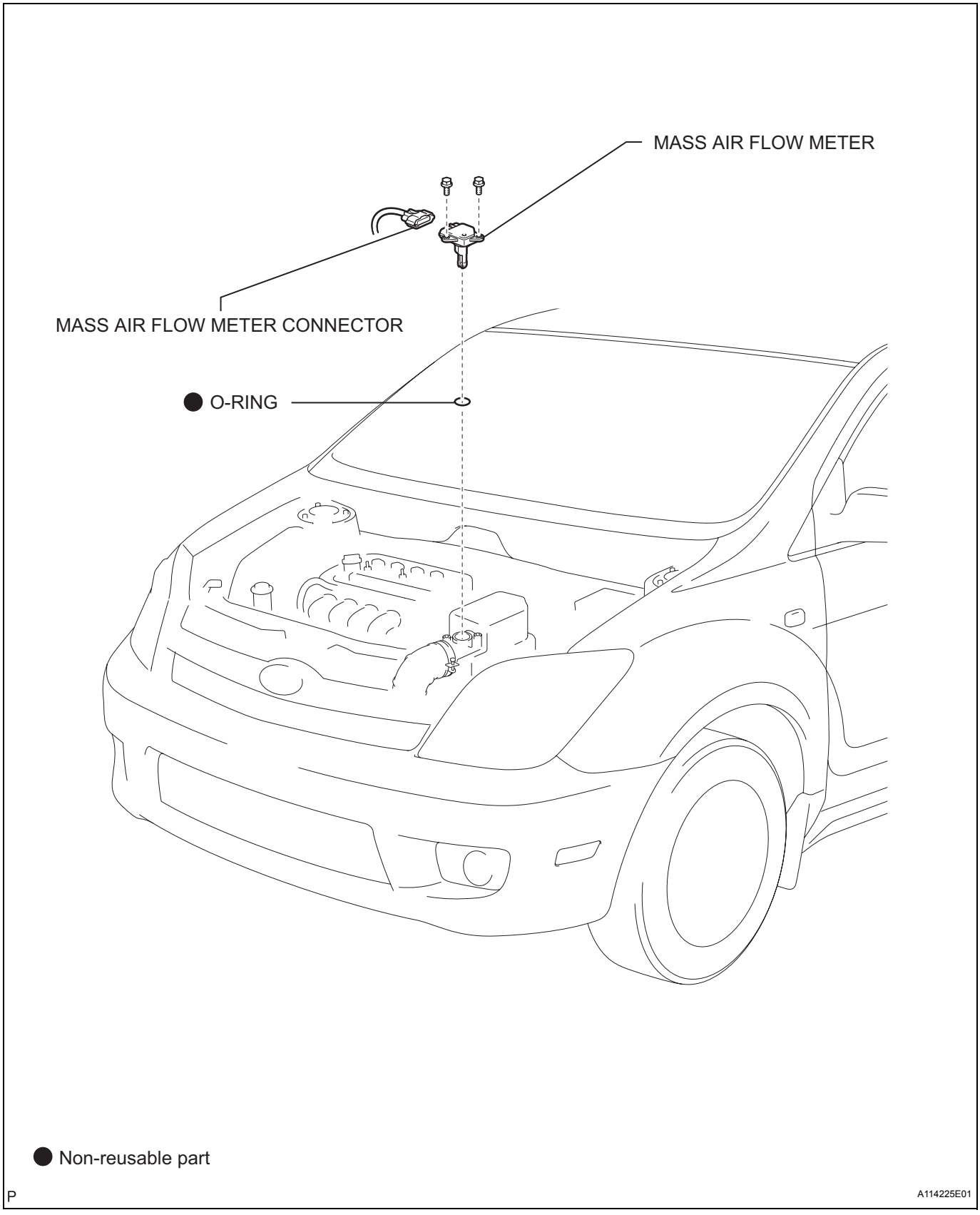
NG

REPLACE ECM

ES

MASS AIR FLOW METER

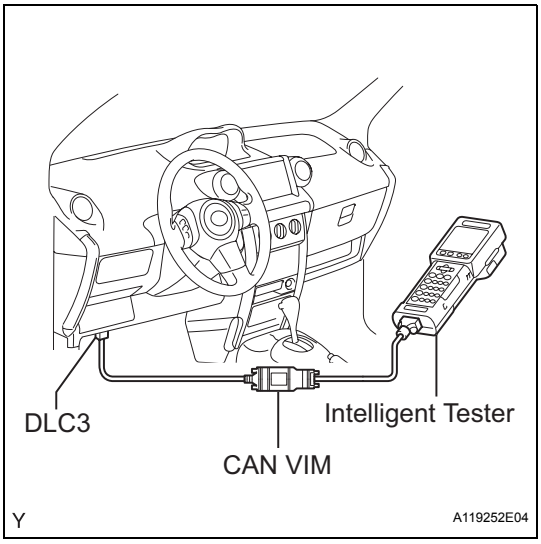
COMPONENTS



ON-VEHICLE INSPECTION

NOTICE:

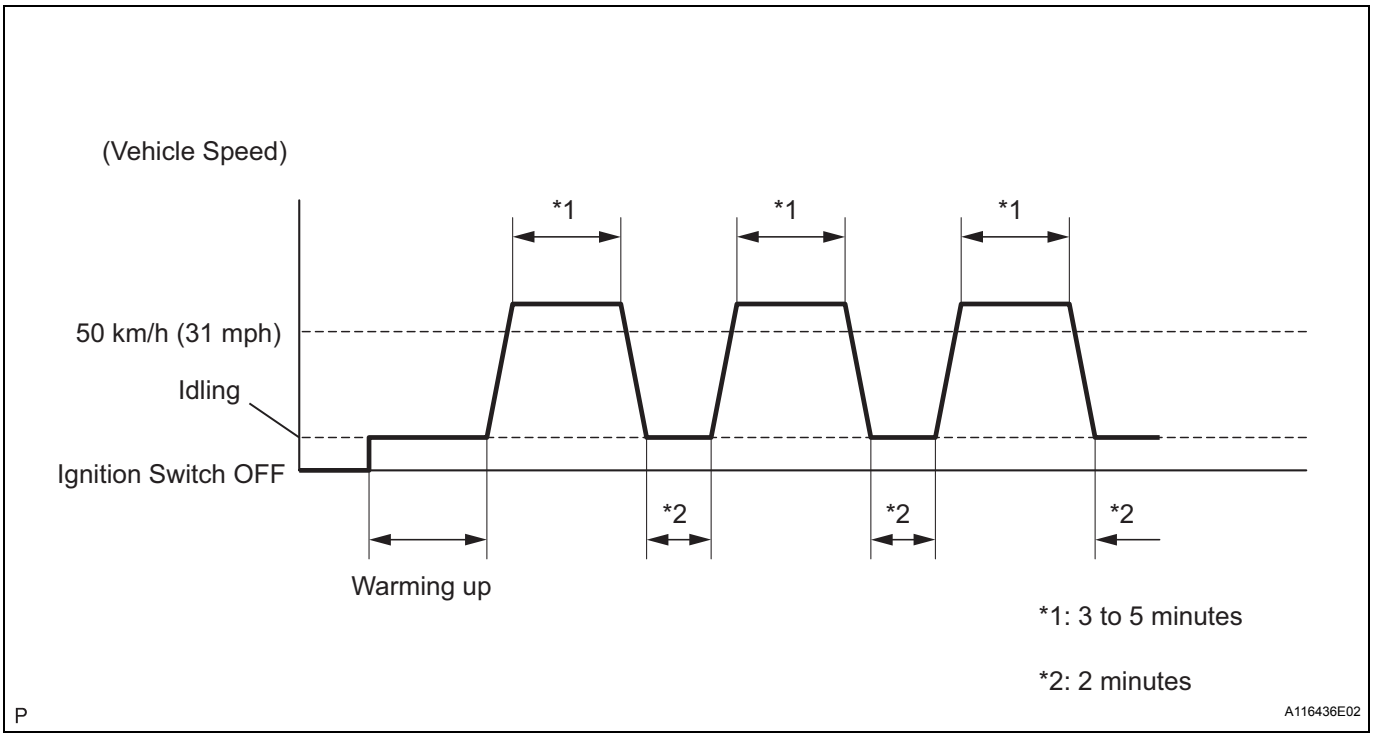
- **Perform the MAF meter inspection according to the procedures below.**
- **Only replace the MAF meter when both the LONG FT#1 value and MAF value in the DATA LIST (with the engine stopped) are not within the normal operating range.**



1. CHECK MASS AIR FLOW METER

(a) Perform confirmation driving pattern.

(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Turn the tester ON.
(4) Clear the DTCs (see page ES-36).
(5) Start the engine and warm it up with all accessory switches OFF (until the engine coolant temperature is 75°C (167°F) or more).
(6) Drive the vehicle at 50 km/h (31 mph) or more for 3 to 5 minutes*1.
(7) Allow the engine to idle for 2 minutes*2.
(8) Perform steps *1 and *2 at least 3 times.



(b) Read value using intelligent tester (LONG FT#1).

(1) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / LONG FT#1.
(2) Read the values displayed on the tester.
Standard value:
Within -15 to +15 %

If the result is not within the specified range, perform the inspection below.

(c) Read value using intelligent tester (MAF).

NOTICE:

- **Turn off the engine.**
- **Perform the inspection with the vehicle indoors and on a level surface.**
- **Perform the inspection of the MAF meter while it is installed to the air cleaner case (installed to the vehicle).**
- **During the test, do not use the exhaust air duct to perform suction on the exhaust pipe.**

(1) Turn the ignition switch to ACC.

(2) Turn the ignition switch ON (do not run the engine).

(3) Turn the tester ON.

(4) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.

(5) Wait 30 seconds, and read the values on the intelligent tester.

Standard condition:

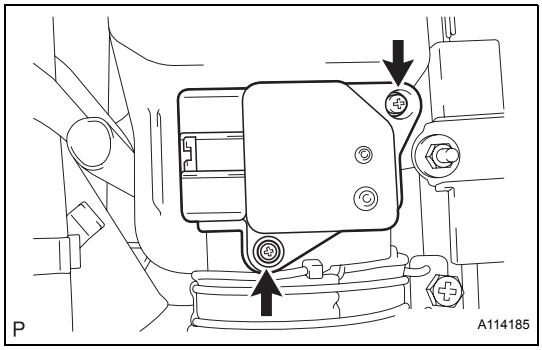
Less than 0.27g/s

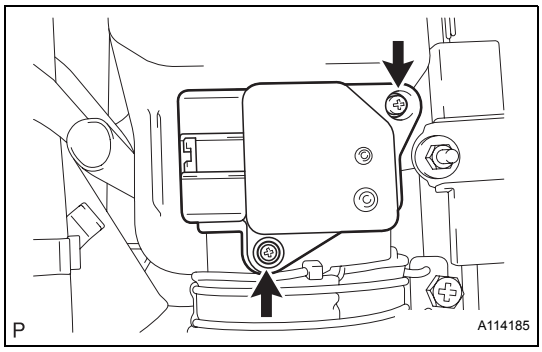
- If the result is not as specified, replace the MAF meter.
- If the result is within the specified range, inspect the cause of the extremely rich or lean air fuel ratio (see page ES-148).

ES

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE MASS AIR FLOW METER**
   (a) Disconnect the MAF meter connector.
   (b) Remove the 2 screws and MAF meter.
   (c) Remove the O-ring from the MAF meter.





INSTALLATION

1. **INSTALL MASS AIR FLOW METER**
   (a) Install a new O-ring to the MAF meter.
   (b) Install the MAF meter with the 2 screws.
   (c) Connect the MAF connector.
2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting the cable from the negative (-) battery terminal.

DTC	P0116	Engine Coolant Temperature Circuit Range / Performance Problem

DESCRIPTION

Refer to DTC P0115 (see page ES-89).

DTC No.	DTC Detection Condition	Trouble Area
P0116	When one of following conditions is met (2 trip detection logic): • When cold engine is started and engine is warmed up, Engine Coolant Temperature (ECT) sensor value does not change • When warmed up engine is started, driving does not change ECT sensor value • After a warmed up engine is started, if the ECT sensor value does not change when the engine is stopped and then the next cold engine start is performed, it is determined that a malfunction has occurred.	• Thermostat • Engine Coolant Temperature (ECT) sensor

ES

MONITOR DESCRIPTION

- When a cold engine start is performed and then the engine is warmed up, if the ECT sensor value does not change, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.
- When a warmed up engine is started, if the ECT sensor value does not change during driving, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.
- After a warmed up engine is started, if the ECT sensor value does not change when the engine is stopped and then the next cold engine start is performed, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0116: Engine coolant temperature (ECT) sensor cold start monitor P0116: ECT sensor hot start monitor P0116: ECT sensor soak monitor
Required Sensors/Components (Main)	ECT sensor
Required Sensors/Components (Related)	None
Frequency of Operation	Once per driving cycle
Duration	180 seconds or more
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Engine Coolant Temperature (ECT) sensor cold start monitor:

This monitor will run whenever these DTCs are not present	P0100 to P0103: Mass air flow (MAF) meter P0110 to P0113: Intake air temperature (IAT) sensor
Battery voltage	10.5 V or more
Time after engine start	1 seconds or more
ECT at engine start	Less than 60°C (140°F)
IAT sensor circuit	OK
Soak time	5 hours or more
Accumulated MAF	900 g or more
Engine	Running
Fuel cut	OFF
Difference between ECT at engine start and IAT	Less than 40°C (72°F)

ECT sensor hot start monitor:

This monitor will run whenever these DTCs are not present	P0100 to P0103: MAF meter P0110 to P0113: IAT sensor
Battery voltage	10.5 V or more
MAF meter circuit	OK
ECT at engine start	Less than 60°C (140°F)
ECT at engine start	60 to 150°C (140 to 302°F)
Engine load change	10 times or more
Accumulated MAF	3,000 g or more

ECT sensor soak monitor:

This monitor will run whenever these DTCs are not present	P0100 to P0103: MAF meter P0110 to P0113: IAT sensor
Battery voltage	10.5 V or more
Engine	Running
Soak time	5 hours or more
Either (a) or (b) condition is met	-
(a) ECT	60°C (140°F) or more
(b) Accumulated MAF	5,000 g or more

ES

TYPICAL MALFUNCTION THRESHOLDS

Engine Coolant Temperature (ECT) sensor cold start monitor:

ECT sensor value change	Less than 5°C (9°F)

ECT sensor hot start monitor:

ECT sensor value change	Less than 5°C (9°F)

ECT sensor soak monitor:

Difference between current ECT sensor value and previous ECT sensor value when engine stopped	Less than 5°C (9°F)

COMPONENT OPERATING RANGE

Engine coolant temperature	ECT sensor value changes in accordance with actual ECT

WIRING DIAGRAM

Refer to DTC P0115 (see page ES-90).

INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0117, P0118 or P0125 are set simultaneously with DTC P0116, the ECT sensor may have an open or short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0116)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTC.

Result

Display (DTC output)	Proceed to
P0116	A
P0116 and other DTCs	B

B → **GO TO DTC CHART**

A

ES

2 INSPECT THERMOSTAT

(a) Remove the thermostat (see page CO-12).
(b) Check the valve opening temperature of the thermostat.
Standard:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

NG → **REPLACE THERMOSTAT**

OK

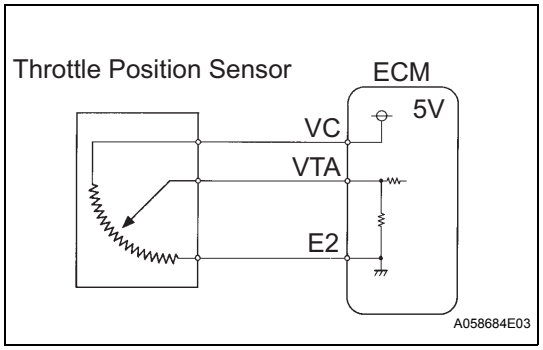
REPLACE ENGINE COOLANT TEMPERATURE SENSOR

DTC	P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit

DTC	P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input

DTC	P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input

DESCRIPTION



HINT:
These DTCs relate to the Throttle Position (TP) sensor.
The TP sensor is mounted on the throttle body and detects the throttle valve opening angle.
When the throttle valve is fully closed, the sensor transmits a signal voltage of approximately 0.3 to 1.0 V to terminal VTA of the ECM. This signal voltage increases in proportion to the opening angle of the throttle valve, reaching approximately 3.2 to 4.9 V when the throttle valve is fully open.
The ECM determines the vehicle driving conditions from these signals and uses this information in functions such as air-fuel ratio correction, power increase correction and fuel cut control.

DTC No.	DTC Detection Condition	Trouble Area
P0120	VTA less than 0.14 V, or VTA more than 4.91 V for 5 seconds or more (1 trip detection logic)	• Throttle Position (TP) sensor • ECM
P0122	VTA stays less than 0.14 V for 5 seconds or more (1 trip detection logic)	• TP sensor • Short in VTA circuit • Open in VC circuit • ECM
P0123	VTA stays more than 4.91 V for 5 seconds or more (1 trip detection logic)	• TP sensor • Open in VTA circuit • Open in E2 circuit • Short between VC and VTA circuits • ECM

HINT:
- Fail-safe mode: When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts fuel intermittently. Fail-safe mode continues until a pass condition is detected and the ignition switch is turned OFF.
- When any of these DTCs are set, check the throttle valve opening angle using the intelligent tester.

Throttle Valve Fully Closed	Throttle Valve Fully Open	Trouble Area
0%	0%	VC circuit open VTA circuit open or short
Approximately 100%	Approximately 100%	E2 circuit open

MONITOR DESCRIPTION

The resistance of the Throttle Position (TP) sensor varies in accordance with the throttle valve opening angle. The ECM transmits a standardized reference voltage to the VC terminal of the TP sensor and calculates the throttle valve opening angle based on the voltage received from the VTA terminal of the sensor. When the throttle valve is near the fully closed position, the output voltage of the TP sensor is low. When it is near the fully open position, the output voltage is high.
If the ECM detects that the output voltage of the TP sensor is outside the normal range, the ECM interprets this as a malfunction in the TP sensor and sets a DTC.

MONITOR STRATEGY

ES

Related DTCs	P0120: Throttle position sensor range check (fluctuating) P0122: Throttle position sensor range check (low voltage) P0123: Throttle position sensor range check (high voltage)
Required sensors/components (Main)	TP sensor
Required sensors/components (Related)	-
Frequency of operation	Continuous
Duration	5 seconds
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever these DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0120:

Throttle position sensor voltage	Less than 0.14 V or more than 4.91 V

P0122:

Throttle position sensor voltage	Less than 0.14 V

P0123:

Throttle position sensor voltage	More than 4.91 V

COMPONENT OPERATING RANGE

Throttle position sensor voltage	Between 0.14 V and 4.91 V

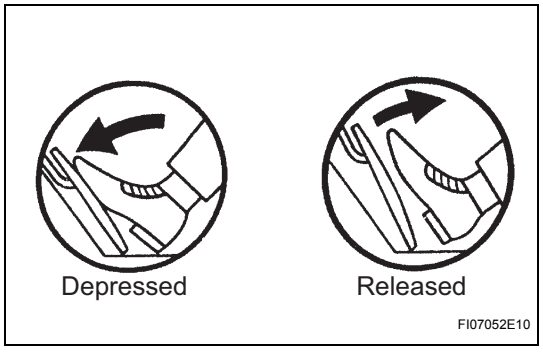
WIRING DIAGRAM

INSPECTION PROCEDURE

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF INTELLIGENT TESTER (THROTTLE VALVE OPENING PERCENTAGE)



(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS.
(d) Read its value displayed on the tester when the accelerator pedal is released and depressed.

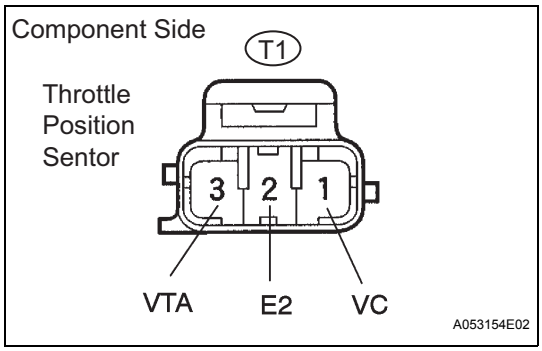
Result

Throttle Valve Opening Angle (%)	Proceed to
0	A
From approximately 0 to 75	B
Approximately 100	C

B	CHECK FOR INTERMITTENT PROBLEMS
C	Go to step 4

A

2 INSPECT THROTTLE POSITION SENSOR



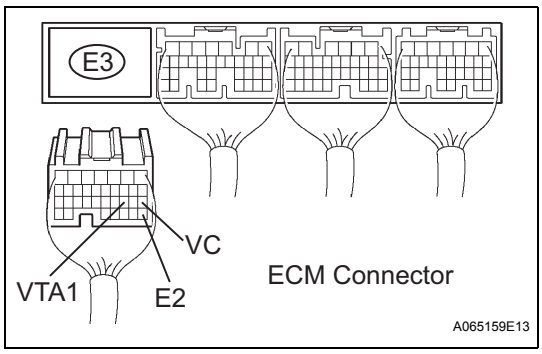
(a) Disconnect the T1 Throttle Position (TP) sensor connector.
(b) Measure the resistance of the TP sensor.
Standard resistance

Tester Connection	Throttle Valve Position	Specified Condition
VC (T1-1) - E2 (T1-2)	-	2.5 to 5.9 kΩ
VTA (T1-3) - E2 (T1-2)	Fully closed	0.2 to 5.7 kΩ
VTA (T1-3) - E2 (T1-2)	Fully open	2.0 to 10.2 kΩ

NG → REPLACE THROTTLE POSITION SENSOR

OK

3 CHECK HARNESS AND CONNECTOR (ECM - THROTTLE POSITION SENSOR)



(a) Disconnect the E3 ECM connector.
(b) Measure the resistance of the ECM connector.
Standard resistance

Tester Connection	Throttle Valve Position	Specified Condition
VC (E3-18) - E2 (E3-28)	-	2.5 to 5.9 kΩ
VTA1 (E3-20) - E2 (E3-28)	Fully closed	0.2 to 5.7 kΩ
VTA1 (E3-20) - E2 (E3-28)	Fully open	2.0 to 10.2 kΩ

Standard resistance (Check for short)

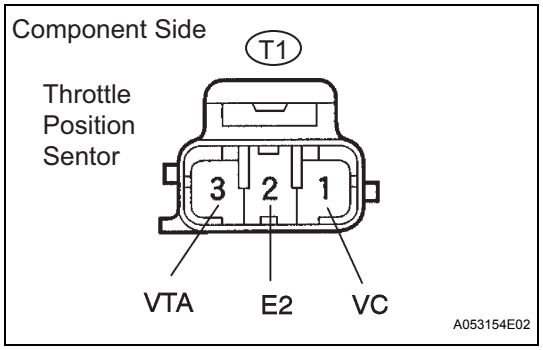
Tester Connection	Specified Condition
VC (E3-18) - Body ground	10 kΩ or higher
VTA1 (E3-20) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM

4 INSPECT THROTTLE POSITION SENSOR



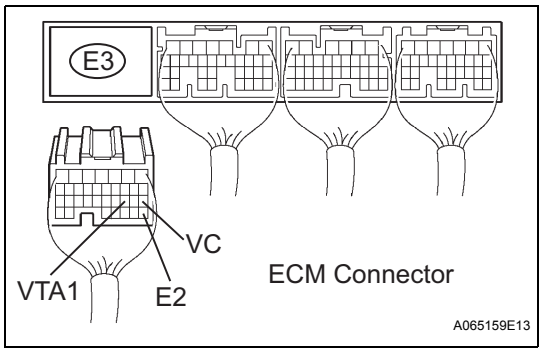
(a) Disconnect the T1 TP sensor connector.
(b) Measure the resistance of the TP sensor.
Standard resistance

Tester Connection	Throttle Valve Position	Specified Condition
VC (T1-1) - E2 (T1-2)	-	2.5 to 5.9 kΩ
VTA (T1-3) - E2 (T1-2)	Fully closed	0.2 to 5.7 kΩ
VTA (T1-3) - E2 (T1-2)	Fully open	2.0 to 10.2 kΩ

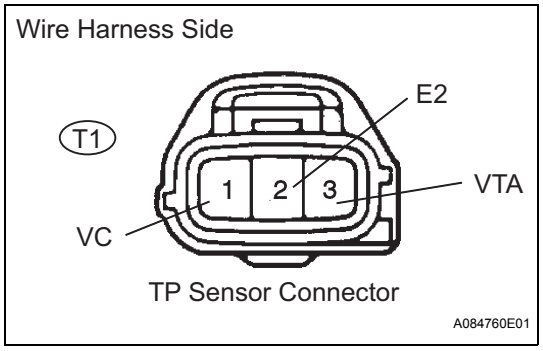
NG → **REPLACE THROTTLE POSITION SENSOR**

OK

5 CHECK HARNESS AND CONNECTOR (ECM - THROTTLE POSITION SENSOR)



(a) Disconnect the E3 ECM connector.



(b) Disconnect the T1 TP sensor connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
VC (T1-1) - VC (E3-18)	Below 1 Ω
VTA (T1-3) - VTA1 (E3-20)	Below 1 Ω
E2 (T1-2) - E2 (E3-28)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VC (T1-1) or VC (E3-18) - Body ground	10 kΩ or higher
VTA (T1-3) or VTA1 (E3-20) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

ES

DTC	P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem

DESCRIPTION

HINT:
This DTC relates to the Throttle Position (TP) sensor.
Refer to DTC P0120 (see page ES-97).

DTC No.	DTC Detection Condition	Trouble Area
P0121	After vehicle speed exceeds 30 km/h (18.6 mph) once, Throttle Position (TP) sensor output voltage deviates from the standard range when throttle valve closed at 0 km/h (0 mph) on 4 occasions	Throttle Position (TP) sensor

MONITOR DESCRIPTION

The resistance of the TP sensor varies in accordance with the throttle valve opening angle. The ECM transmits a standardized reference voltage to the VC terminal of the TP sensor and calculates the throttle valve opening angle based on the voltage received from the VTA terminal of the sensor.
When the throttle valve is near the fully closed position, the output voltage of the TP sensor is low. When it is near the fully open position, the output voltage is high.
The ECM monitors the indicated throttle valve opening angle during stop-and-go driving conditions. If the indicated angle (or voltage) in the closed throttle valve position is outside the specified range, the ECM interprets this as a malfunction in the TP sensor and sets the DTC.
HINT:
When this DTC is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts fuel intermittently. Fail-safe mode continues until a pass condition is detected and the ignition switch is turned OFF.

MONITOR STRATEGY

Related DTCs	P0121: TP sensor rationality
Required Sensors/Components (Main)	TP sensor
Required Sensors/Components (Related)	None
Frequency of Operation	Continuous
Duration	Stop and go is performed 4 times
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Stop and Go	4 times

Stop-and-go is defined as follows:
Stop indicates a vehicle speed of 0 km/h (0 mph). Go indicates a vehicle speed of 30 km/h (18.6 mph).

TYPICAL MALFUNCTION THRESHOLDS

Closed throttle position learning value	Lower than 0.298 or 1.05 V or higher

COMPONENT OPERATING RANGE

Closed throttle position learning value	0.298 to 1.05 V

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0121)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0121 and other DTCs	A
P0121	B

HINT:
If any DTCs other than P0121 are output, troubleshoot those DTCs first.

B → REPLACE THROTTLE POSITION SENSOR

A

GO TO DTC CHART

DTC	P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control

DESCRIPTION

Refer to DTC P0115 (see page ES-89).

DTC No.	DTC Detection Condition	Trouble Area
P0125	• Case 1: ECT above 10°C (50°F) at engine start and following conditions met (2 trip detection logic): (a) 1 minute elapsed since engine start (b) ECT sensor value remains below closed loop fuel control enabling temperature • Case 2: ECT between -6.6 and 10°C (20 and 50°F) at engine start and following conditions met (2 trip detection logic): (a) 1.7 minutes elapsed since engine start (b) ECT sensor value remains below closed loop fuel control enabling temperature • Case 3: Engine Coolant Temperature (ECT) less than -6.6°C (20°F) at engine start and following conditions met (2 trip detection logic): (a) 19 minutes elapsed since engine start (b) ECT sensor value remains below closed loop fuel control enabling temperature	• Cooling system • Engine Coolant Temperature (ECT) sensor • Thermostat

MONITOR DESCRIPTION

The resistance of the ECT sensor varies in proportion to the actual ECT. The ECM supplies a constant voltage to the sensor and monitors the signal output voltage of the sensor. The signal voltage output varies according to the changing resistance of the sensor. After the engine is started, the ECT is monitored through this signal. If the ECT sensor indicates that the engine is not yet warm enough for closed loop fuel control, despite a specified period of time having elapsed since the engine was started, the ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.
Example:
The ECT is 0°C (32°F) at engine start. After 5 minutes running time, the ECT sensor still indicates that the engine is not warm enough to begin closed loop fuel (air-fuel ratio feedback) control. The ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0125: Insufficient engine coolant temperature for closed loop (case 1) P0125: Insufficient engine coolant temperature for closed loop (case 2) P0125: Insufficient engine coolant temperature for closed loop (case 3)
Required sensors/components (Main)	Engine coolant temperature sensor
Required sensors/components (Related)	Cooling system
Frequency of operation	Continuous
Duration	Maximum 19 minutes (Varies with ECT at engine start)
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Insufficient engine coolant temperature for closed loop (case 1)

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0128 (Thermostat)

ECT at engine start	10°C (50°F) or more

Insufficient engine coolant temperature for closed loop (case 2)

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0128 (Thermostat)
ECT at engine start	-6.6 to 10°C (20 to 50°F)

Insufficient engine coolant temperature for closed loop (case 3)

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0128 (Thermostat)
ECT at engine start	Less than -6.6°C (20°F)

ES

TYPICAL MALFUNCTION THRESHOLDS

Insufficient engine coolant temperature for closed loop (case 1)

ECT sensor value	Less than closed loop enabling temperature for 55 seconds

Insufficient engine coolant temperature for closed loop (case 2)

ECT sensor value	Less than closed loop enabling temperature for 103 seconds

Insufficient engine coolant temperature for closed loop (case 3)

ECT sensor value	Less than closed loop enabling temperature for 1144 seconds

COMPONENT OPERATING RANGE

ECT sensor value	Reaches 75°C (167°F) or more

WIRING DIAGRAM

Refer to DTC P0115 (see page ES-90).

INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0116, P0117 or P0118 are set simultaneously with DTC P0125, the Engine Coolant Temperature (ECT) sensor may have an open or short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0125)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0125	A
P0125 and other DTCs	B

HINT:
If any DTCs other than P0125 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2 INSPECT THERMOSTAT

(a) Remove the thermostat (see page CO-12).
(b) Check the valve opening temperature of the thermostat.
Standard:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

NG → REPLACE THERMOSTAT

OK

3 CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG → REPAIR OR REPLACE COOLING SYSTEM

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

ES

DTC	P0128	Thermostat Malfunction

DESCRIPTION

HINT:

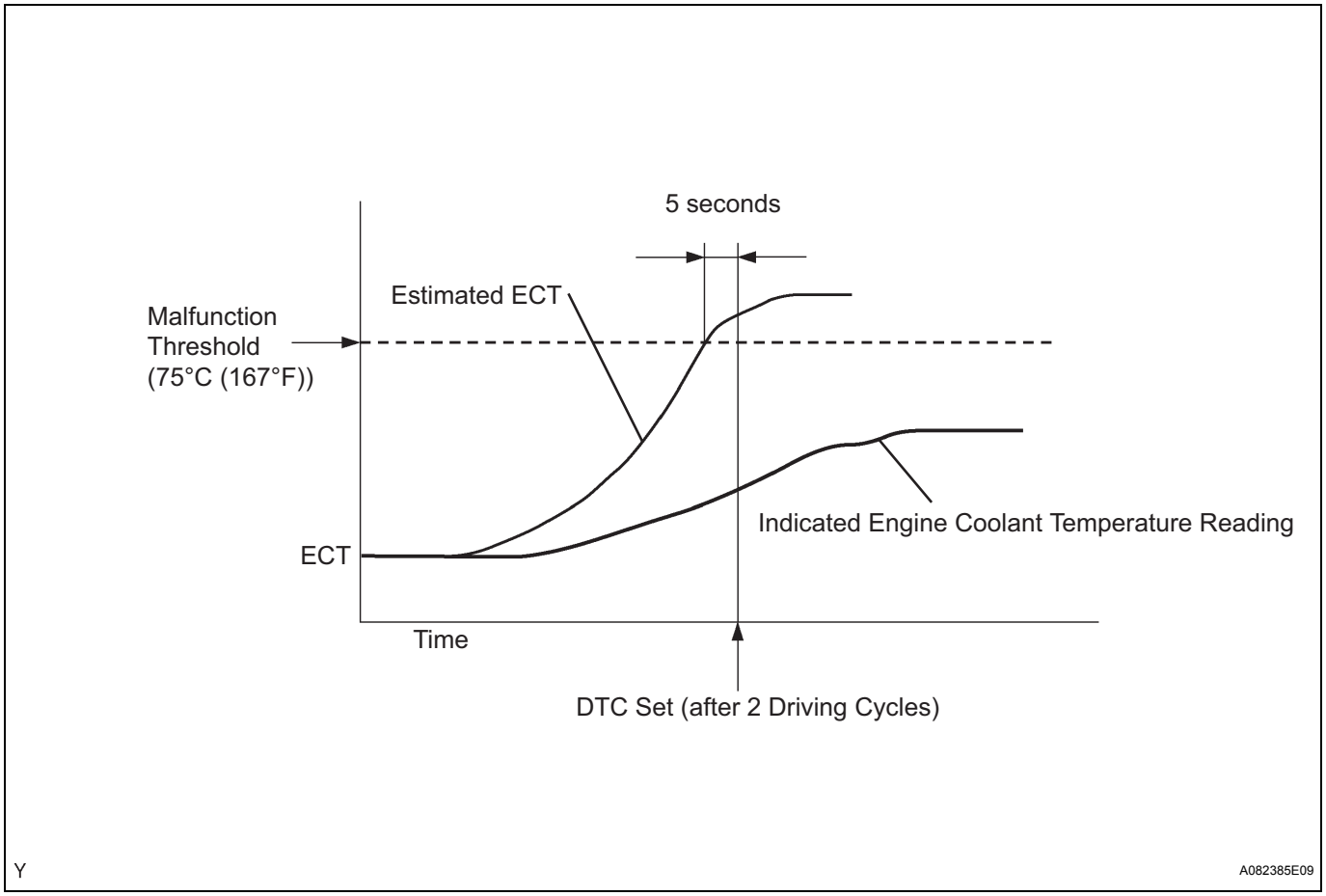
This DTC relates to the thermostat.

This DTC is set when the Engine Coolant Temperature (ECT) does not reach 75°C (167°F) despite sufficient engine warm-up time.

DTC No.	DTC Detection Condition	Trouble Area
P0128	Conditions (a), (b) and (c) met for 5 seconds (2 trip detection logic): (a) Cold start (b) Engine warmed up (c) ECT less than 75°C (167°F)	• Thermostat • Cooling system • Engine Coolant Temperature (ECT) sensor • ECM

ES

MONITOR DESCRIPTION



The ECM estimates the ECT based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT. When the estimated ECT reaches 75°C (167°F), the ECM checks the actual ECT. If the actual ECT is less than 75°C (167°F), the ECM will interpret this as a malfunction in the thermostat or the engine cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0128: Coolant thermostat
Required sensors/components (Main)	Thermostat
Required sensors/components (Related)	Engine Coolant Temperature (ECT) sensor, Intake Air Temperature (IAT) sensor, Vehicle speed sensor

Frequency of operation	Once per driving cycle
Duration	400 seconds
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0010 (VVT OCV) P0011 (VVT system 1 - advance) P0012 (VVT system 1 - retard) P0031, P0032 (heated oxygen sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0125 (insufficient ECT for closed loop) P0130 (heated oxygen sensor 1) P0134 (heated oxygen sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0351 - P0354 (igniter) P0441 - P0456 (EVAP system) P0500 (VSS)
Battery voltage	11 V or more
Intake air temperature at engine start (IAT)	-10°C (14°F) or more, and 35°C (95°F) or less
Engine coolant temperature at engine start (ECT)	-10°C (14°F) or more, and 35°C (95°F) or less
ECT at engine start - IAT at engine start	-15°C (-27°F) or more, and 7°C (12.6°F) or less
Accumulated time that vehicle speed is 128 km/h (80 mph) or more	Less than 20 seconds

TYPICAL MALFUNCTION THRESHOLDS

Duration that both conditions below are met:	5 seconds or more
Estimated engine coolant temperature	75°C (167°F) or more
ECT sensor output	Less than 75°C (167°F)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0128)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0128	A
P0128 and other DTCs	B

HINT:
If any DTCs other than P0128 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2 CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG → REPAIR OR REPLACE COOLING SYSTEM

OK

3 INSPECT THERMOSTAT

(a) Remove the thermostat (see page CO-12).
(b) Check the valve opening temperature of the thermostat.
Standard:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

NG → REPLACE THERMOSTAT

OK

REPLACE ECM

DTC	P0130	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)

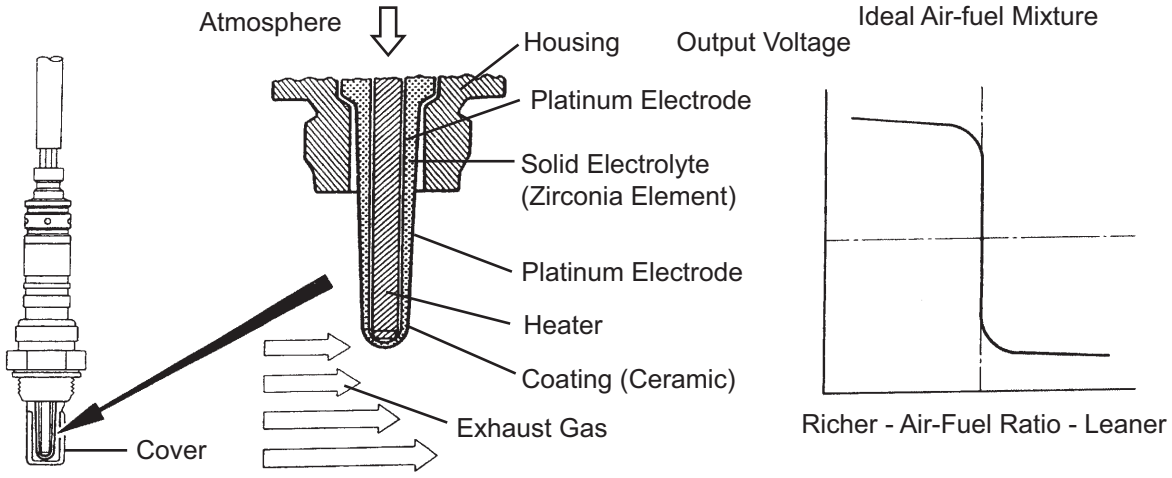
DTC	P2195	Oxygen Sensor Signal Stuck Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen Sensor Signal Stuck Rich (Bank 1 Sensor 1)

ES

DESCRIPTION

The Heated Oxygen (HO2) sensor (bank 1 sensor 1) monitors the oxygen concentration in the exhaust gas. For optimum TWC operation, the air-fuel mixture must be maintained as close as possible to the stoichiometric ratio. The HO2 sensor output voltage changes dramatically in the vicinity of the stoichiometric ratio. By making adjustments in accordance with these signal voltages, the ECM adjusts the fuel injection time so that the air-fuel ratio remains close to stoichiometric levels.
If the oxygen concentration in the exhaust gas increases, the air-fuel ratio is lean and the HO2 sensor output voltage to the ECM drops below 0.45 V. If the oxygen concentration in the exhaust gas decreases, the air-fuel ratio is rich and the HO2 sensor output voltage to the ECM increases to above 0.45 V.



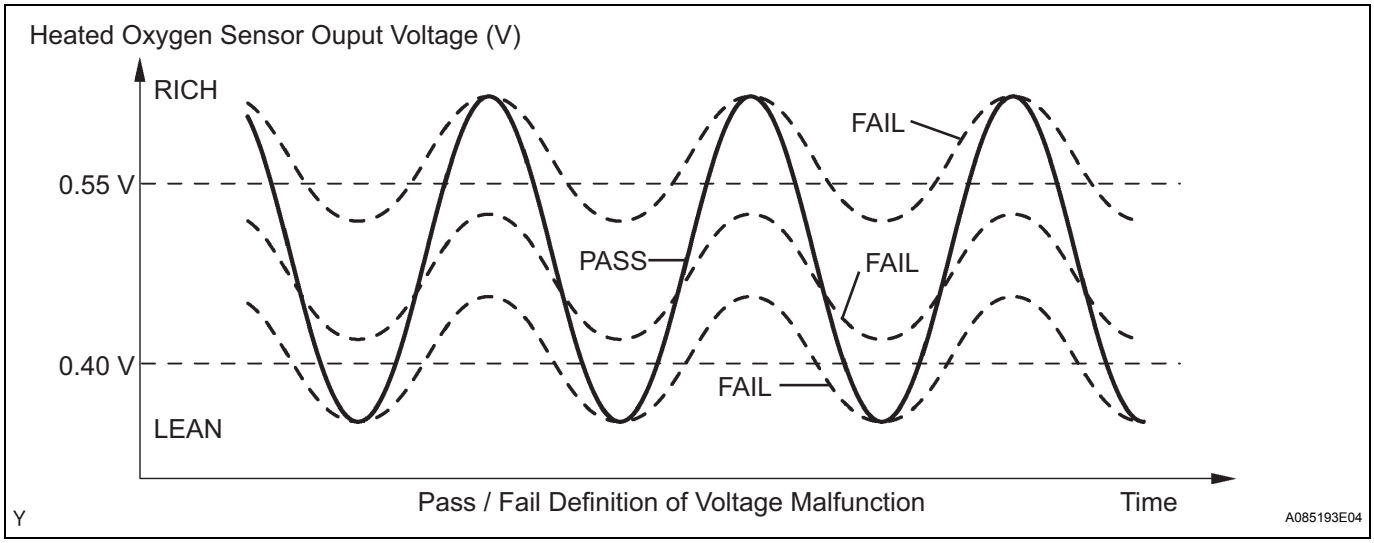
DTC No.	DTC Detection Condition	Trouble Area
P0130	Output voltage of Heated Oxygen (HO2) sensor remains at 0.4 V or more, or 0.55 V or less, during idling after engine is warmed up (2 trip detection logic)	• Open or short in HO2 sensor (bank 1 sensor 1) circuit • HO2 sensor (bank 1 sensor 1) • HO2 sensor heater (bank 1 sensor 1) • EFI relay • Air induction system • Fuel pressure • Injector • ECM
P2195	Output voltage of HO2 sensor remains at 0.55 V or less during idling with warm engine (2 trip detection logic)	• Open or short in HO2 sensor (bank 1 sensor 1) circuit • HO2 sensor (bank 1 sensor 1) • HO2 sensor heater (bank 1 sensor 1) • EFI relay • Air induction system • Fuel pressure • Injector • ECM

DTC No.	DTC Detection Condition	Trouble Area
P2196	Output voltage of HO2 sensor remains at 0.4 V or more during idling with warm engine (2 trip detection logic)	• Open or short in HO2 sensor (bank 1 sensor 1) circuit • HO2 sensor (bank 1 sensor 1) • HO2 sensor heater (bank 1 sensor 1) • EFI relay • Air induction system • Fuel pressure • Injector • ECM

HINT:
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC), and located near the engine assembly.
- The output voltage of the HO2 sensor and the short-term fuel trim value can be read using the intelligent tester.

ES

MONITOR DESCRIPTION



MONITOR STRATEGY

Related DTCs	P0130: Heated Oxygen (HO2) sensor (bank 1 sensor 1) voltage P2195: Heated Oxygen (HO2) sensor (bank 1 sensor 1) voltage stuck Lean P2196: Heated Oxygen (HO2) sensor (bank 1 sensor 1) voltage stuck Rich
Required Sensors/Components (Main)	Front HO2 senor (sensor 1)
Required Sensors/Components (Related)	Crankshaft Position (CKP) sensor, Vehicle Speed Sensor (VSS)
Frequency of Operation	Once per driving cycle
Duration	20 to 36 seconds (3 times)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever these DTCs not present	P0031, P0032 (heated oxygen sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0134 (heated oxygen sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0441 - P0456 (EVAP system) P0500 (VSS)
Time after engine start	120 seconds
Idling	ON
Fuel system status	Closed loop
Vehicle speed	Less than 5 km/h (3.125 mph)
Driving record for 20 seconds or more	40 km/h (25 mph) or more and 900 rpm or more

ES

TYPICAL MALFUNCTION THRESHOLDS

Heated oxygen sensor voltage (P0130):

Occasions either of following conditions is met	More than 2 times
Minimum HO2 sensor voltage	0.4 V or more for 25 seconds or more
Maximum HO2 sensor voltage	0.55 V or less for 25 seconds or more

Heated oxygen sensor voltage stuck Lean (P2195):

Occasions following condition is met	2 times
Maximum heated oxygen sensor voltage	0.55 V or less for 25 seconds or more

Heated oxygen sensor voltage stuck Rich (P2196):

Occasions following condition is met	2 times
Minimum heated oxygen sensor voltage	0.4 V or more for 25 seconds or more

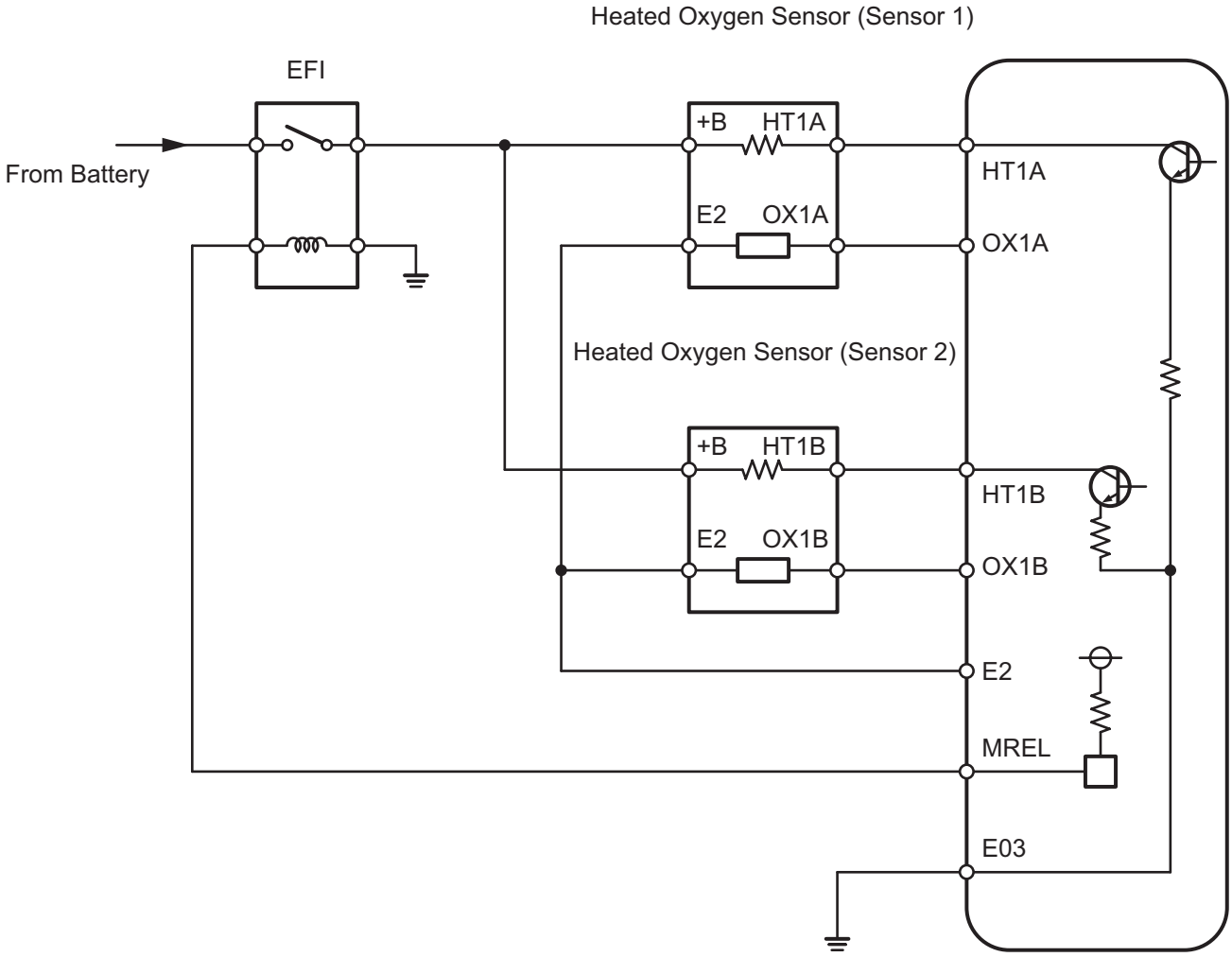
COMPONENT OPERATING RANGE

Heated Oxygen (HO2) sensor voltage	Fluctuates for a second

MONITOR RESULT

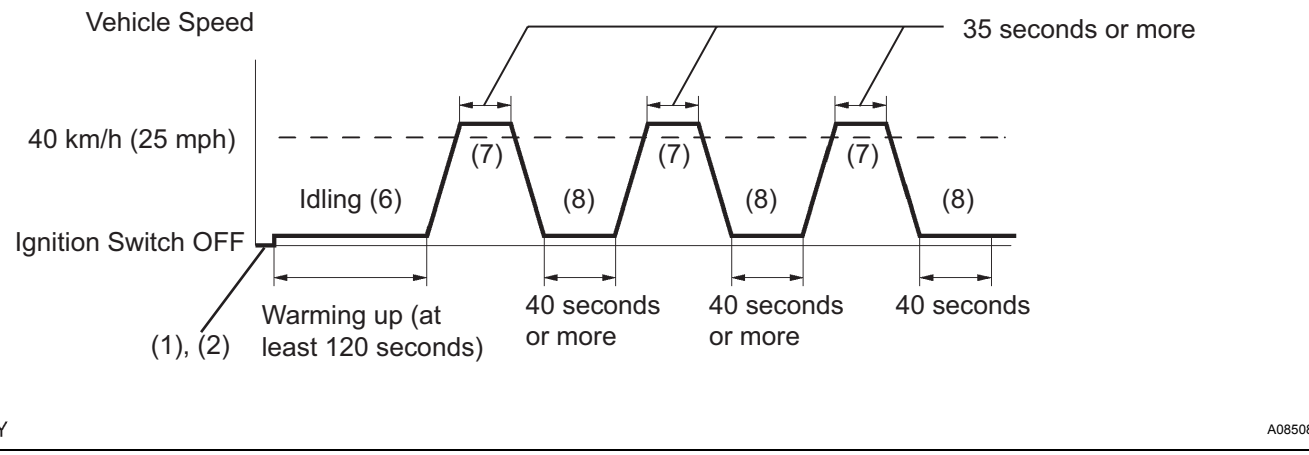
Refer to CHECKING MONITOR STATUS (see page ES-18).

WIRING DIAGRAM



ES

CONFIRMATION DRIVING PATTERN



HINT:
This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON and turn the tester ON.
(3) Clear DTCs (see page ES-36).
(4) If using the intelligent tester, switch the ECM from normal mode to check mode (see page ES-40).
(5) Start the engine.
(6) Allow the engine to idle until the engine coolant temperature reaches 75°C (167°F).
(7) Drive the vehicle at an engine speed of more than 40 km/h (25 mph) for 35 seconds or more.
(8) Allow the engine to idle for 40 seconds or more.
(9) Repeat steps (6) and (7) described above at least 3 times.
(10) Allow the engine to idle for 40 seconds or more.

HINT:
When using the intelligent tester: The MIL will be illuminated during step (10) if a malfunction still exists.
CAUTION:
If the conditions in this test are not strictly followed, malfunctions may not be detected.

INSPECTION PROCEDURE

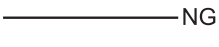
HINT:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Heated Oxygen (HO2) sensors and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester ON.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage outputs of the HO2 sensors (O2S B1S1 and O2S B1S2) displayed on the tester.
   HINT:
   - The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
   - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volume	Status	Voltage
O2S B1S1 (Front HO2 Sensor)	+25%	Rich	More than 0.55
O2S B1S1 (Front HO2 Sensor)	-12.5%	Lean	Less than 0.4
O2S B1S2 (Rear HO2 Sensor)	+25%	Rich	More than 0.5
O2S B1S2 (Rear HO2 Sensor)	-12.5%	Lean	Less than 0.4

NOTICE:
The front HO2 sensor has an output delay of a few seconds and the rear HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	Front HO2 Sensor (Sensor 1) Output Voltage		Rear HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Front HO2 sensor • Front HO2 sensor heater • Front HO2 sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Rear HO2 sensor • Rear HO2 sensor heater • Rear HO2 sensor circuit
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely rich or lean)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the front and rear HO2 sensors.
- To display the graph, enter the following menus on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST/ A/F CONTROL / USER DATA / O2S B1S1 and O2S B1S2; then press the YES button and ENTER button followed by the F4 button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes lean, HO2 sensor DTCs are recorded, and the ECM illuminates the MIL.

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high HO2 sensor (sensor 1) voltage (0.55 V or more) could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A low HO2 sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO HEATED OXYGEN SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.

ES

(c) On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC output)	Proceed to
P0130, P2195 and/or P2196	A
P0130, P2195 and/or P2196 and other DTCs	B

HINT:
If any DTCs other than P0130, P2195 and/or P2196 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

ES

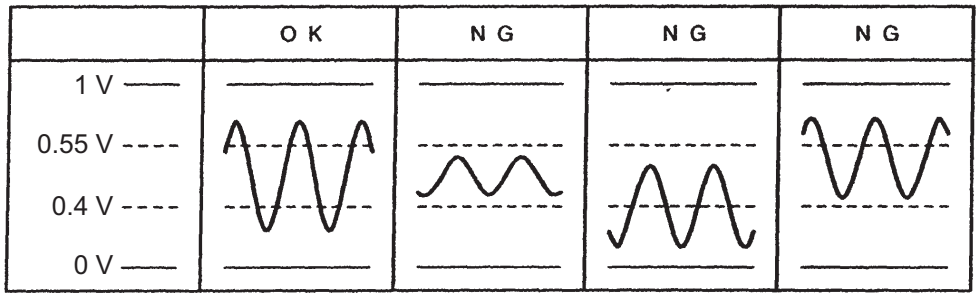
A

2	READ VALUE OF INTELLIGENT TESTER (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1S1.
(e) Warm up the Heated Oxygen (HO2) sensor at an engine speed of 2,500 rpm for approximately 90 seconds.
(f) Read the voltage output of the front HO2 sensor displayed on the tester while the engine is idling.

Standard voltage:

Fluctuates between less than 0.4 V and more than 0.55 V (refer to table below).

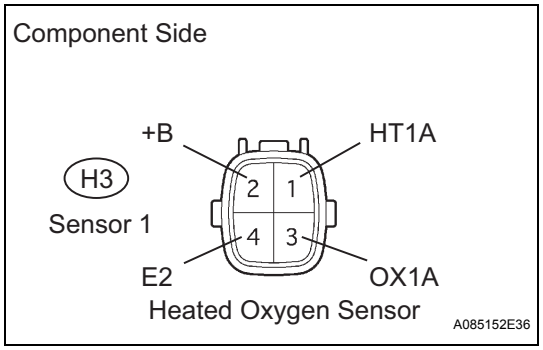


A085277E01

OK → **Go to step 9**

NG

3 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



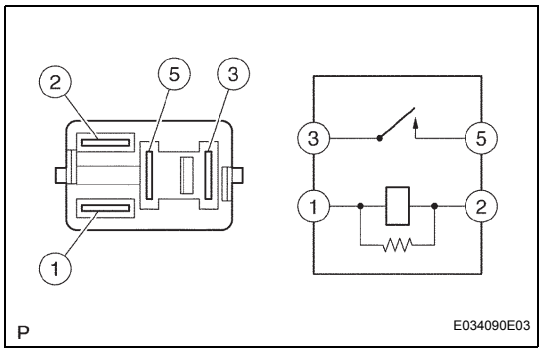
(a) Disconnect the H3 HO2 sensor connector.
(b) Measure the resistance of the HO2 sensor connector.
Standard resistance

Tester Connection	Specified Condition
HT1A (H3-1) - +B (H3-2)	11 to 16 Ω at 20°C (68°F)
HT1A (H3-1) - E2 (H3-4)	10 kΩ or higher

NG → REPLACE HEATED OXYGEN SENSOR

OK

4 INSPECT EFI RELAY (Marking: EFI)



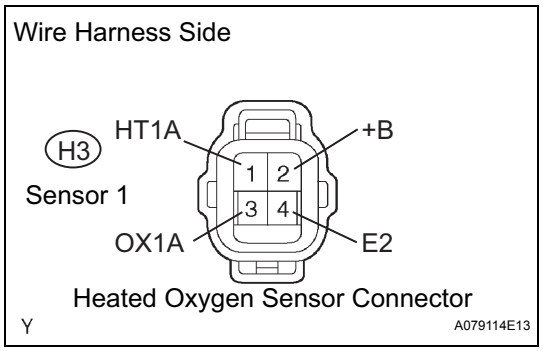
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the EFI relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → REPLACE EFI RELAY

OK

5 CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM)

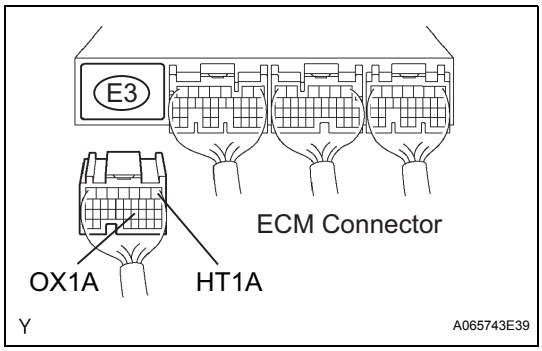


(a) Disconnect the H3 HO2 sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the +B terminal of the H3 HO2 sensor connector and body ground.
Standard voltage

Tester Connection	Specified Condition
+B (H3-2) - Body ground	9 to 14 V

(d) Turn the ignition switch OFF.
(e) Disconnect the E3 ECM connector.

ES



(f) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

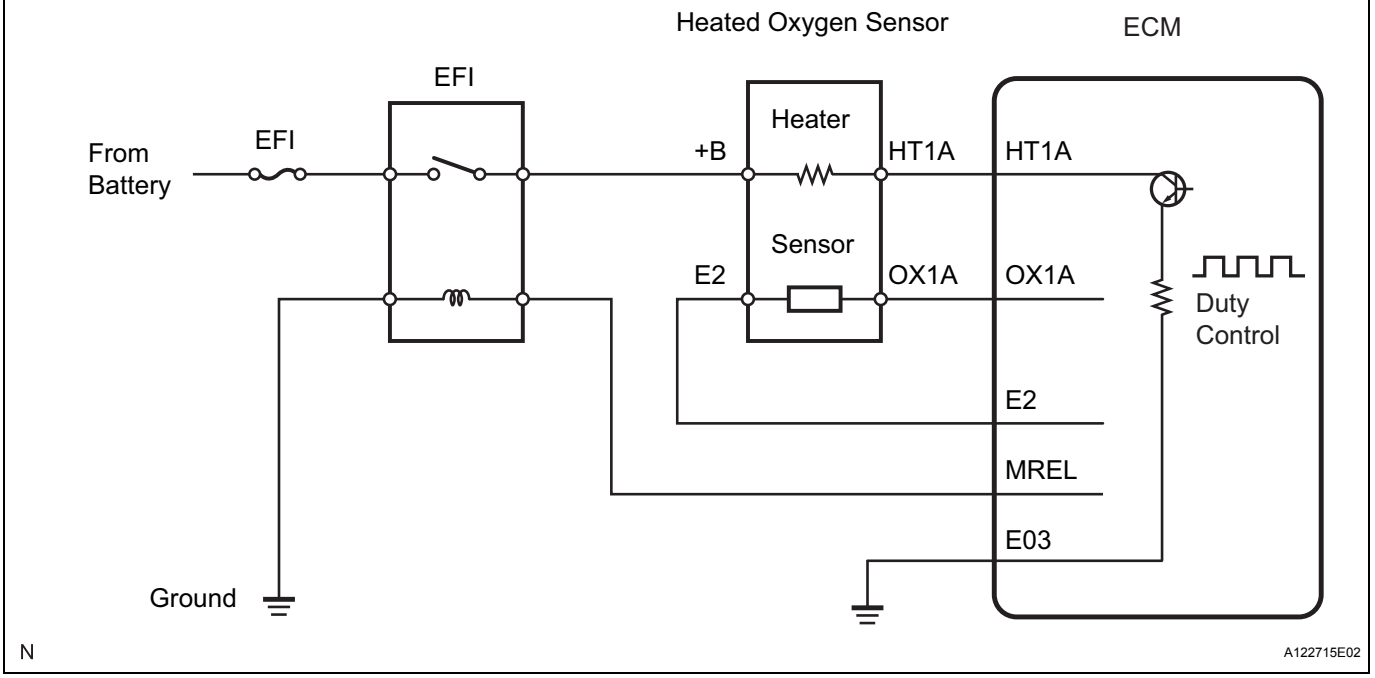
Tester Connection	Specified Condition
HT1A (H3-1) - HT1A (E3-1)	Below 1 Ω
OX1A (H3-3) - OX1A (E3-21)	Below 1 Ω
E2 (H3-4) - Body ground	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HT1A (H3-1) or HT1A (E3-1) - Body ground	10 kΩ or higher
OX1A (H3-3) or OX1A (E3-21) - Body ground	10 kΩ or higher

ES

Reference (System Diagram of Bank 1 Sensor 1)



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leaks.

OK:

No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

7	CHECK FUEL PRESSURE

(a) Check the fuel pressure (high or low pressure) (see page FU-7).

NG → REPAIR OR REPLACE FUEL SYSTEM

OK

8	INSPECT FUEL INJECTOR

(a) Check the injector injection and volume (see page FU-13).

NG → REPLACE FUEL INJECTOR

OK

REPLACE HEATED OXYGEN SENSOR

9	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

10	CHECK WHETHER DTC OUTPUT RECURS (HEATED OXYGEN SENSOR DTCS)

(a) Read DTCs using the intelligent tester.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

Result

Display (DTC output)	Proceed to
P0130, P2195 and/or P2196	A
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE HEATED OXYGEN SENSOR

ES

DTC	P0133	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)

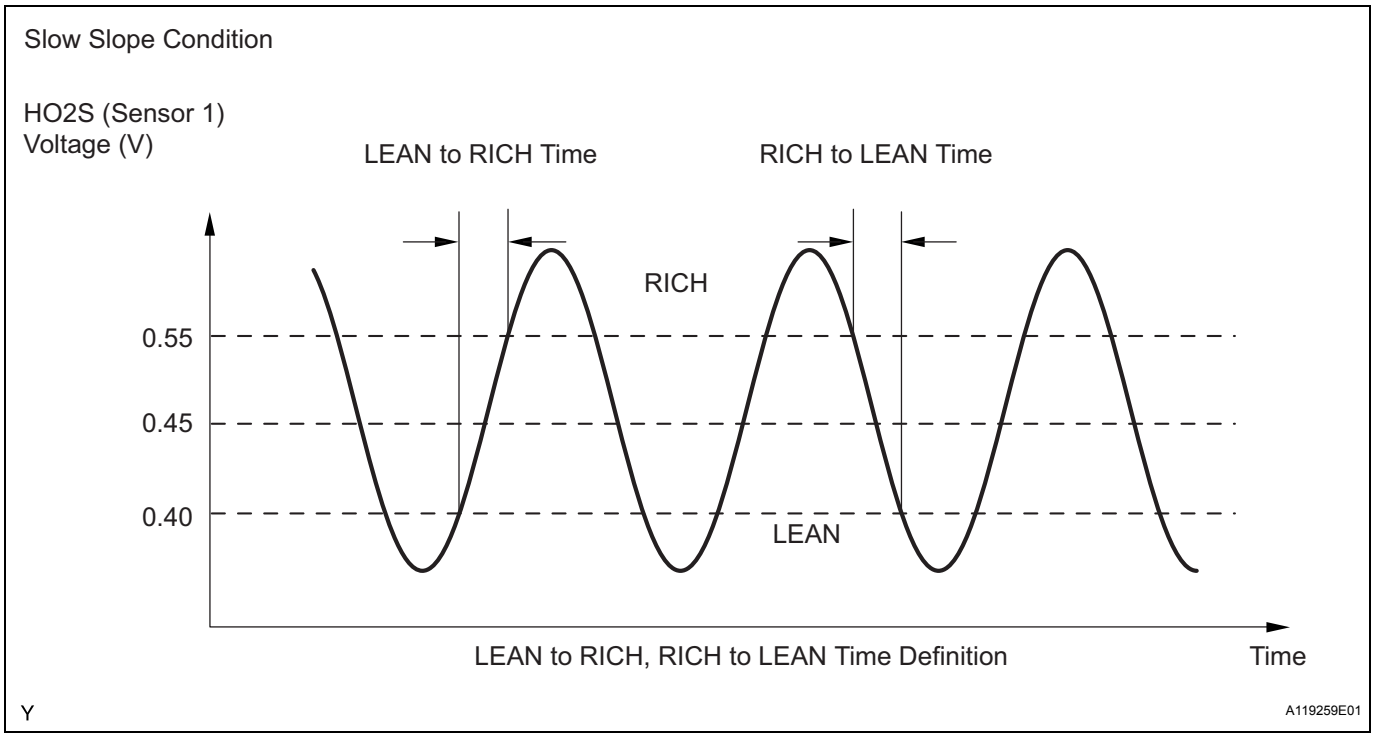
DESCRIPTION

HINT:
Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.
Refer to DTC P0130 (see page ES-110).

DTC No.	DTC Detection Condition	Trouble Area
P0133	• While idling with warm engine, response time for voltage output of Heated Oxygen (HO2) sensor to change from rich to lean or from lean to rich is 0.9 seconds or more (2 trip detection logic) • While idling, response time of HO2 sensor output voltage in 1 rich-lean cycle is 9 seconds or more (2 trip detection logic)	• Open or short in Heated Oxygen (HO2) sensor (bank 1 sensor 1) circuit • HO2 sensor (bank 1 sensor 1) • HO2 sensor heater (bank 1 sensor 1) • EFI relay • Air induction system • Fuel pressure • Injector • ECM

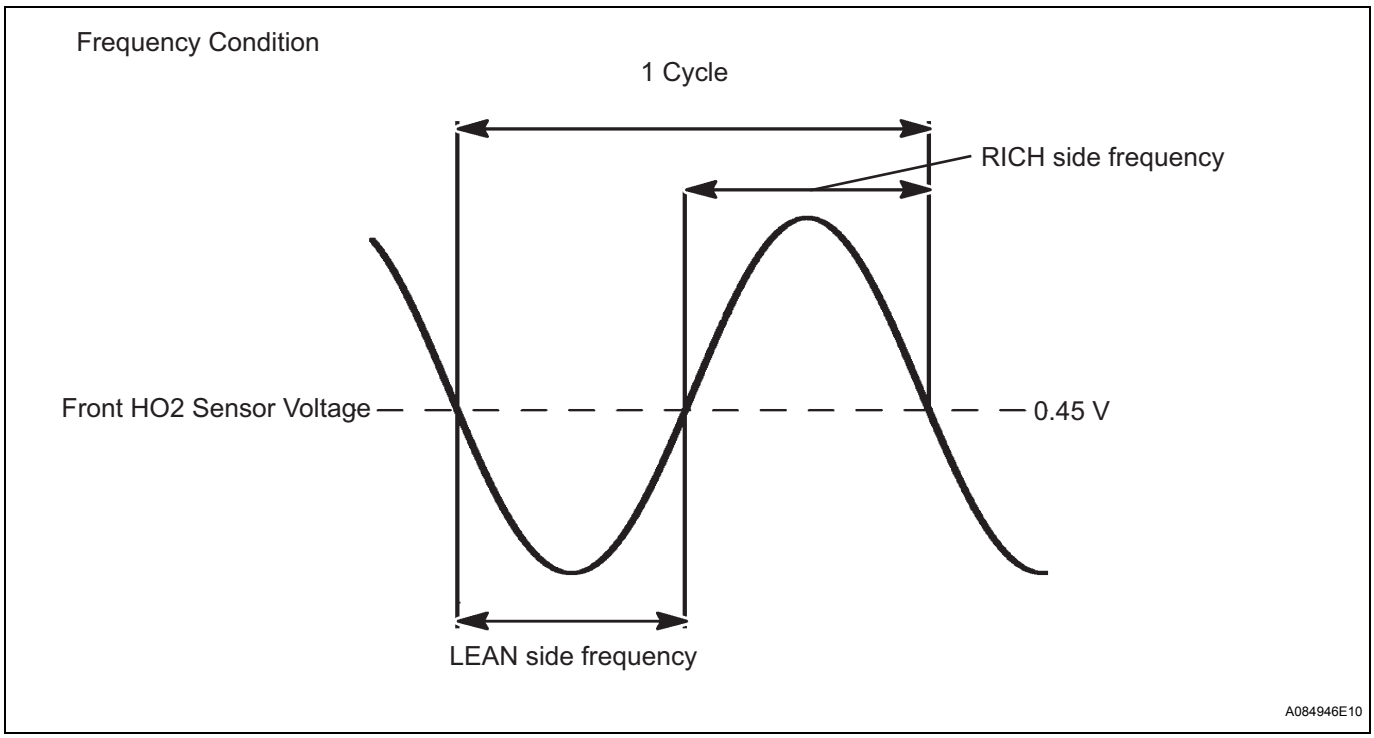
ES

MONITOR DESCRIPTION



The Heated Oxygen (HO2) sensor detects the oxygen levels in the exhaust gas and transmits this information to the ECM, which uses it to maintain the air-fuel ratio as close as possible to stoichiometric levels. This optimizes the three-way catalytic converter's ability to purify the exhaust gases.
The sensor element is made of platinum electrode and solid electrolyte (zirconia element), and includes an integrated heating element. The inner surface of the sensor element is exposed to the outside air and the outer surface is exposed to the exhaust gases.
The HO2 sensor generates a waveform voltage signal that oscillates between 0.1 V and 0.9 V in accordance with the oxygen concentration in the exhaust gas. The HO2 sensor has a characteristic whereby this output voltage changes dramatically in the vicinity of the stoichiometric air-fuel ratio.
When the output voltage of the HO2 sensor is 0.55 V or more, the ECM determines that the air-fuel ratio is rich. When it is 0.40 V or less, the ECM determines that the air-fuel ratio is lean.

The ECM also monitors the response of the HO2 sensor. If the response time of the output changes from rich to lean or vice versa becomes longer than preset thresholds, the ECM interprets this as a malfunction in the HO2 sensor, illuminates the MIL and sets the DTC (2 trip detection logic).



MONITOR STRATEGY

Related DTCs	P0133: Heated Oxygen (HO2) sensor (bank 1 sensor 1) responsibility P0133: HO2 sensor (bank 1 sensor 1) frequency at idle P0133: HO2 sensor (bank 1 sensor 1) frequency at driving
Required Sensors/Components (Main)	HO2 sensor (sensor 1)
Required Sensors/Components (Related)	None
Frequency of Operation	Continuous
Duration	60 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

HO2 sensor bank 1 sensor 1 responsibility

This monitor will run whenever these DTCs are not present	P0031, P0032 (heated oxygen sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0134 (heated oxygen sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0441 - P0456 (EVAP system) P0500 (VSS)
Driving record for 20 seconds or more	40 km/h (25 mph) or more and 900 rpm or more
Time after engine start	120 seconds or more
Idle	ON
Fuel system	Closed loop

Vehicle speed	Less than 5 km/h (3 mph)
ECT	40°C (104°F) or more

HO2 sensor bank 1 sensor 1 frequency at idle

This monitor will run whenever these DTCs are not present	P0031, P0032 (heated oxygen sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0134 (heated oxygen sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0441 - P0456 (EVAP system) P0500 (VSS)
Driving record for 20 seconds or more	40 km/h (25 mph) or more and 900 rpm or more
Time after engine start	120 seconds or more
Idle	ON
Fuel system	Closed loop
Vehicle speed	Less than 5 km/h (3 mph)
ECT	40°C (104°F) or more

HO2 sensor bank 1 sensor 1 frequency at driving

This monitor will run whenever these DTCs are not present	P0031, P0032 (heated oxygen sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0134 (heated oxygen sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0441 - P0456 (EVAP system) P0500 (VSS)
Driving record for 20 seconds or more	40 km/h (25 mph) or more and 900 rpm or more
Time after engine start	120 seconds or more
Idle	OFF
MAF	4.2 to 20 g/sec.
Fuel system	Closed loop
Engine rpm	1,000 to 3,500 rpm
Fuel cut	OFF
ECT	70°C (158°F) or more

TYPICAL MALFUNCTION THRESHOLDS

HO2 sensor (bank 1 sensor 1) responsibility

Rich (0.55 V) to Lean (0.4 V) switch time	0.9 seconds or more
Lean (0.4 V) to Rich (0.55 V) switch time	0.9 seconds or more

HO2 sensor (bank 1 sensor 1) frequency at idle

HO2 sensor frequency in 1 period	9 seconds or more

HO2 sensor (bank 1 sensor 1) frequency at driving

HO2 sensor frequency in 1 period	Malfunction threshold or more

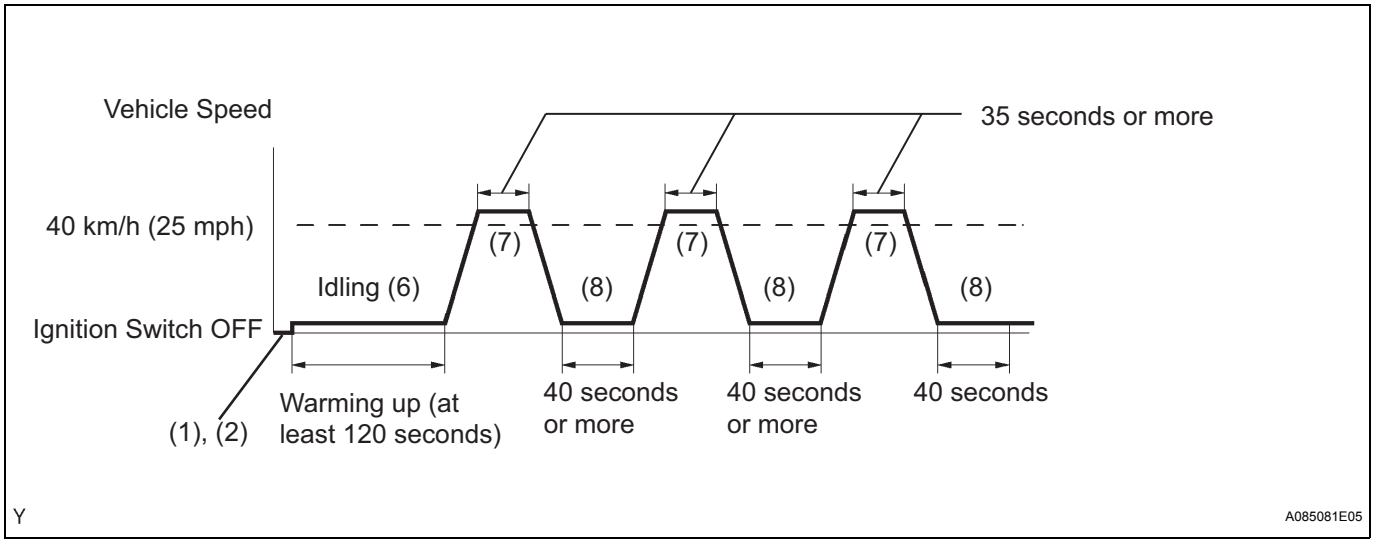
COMPONENT OPERATING RANGE

HO2 sensor voltage	Fluctuates for a second

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

CONFIRMATION DRIVING PATTERN



HINT:
This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON and turn the tester ON.
(3) Clear DTCs (see page ES-36).
(4) If using the intelligent tester, switch the ECM from normal mode to check mode (see page).
(5) Start the engine.
(6) Allow the engine to idle until the engine coolant temperature reaches 75°C (167°F).
(7) Drive the vehicle at an engine speed of more than 40 km/h (25 mph) for 35 seconds or more.
(8) Allow the engine to idle for 40 seconds or more.
(9) Repeat steps (6) and (7) described above at least 3 times.
(10) Allow the engine to idle for 40 seconds or more.
HINT:
When using the intelligent tester: The MIL will be illuminated during step (10) if a malfunction still exists.
CAUTION:
If the conditions in this test are not strictly followed, malfunctions may not be detected.

WIRING DIAGRAM

Refer to DTC P0130 (see page ES-113).

INSPECTION PROCEDURE

HINT:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Heated Oxygen (HO2) sensors and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.
1. Connect the intelligent tester to the DLC3.

2. Start the engine and turn the tester ON.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage output of the HO2 sensors (O2S B1S1 and O2S B1S2) displayed on the tester.
   HINT:
   - The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
   - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
O2S B1S1 (Front HO2 Sensor)	+25%	Rich	More than 0.55
O2S B1S1 (Front HO2 Sensor)	-12.5%	Lean	Less than 0.4
O2S B1S2 (Rear HO2 Sensor)	+25%	Rich	More than 0.5
O2S B1S2 (Rear HO2 Sensor)	-12.5%	Lean	Less than 0.4

NOTICE:
The front HO2 sensor has an output delay of a few seconds and the rear HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	Front HO2 Sensor (Sensor 1) Output Voltage		Rear HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Front HO2 sensor • Front HO2 sensor heater • Front HO2 sensor circuit
Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V			
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Rear HO2 sensor • Rear HO2 sensor heater • Rear HO2 sensor circuit
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely rich or lean)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the front and rear HO2 sensors.

- To display the graph, enter the following menus on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST/ A/F CONTROL / USER DATA / O2S B1S1 and O2S B1S2; then press the YES button and ENTER button followed by the F4 button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes lean, HO2 sensor DTCs are recorded, and the ECM illuminates the MIL.

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high HO2 sensor (sensor 1) voltage (0.55 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low HO2 sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0133)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0133	A
P0133 and other DTCs	B

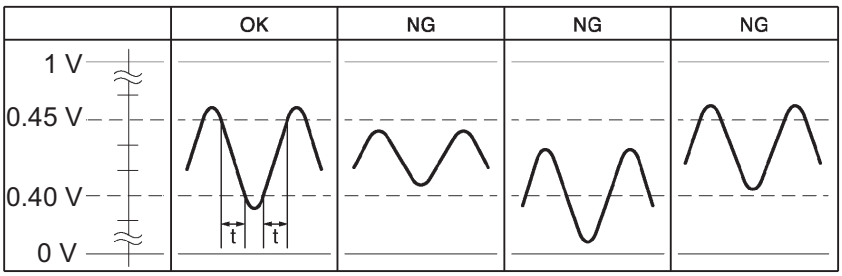
HINT:
If any DTCs other than P0133 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	READ VALUE OF INTELLIGENT TESTER (HEATED OXYGEN SENSOR DURING IDLING)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1S1.
(e) Warm up the Heated Oxygen (HO2) sensor at an engine speed of 2,500 rpm for approximately 90 seconds.
(f) Read the voltage output of the front HO2 sensor displayed on the tester, while the engine is idling.
Standard:
Fluctuates between less than 0.40 V and more than 0.45 V, and period "t" must be less than 0.6 seconds (refer to table below).

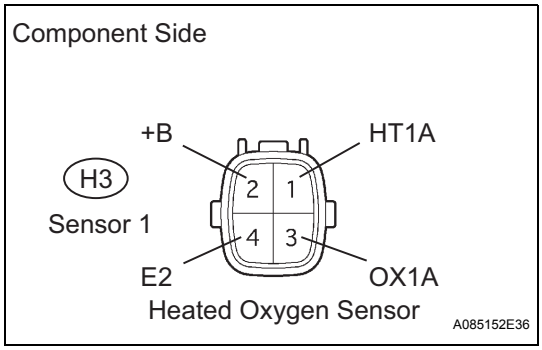


OK → **Go to step 9**

ES

NG

3 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



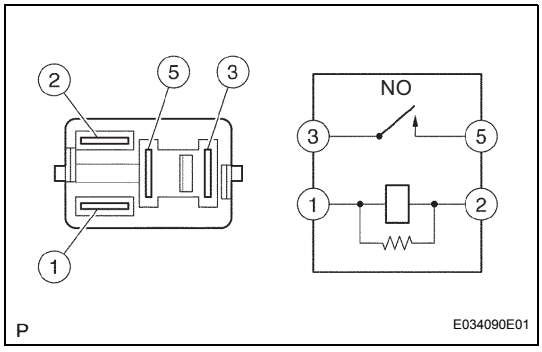
(a) Disconnect the H3 HO2 sensor connector.
(b) Measure the resistance between the terminals of the HO2 sensor connector.
Standard resistance

Tester Connection	Specified Condition
HT1A (H3-1) - +B (H3-2)	11 to 16 Ω at 20°C (68°F)
HT1A (H3-1) - E2 (H3-4)	10 kΩ or higher

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

4 INSPECT EFI RELAY (Marking: EFI)



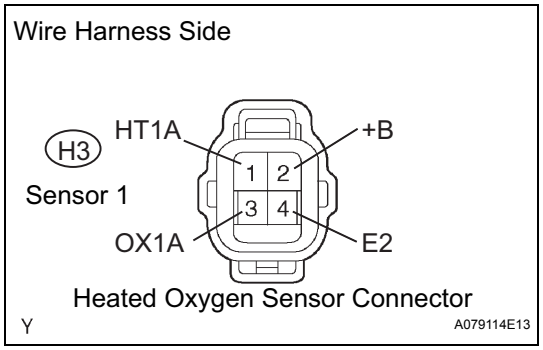
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the EFI relay.
Standard resistance

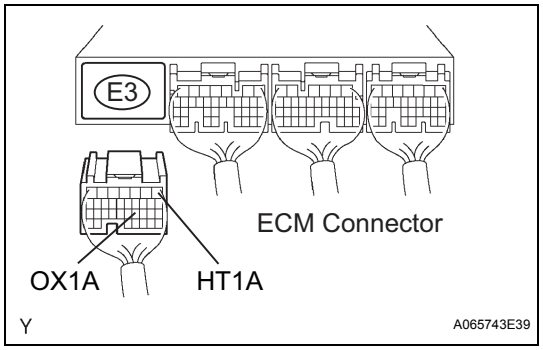
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage applied to terminals 1 and 2)

NG → **REPLACE EFI RELAY**

OK

5 CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM)





(a) Disconnect the H3 HO2 sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the +B terminal of the H3 HO2 sensor connector and body ground.

Standard voltage

Tester Connection	Specified Condition
+B (H3-2) - Body ground	9 to 14 V

(d) Turn the ignition switch OFF.

(e) Disconnect the E3 ECM connector.
(f) Measure the resistance of the wire harness side connectors.

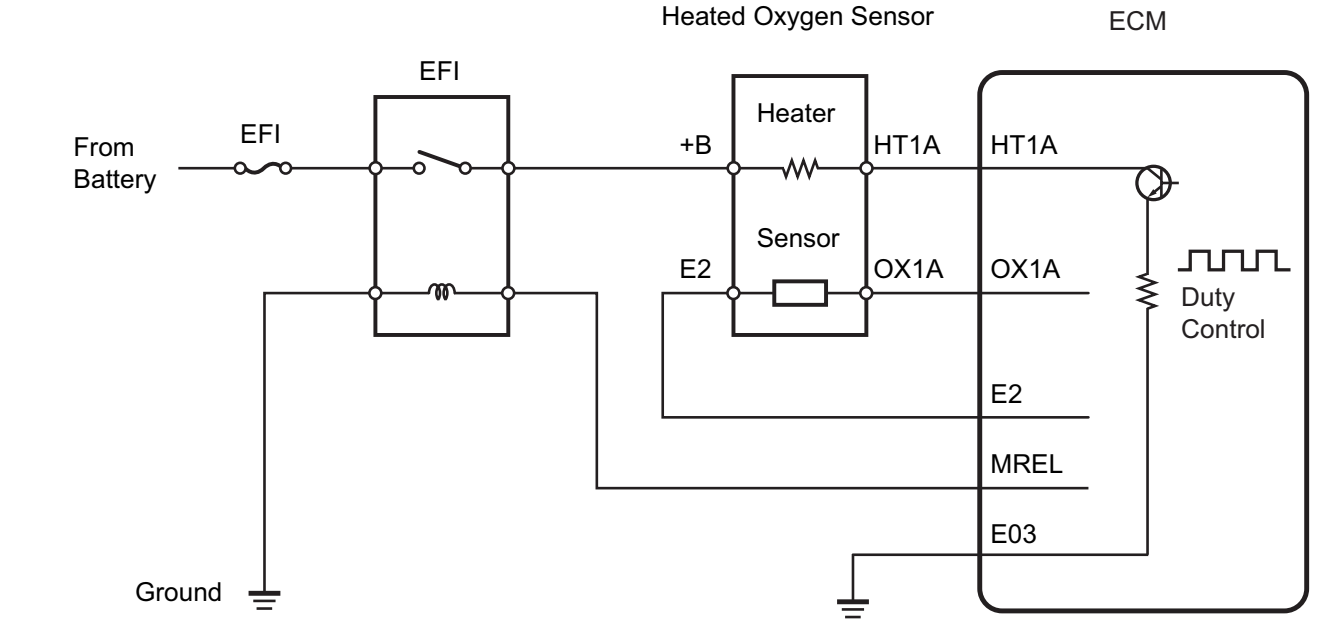
Standard resistance (Check for open)

Tester Connection	Specified Condition
HT1A (H3-1) - HT1A (E3-1)	Below 1 Ω
OX1A (H3-3) - OX1A (E3-21)	Below 1 Ω
E2 (H3-4) - Body ground	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HT1A (H3-1) or HT1A (E3-1) - Body ground	10 kΩ or higher
OX1A (H3-3) or OX1A (E3-21) - Body ground	10 kΩ or higher

Reference (System Diagram of Bank 1 Sensor 1)



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leaks.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

ES

7	CHECK FUEL PRESSURE

(a) Check the fuel pressure (high or low pressure) (see page FU-7).

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

8	INSPECT FUEL INJECTOR (INJECTION AND VOLUME)

(a) Check the injector injection and volume (see page FU-13).

NG → **REPLACE FUEL INJECTOR**

OK

REPLACE HEATED OXYGEN SENSOR

9	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

10	CHECK WHETHER DTC OUTPUT RECURS (DTC P0133)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0133	A
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE HEATED OXYGEN SENSOR

DTC	P0134	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)

DESCRIPTION

The heated oxygen sensor (HO2S) located on the front of the catalyst converter is used to control the fuel trim.

Refer to the description of DTC P0130 for detailed information (see page ES-110).

DTC No.	DTC Detecting Condition	Trouble Area
P0134	(a) HO2S voltage (bank 1 sensor 1) does not exceed 0.45 V while intrusive closed loop with short-term fuel trim is 18% or more for 15 seconds (2 trip detection logic) Intrusive closed loop runs when all of the following conditions are met for 20 seconds: • Driving at 40 km/h (25 mph) or more • Not idle • HO2S voltage is less than 0.45 V	• HO2S (bank 1 sensor 1) • Fuel pressure • Air induction system • Ventilation hose • Ventilation valve • Injector • Exhaust gas leakage
	(b) With warm engine, Heated Oxygen (HO2) sensor (bank 1 sensor 1) output does not indicate rich (more than 0.45 V) even once when conditions (1), (2), (3), (4), (5) and (6) continue for 30 seconds or more (2 trip detection logic) (1) After detection condition (a) is determined to be normal (2) Engine running (3) Engine coolant temperature more than 75°C (167°F) (4) Throttle valve not fully closed (5) Fuel system status is closed loop (6) Short-term fuel trim is 18% or more	

HINT:

If this DTC is set, check the output voltage of the HO2 sensor (bank 1 sensor 1) by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1S1.

MONITOR DESCRIPTION

To monitor the heated oxygen sensor (HO2S) activity, the ECM (PCM) performs the intrusive closed loop if the HO2S voltage does not exceed 0.45 V while the vehicle is running under the closed loop. In the intrusive closed loop, the ECM (PCM) varies the fuel trim and checks whether the HO2S voltage exceeds 0.45V or not.

Then, the HO2S voltage varies between 0.1 and 0.9 V when the HO2S functions. If the HO2S voltage does not exceed 0.45 V, the ECM (PCM) interprets this as a malfunction. The ECM (PCM) illuminates the MIL and sets the DTC (2 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0134: Excessive time to enter closed loop for HO2S (bank 1 sensor 1)
Required Sensors/Components (Main)	HO2 sensor (bank 1 sensor 1)
Required Sensors/Components (Related)	None
Frequency of Operation	Once per driving cycle
Duration	110 seconds
MIL Operation	2 driving cycle
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Intrusive closed loop

Monitor runs whenever these DTCs not present	P0031, P0032 (heated oxygen sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0130 (heated oxygen sensor - sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0441 - P0456 (EVAP system) P0500 (VSS)
Intrusive closed loop	Running
Intrusive closed loop runs when following conditions are met for:	20 seconds or more
ECT	ECT to enable closed loop or more
Engine rpm	900 rpm or more
Vehicle speed	40 km/h (25 mph) or more
Idle	OFF
HO2S voltage	Less than 0.45 V
Battery voltage	11 V or higher

Others

Engine	Running
ECT	75°C (167°F) or more
Fuel system status	Closed loop
Idle	OFF

TYPICAL MALFUNCTION THRESHOLDS

Intrusive closed loop

HO2S voltage in intrusive closed loop	Less than 0.45 V for 15 seconds with short-term fuel trim 18% or more

Others

HO2S voltage	Less than 0.45 V for 30 seconds with short-term fuel trim 18% or more

COMPONENT OPERATING RANGE

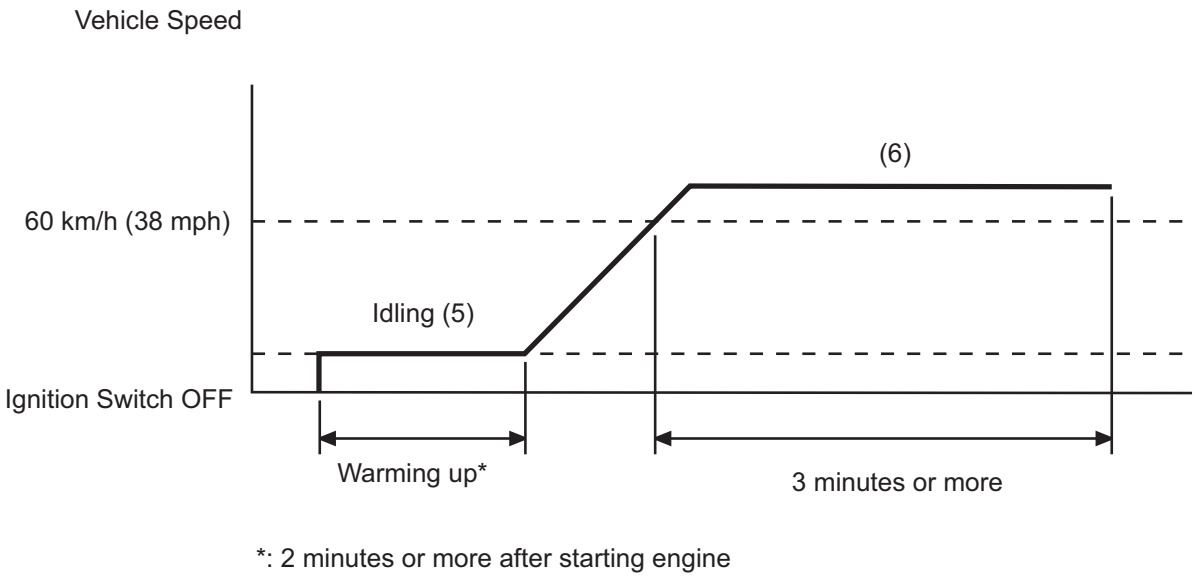
HO2S voltage in closed loop	Switching between 0.1 and 0.9 V

WIRING DIAGRAM

Refer to DTC P0130 (see page ES-113).

ES

CONFIRMATION DRIVING PATTERN



HINT:
This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON and turn the tester ON.
(3) Clear DTCs (see page ES-36).
(4) Start the engine.
(5) Allow the engine to idle until the engine coolant temperature reaches 40°C (104°F).
Drive the vehicle at a speed of more than 60 km/h (38 mph) for 3 minutes or more.
NOTICE:
If the conditions in this test are not strictly followed, malfunctions may not be detected.

INSPECTION PROCEDURE

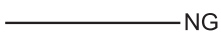
HINT:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Heated Oxygen (HO2) sensors and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester ON.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage output of the HO2 sensors (O2S B1S1 and O2S B1S2) displayed on the tester.
   HINT:
   - The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
   - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
O2S B1S1 (Front HO2 Sensor)	+25%	Rich	More than 0.55
O2S B1S1 (Front HO2 Sensor)	-12.5%	Lean	Less than 0.4
O2S B1S2 (Rear HO2 Sensor)	+25%	Rich	More than 0.5
O2S B1S2 (Rear HO2 Sensor)	-12.5%	Lean	Less than 0.4

NOTICE:
The front HO2 sensor has an output delay of a few seconds and the rear HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	Front HO2 Sensor (Sensor 1) Output Voltage		Rear HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Front HO2 sensor • Front HO2 sensor heater • Front HO2 sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Rear HO2 sensor • Rear HO2 sensor heater • Rear HO2 sensor circuit
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely rich or lean)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the front and rear HO2 sensors.
- To display the graph, enter the following menus on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST/ A/F CONTROL / USER DATA / O2S B1S1 and O2S B1S2; then press the YES button and ENTER button followed by the F4 button.

NOTICE:
If the vehicle is short of fuel, the air-fuel ratio becomes lean, HO2 sensor DTCs are recorded, and the ECM illuminates the MIL.

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.

- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high HO2 sensor (sensor 1) voltage (0.55 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low HO2 sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0134)

ES

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0134	A
P0134 and other DTCs	B

HINT:
If any DTCs other than P0134 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2	READ VALUE OF INTELLIGENT TESTER (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1S1 and ENGINE SPD.
(e) Warm up the engine until the engine coolant temperature reaches more than 75°C (169°F).
(f) Rev the engine up to 4,000 rpm 3 times using the accelerator pedal.
(g) Read the output voltage of the front Heated Oxygen (HO2) sensor displayed on the tester when the engine speed is suddenly increased.
Standard:
HO2 sensor voltage output indicates 0.45 V or more (rich signal) at least once.

OK → **Go to step 12**

NG

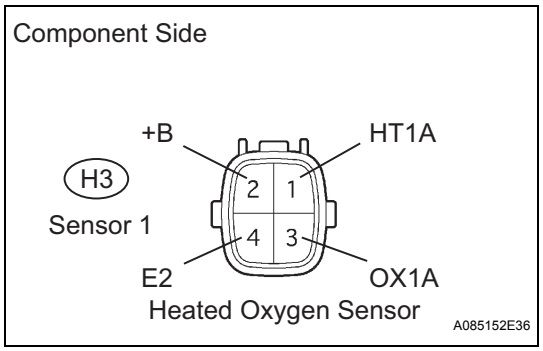
3	CHECK VENTILATION HOSE CONNECTIONS

OK:
Ventilation hose is connected correctly and is not damaged.

NG → **REPAIR OR REPLACE VENTILATION HOSE**

OK

4	INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



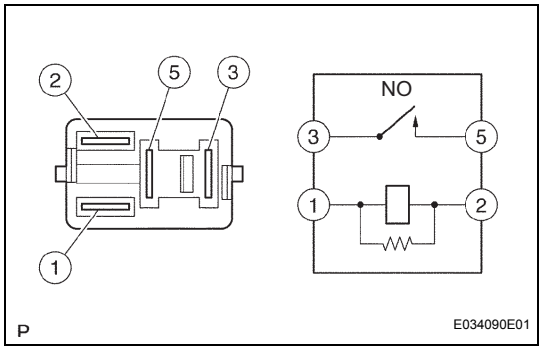
(a) Disconnect the H3 HO2 sensor connector.
(b) Measure the resistance of the HO2 sensor connector.
Standard resistance

Tester Connection	Specified Condition
HT1A (H3-1) - +B (H3-2)	11 to 16 Ω at 20°C (68°F)
HT1A (H3-1) - E2 (H3-4)	10 kΩ or higher

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

5	INSPECT EFI RELAY (Marking: EFI)



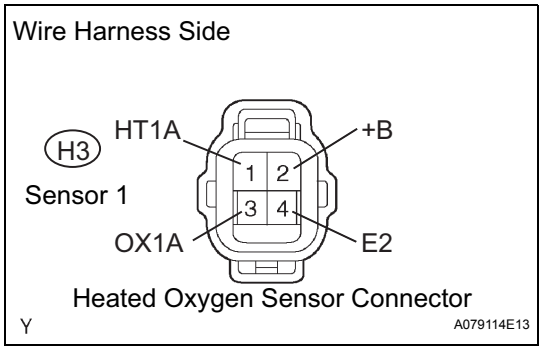
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the EFI relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage applied to terminals 1 and 2)

NG → **REPLACE EFI RELAY**

OK

6	CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM)

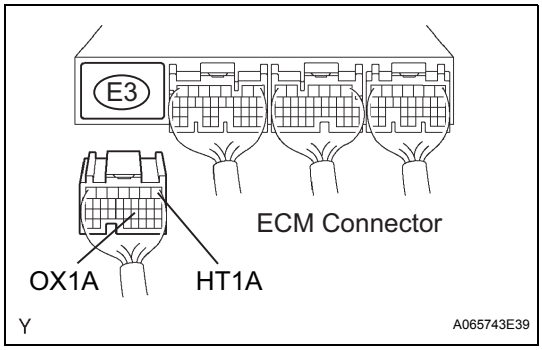


(a) Disconnect the H3 HO2 sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the +B terminal of the H3 HO2 sensor connector and body ground.

Standard voltage

Tester Connection	Specified Condition
+B (H3-2) - Body ground	9 to 14 V

(d) Turn the ignition switch OFF.



(e) Disconnect the E3 ECM connector.
(f) Measure the resistance of the wire harness side connectors.

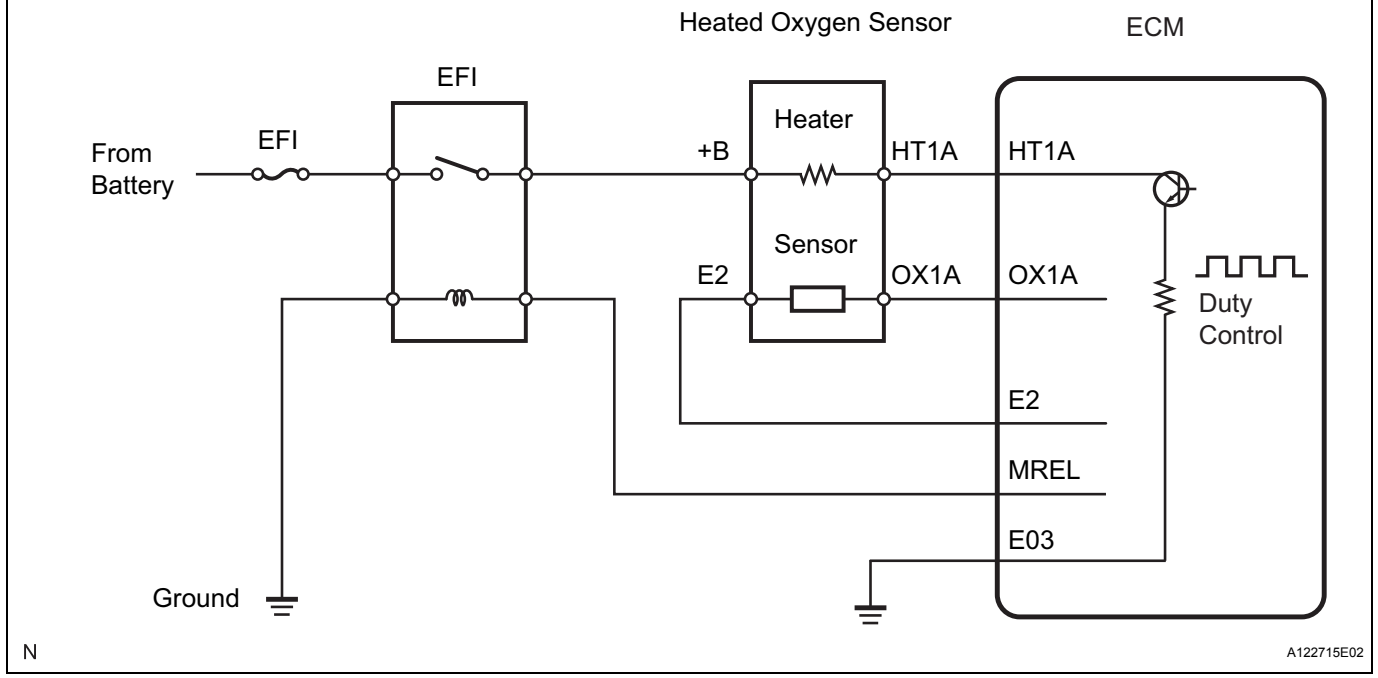
Standard resistance (Check for open)

Tester Connection	Specified Condition
HT1A (H3-1) - HT1A (E3-1)	Below 1 Ω
OX1A (H3-3) - OX1A (E3-21)	Below 1 Ω
E2 (H3-4) - Body ground	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HT1A (H3-1) or HT1A (E3-1) - Body ground	10 kΩ or higher
OX1A (H3-3) or OX1A (E3-21) - Body ground	10 kΩ or higher

Reference (System Diagram of Bank 1 Sensor 1)



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7	CHECK WHETHER MISFIRE OCCURS BY MONITORING DTC AND DATA LIST

NG → TROUBLESHOOT MISFIRE

OK

8	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leaks.
OK:
No leakage from air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

9	CHECK FUEL PRESSURE

(a) Check the fuel pressure (see page FU-7).

NG → REPAIR OR REPLACE FUEL SYSTEM

OK

10	INSPECT FUEL INJECTOR (INJECTION AND VOLUME)

(a) Check the injector injection and volume (see page FU-13).

NG → REPLACE FUEL INJECTOR

OK

11	CHECK FOR EXHAUST GAS LEAKS

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

REPLACE HEATED OXYGEN SENSOR

ES

12	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

13	CHECK WHETHER DTC OUTPUT RECURS (DTC P0134)

(a) Read DTCs using the intelligent tester.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P0134	B

B → REPLACE ECM

A

14	CONFIRM WHETHER VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → CHECK FOR INTERMITTENT PROBLEMS

YES

DTC CAUSED BY RUNNING OUT OF FUEL

CHECK FOR INTERMITTENT PROBLEMS

HINT:
Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect with the intelligent tester when the ECM is in check mode. In check mode, the ECM uses 1 trip detection logic, which is more sensitive to malfunctions than normal mode (default), which uses 2 trip detection logic.

1. Clear the DTCs (see page ES-36).
2. Switch the ECM from normal mode to check mode using the intelligent tester (see page ES-40).
3. Perform a simulation test (see pageIN-25).
4. Check and wiggle the harness(es), connector(s) and terminal(s) (see page IN-33).

BASIC INSPECTION

When the malfunction is not confirmed by the DTC check, troubleshooting should be carried out in all circuits considered to be possible causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location of the problem can be found quickly and efficiently. Therefore, using this check is essential when engine troubleshooting.

ES

1 CHECK BATTERY VOLTAGE

NOTICE:
Perform this check with the engine stopped and ignition switch OFF.

Result	Proceed to
11 V or more	OK
Below 11 V	NG

NG → **CHARGE OR REPLACE BATTERY**

OK

2 CHECK WHETHER ENGINE WILL CRANK

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE**

OK

3 CHECK WHETHER ENGINE STARTS

NG → **GO TO STEP 6**

OK

4 CHECK AIR FILTER

(a) Visually check that the air filter is not excessively contaminated with dirt or oil.

NG → **REPLACE AIR FILTER**

OK

5 CHECK IDLING SPEED

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE**

OK

6	CHECK FUEL PRESSURE

NG → PROCEED TO TROUBLESHOOTING

OK

7	CHECK FOR SPARK

NG → PROCEED TO TROUBLESHOOTING

OK

PROCEED TO PROBLEM SYMPTOMS TABLE

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0138	Heated Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)

DTC	P0139	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 2)

DESCRIPTION

The rear Heated Oxygen (HO2) sensor (bank 1 sensor 2) is located behind the Three-Way Catalytic Converter (TWC), and detects the oxygen concentration in the exhaust gas. For optimum TWC operation, the air fuel mixture must be maintained as close as possible to the stoichiometric ratio. The HO2 sensor output voltage changes dramatically in the vicinity of the stoichiometric ratio. By making adjustments in accordance with these signal voltage changes, the ECM adjusts the fuel injection time so that the air-fuel ratio remains as close as possible to stoichiometric levels.

The rear HO2 sensor generates a voltage that ranges from 0.1 V to 0.9 V according to the oxygen concentration in the exhaust gas. When the oxygen concentration in the exhaust gas increases, the HO2 sensor voltage drops below 0.45 V. The ECM interprets this as the air-fuel ratio being lean. Alternatively, the sensor voltage rises to more than 0.45 V when there is no oxygen in the exhaust gas. The ECM interprets this as the air-fuel ratio being rich.

DTC No	DTC Detection Condition	Trouble Area
P0136	Either of following conditions (a) or (b) met: (a) Rear Heated Oxygen (HO2) sensor voltage remains below 0.4 V (lean) or above 0.5 V (rich) while vehicle repeatedly accelerated and decelerated for 5 minutes or more (b) Rear HO2 sensor voltage remains below 0.05 V for long time period	• Open or short in Heated Oxygen (HO2) sensor (sensor 2) circuit • HO2 sensor (sensor 2) • HO2 sensor (sensor 2) heater • EFI relay
P0138	Rear HO2 sensor output voltage 1.2 V or more for 10 seconds	• HO2 sensor (sensor 2) • Short in HO2 sensor (sensor 2) circuit
P0139	When either condition below is met: • After fuel cut starting, time until rear HO2 sensor (sensor 2) voltage drops to below 0.2 V is 7 seconds or more • During fuel cut, duration that rear oxygen sensor voltage drops from 0.35 V to 0.2 V is 1 second or more	• HO2 sensor (sensor 2) • Short in HO2 sensor (sensor 2) circuit

MONITOR DESCRIPTION

The ECM monitors the HO2 sensor (bank 1 sensor 2) to check for the following malfunctions. If any one of the malfunctions is detected, the ECM illuminates the MIL and sets a DTC:

- The HO2 sensor output voltage remains above 0.5 V (rich) or below 0.4 V (lean) while the vehicle is accelerated and decelerated for 4 to 8 minutes.
- The HO2 sensor output voltage remains extremely low, below 0.05 V for a long time period of time while the vehicle is driven.
- The HO2 sensor output voltage remains extremely low, below 0.2 V (extremely lean condition) soon after fuel cut is performed while the vehicle is decelerated. The ECM interprets this as the sensor response having deteriorated.
- The HO2 sensor output voltage exceeds more than 1.2 V for 10 seconds.

MONITOR STRATEGY

Related DTCs	P0136: HO2 sensor (bank 1 sensor 2) voltage P0138: HO2 sensor (bank 1 sensor 2) voltage high P0139: HO2 sensor (bank 1 sensor 2) fuel cut

Required Sensors/Components (Main)	HO2 sensor (sensor 2)
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, Mass Air Flow (MAF) meter, Vehicle speed sensor (VSS)
Frequency of Operation	Continuous
Duration	Within 6 minutes: P0136 10 seconds: P0138 7 seconds: P0139
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

ES

Monitor runs whenever these DTCs not present	P0031, P0032 (heated oxygen sensor 1) P0037, P0038 (heated oxygen sensor 2) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0130 (heated oxygen sensor 1) P0134 (heated oxygen sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0441 - P0456 (EVAP system) P0500 (VSS)

P0136 HO2 sensor voltage:

Engine	Running
Fuel system status	Closed loop
Idle	OFF
Cumulative time while oxygen sensor heater is operating	22 seconds or more

P0136 HO2 sensor element:

Engine	Running
Vehicle speed	3 km/h (2 mph) or more
Idle	OFF
Fuel cut	OFF
Intake air amount per revolution	0.16 g/rev or more

P0138 HO2 sensor voltage:

Engine	Running

P0139 HO2 sensor voltage (during fuel cut):

HO2 sensor (sensor 2) voltage before fuel cut	0.2 V or more
Three-way catalytic converter condition	400°C (752°F) or more
ECT	70°C (158°F) or more
Fuel cut	Operating

TYPICAL MALFUNCTION THRESHOLDS

P0136 HO2 sensor voltage:

Lean/Rich switching count	None
Lean	Heated Oxygen (HO2) sensor (sensor 2) voltage less than 0.4 V
Rich	HO2 sensor (sensor 2) voltage 0.5 V or more
Cumulative rear oxygen sensor monitor time	300 seconds or more

P0136 HO2 sensor element:

Cumulative rear HO2 sensor (sensor 2) monitor time	210 seconds or more
Cumulative time when HO2 sensor (sensor 2) voltage less than 0.05 V	126 seconds or more
Cumulative time when HO2 sensor (sensor 2) voltage 0.70 V or more	Less than 42 seconds
Cumulative time when HO2 sensor (sensor 2) voltage more than 0.45 V	Less than 84 seconds
Maximum rear HO2 sensor (sensor 2) rich time: Rear HO2 sensor voltage 0.45 V or more	Less than 20 seconds

P0138 HO2 sensor voltage:

Time while HO2 sensor output voltage 1.2 V or more	10 seconds or more

P0139 HO2 sensor voltage (during fuel cut):

Time until HO2 sensor (sensor 2) voltage drops to below 0.2 V after fuel cut starting	7 seconds or more
Duration that rear oxygen sensor voltage drops from 0.35 V to 0.2 V during fuel cut	1 second or more

COMPONENT OPERATING RANGE

HO2 sensor (sensor 2) voltage	Alternates between 0 V and 1 V

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

WIRING DIAGRAM

Refer to DTC P0130 (see page ES-113).

CONFIRMATION DRIVING PATTERN

This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.

CAUTION:

Strictly observe posted speed limits, traffic laws, and road conditions when performing the driving pattern below.

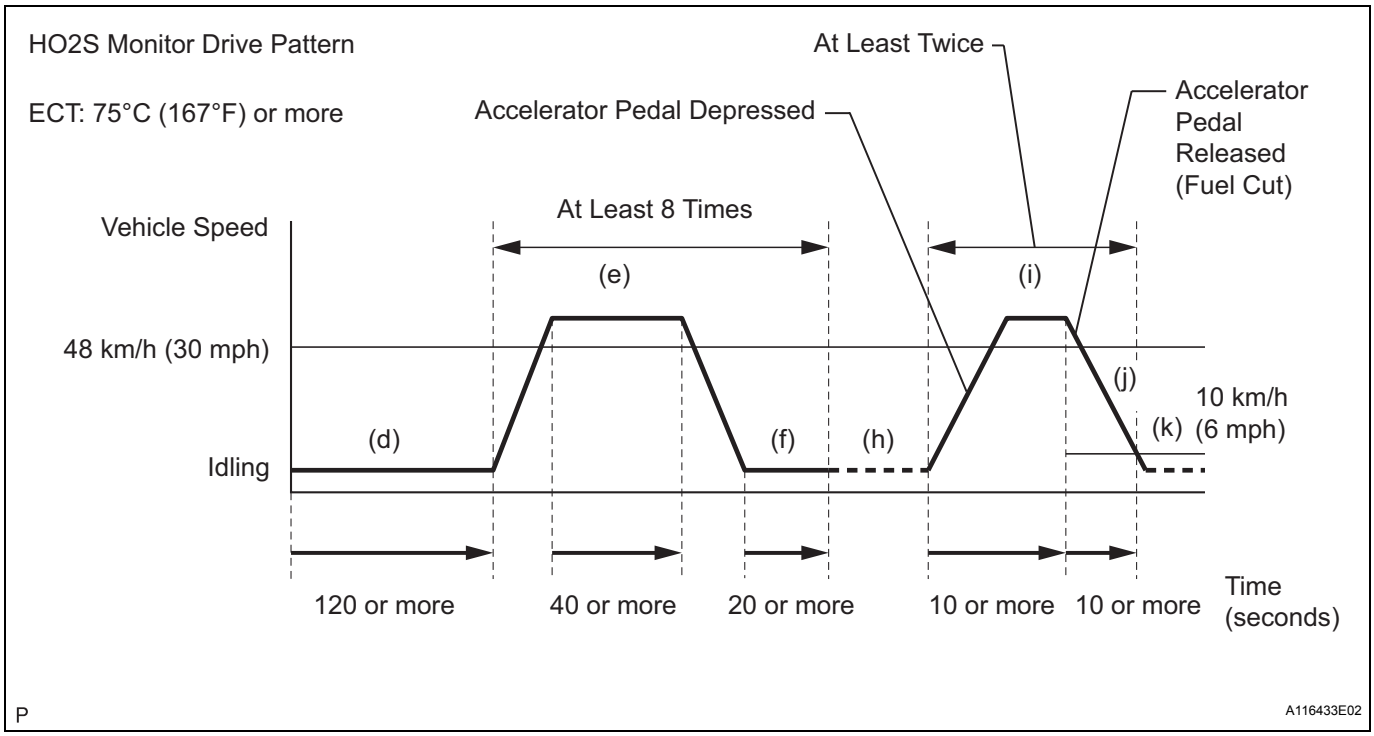
1. **Preconditions**

   The Heated Oxygen (HO2) sensor monitor will not run unless:
   - 2 minutes or more have elapsed since the engine was started.
   - The Engine Coolant Temperature (ETC) is 75°C (167°F) or more.
   - Cumulative driving time at a vehicle speed of 48 km/h (30 mph) or more exceeds 6 minutes.
   - Air-fuel ratio feedback control is performed.
   - Fuel cut control is performed for 8 seconds or more (for the rear HO2 sensor).

2. **Driving Patterns**

   (a) Connect the intelligent tester to the DLC3.
   (b) Turn the ignition switch ON and turn the tester ON.
   (c) Clear DTCs (see page ES-36).
   (d) Start the engine and warm it up until the ETC reaches 75°C (167°F) or higher.
   (e) Drive the vehicle at 48 km/h (30 mph) or more for at least 40 seconds.
   (f) Allow the engine to idle for 20 seconds or more.
   (g) Repeat steps (e) and (f) described above at least 8 times in 1 driving cycle.
   (h) Change the transmission to 2nd gear.
   (i) Accelerate the vehicle to 48 km/h (30 mph) or more by depressing the accelerator pedal for at least 10 seconds.

(j) Soon after performing step (i) above, release the accelerator pedal for at least 10 seconds without depressing the brake pedal in order to execute fuel cut control.
(k) Allow the vehicle to decelerate to less than 10 km/h (6 mph).
(l) Repeat steps from (i) through (k) described above at least twice in 1 driving cycle.



INSPECTION PROCEDURE

HINT:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Heated Oxygen (HO2) sensors and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester ON.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage output of the HO2 sensors (O2S B1S1 and O2S B1S2) displayed on the tester.
   HINT:
   - The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
   - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
O2S B1S1 (Front HO2 Sensor)	+25%	Rich	More than 0.55
O2S B1S1 (Front HO2 Sensor)	-12.5%	Lean	Less than 0.4
O2S B1S2 (Rear HO2 Sensor)	+25%	Rich	More than 0.5
O2S B1S2 (Rear HO2 Sensor)	-12.5%	Lean	Less than 0.4

NOTICE:
The front HO2 sensor has an output delay of a few seconds and the rear HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	Front HO2 Sensor (Sensor 1) Output Voltage		Rear HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Front HO2 sensor • Front HO2 sensor heater • Front HO2 sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Rear HO2 sensor • Rear HO2 sensor heater • Rear HO2 sensor circuit
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely rich or lean)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the front and rear HO2 sensors.
- To display the graph, enter the following menus on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST/ A/F CONTROL / USER DATA / O2S B1S1 and O2S B1S2; then press the YES button and ENTER button followed by the F4 button.
  NOTICE:
  If the vehicle is short of fuel, the air-fuel ratio becomes lean, HO2 sensor DTCs are recorded, and the ECM illuminates the MIL.

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high HO2 sensor (sensor 1) voltage (0.55 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low HO2 sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0136, P0138 AND/OR P0139)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC output)	Proceed to
P0136, P0138 and/or P0139	A
P0136, P0138 and/or P0139, and other DTCs	B

ES

HINT:
If any DTCs other than P0136, P0138 and/or P0139 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2	READ VALUE OF INTELLIGENT TESTER (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

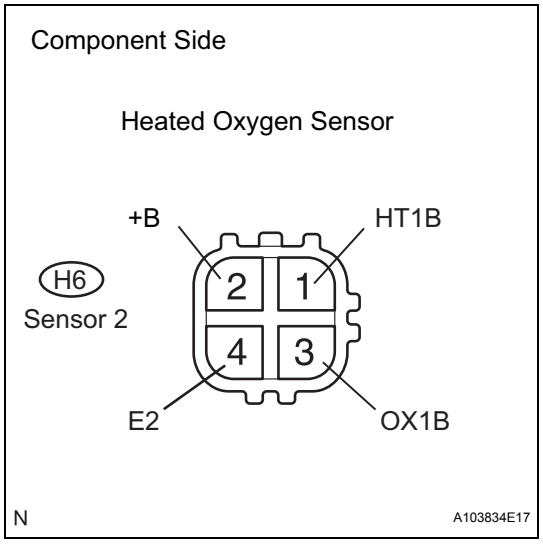
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1S2 and ENGINE SPD.
(e) Warm up the engine.
(f) Run the engine at an engine speed of 2,500 rpm for 3 minutes.
(g) Rev the engine up to 4,000 rpm 3 times using the accelerator pedal.
(h) Read the output voltage of the rear Heated Oxygen (HO2) sensor displayed on the tester when the engine speed is suddenly increased.

Standard voltage:
Rear HO2 sensor voltage output fluctuates between less than 0.4 V and more than 0.55 V.

OK → **Go to step 6**

NG

3 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



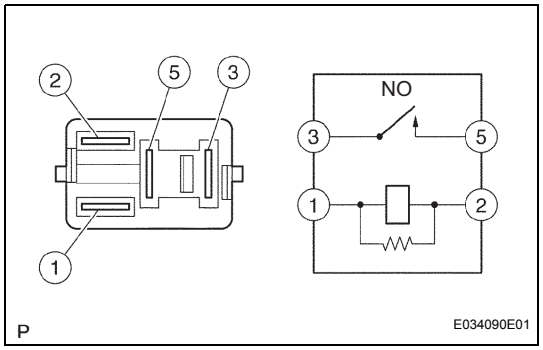
(a) Disconnect the H6 HO2 sensor connector.
(b) Measure the resistance of the HO2 sensor connector.
Standard resistance

Tester Connection	Specified Condition
HT1B (H6-1) - +B (H6-2)	11 to 16 Ω at 20 °C (68 °F)
HT1B (H6-1) - E2 (H6-4)	10 kΩ or higher

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

4 INSPECT EFI RELAY (Marking EFI)



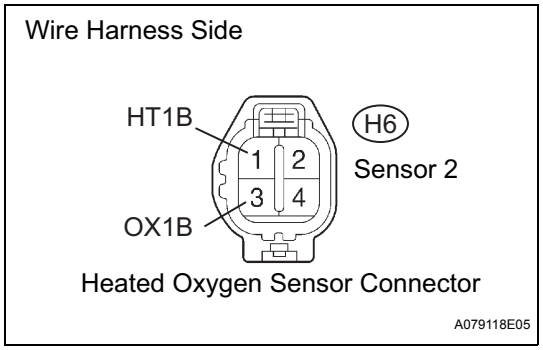
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the EFI relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

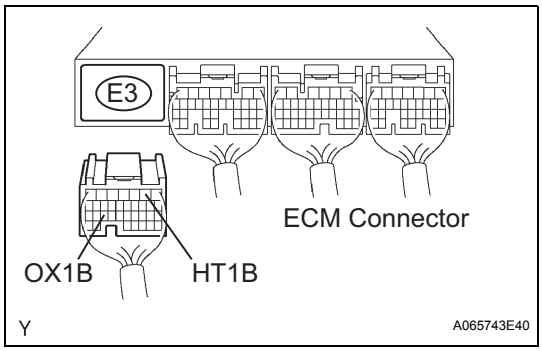
NG → **REPLACE EFI RELAY**

OK

5 CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM)



(a) Disconnect the H6 HO2 sensor connector.



(b) Disconnect the E3 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

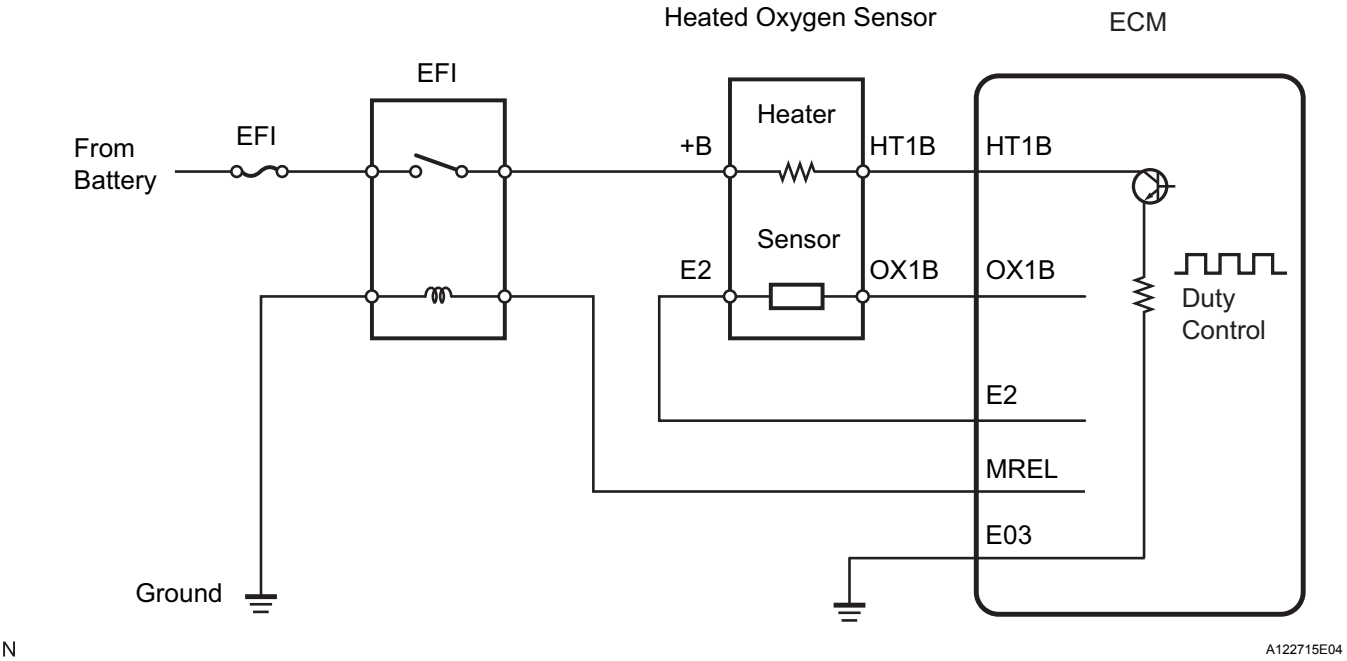
Tester Connection	Specified Condition
HT1B (H6-1) - HT1B (E3-2)	Below 1 Ω
OX1B (H6-3) - OX1B (E3-25)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HT1B (H6-1) or HT1B (E3-2) - Body ground	10 kΩ or higher
OX1B (H6-3) or OX1B (E3-25) - Body ground	10 kΩ or higher

ES

Reference (System Diagram of Bank 1 Sensor 2)



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HEATED OXYGEN SENSOR

6	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

7	CHECK WHETHER DTC OUTPUT RECURS (DTC P0136, P0138 AND/OR P0139)

(a) Read DTCs using the intelligent tester.

(b) If using the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

Result

Display (DTC output)	Proceed to
P0136, P0138 and/or P0139	A
No output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A

REPLACE HEATED OXYGEN SENSOR

DTC	P0171	System Too Lean (Bank 1)

DTC	P0172	System Too Rich (Bank 1)

DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim consists of both the short-term and long-term fuel trims.

The short-term fuel trim is fuel compensation that is used to constantly maintain the air-fuel ratio at stoichiometric levels. The signal from the front Heated Oxygen (HO2) sensor indicates whether the air-fuel ratio is rich or lean compared to the stoichiometric ratio. This triggers a reduction in the fuel injection volume if the air-fuel ratio is rich and an increase in the fuel injection volume if it is lean.

ES

Factors such as individual engine differences, wear over time and changes in operating environment cause short-term fuel trim to vary from the central value. The long-term fuel trim, which controls overall fuel compensation, compensates for long-term deviations in the fuel trim from the central value caused by the short-term fuel trim compensation.

If both the short-term and long-term fuel trims are lean or rich beyond predetermined values, it is interpreted as a malfunction, and the ECM illuminates the MIL and sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0171	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to lean side (2 trip detection logic)	• Air induction system • Injector blockage • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Fuel pressure • Gas leakage from exhaust system • Open or short in Heated Oxygen (HO2) sensor (bank 1 sensor 1) circuit • HO2 sensor (bank 1 sensor 1) • HO2 sensor heater (bank 1 sensor 1) • EFI relay • Ventilation valve and hose • Ventilation hose connections • ECM
P0172	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to rich side (2 trip detection logic)	• Injector leakage or blockage • MAF meter • ECT sensor • Ignition system • Fuel pressure • Gas leakage from exhaust system • Open or short in HO2 sensor (bank 1 sensor 1) circuit • HO2 sensor (bank 1 sensor 1) • HO2 sensor heater (bank 1 sensor 1) • EFI relay • ECM

HINT:

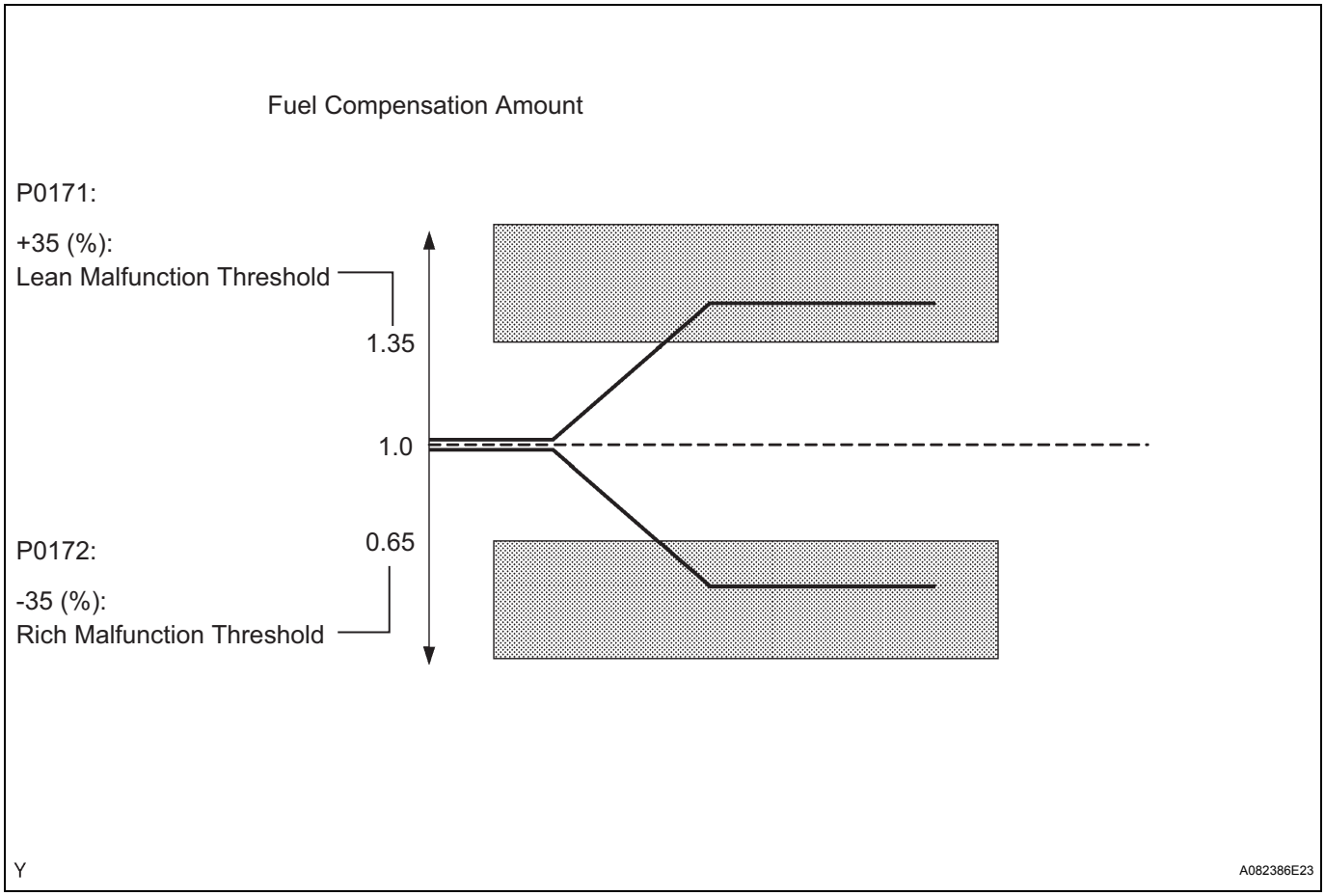
- When DTC P0171 is set, the actual air-fuel ratio is on the lean side. When DTC P0172 is set, the actual air-fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air-fuel ratio is lean and DTC P0171 may be set. The MIL is then illuminated.
- When the total of the short-term and long-term fuel trim values is within the malfunction threshold (and the engine coolant temperature is more than 75°C [167°F]), the system is functioning normally.

MONITOR DESCRIPTION

Under closed loop fuel control, fuel injection volumes that deviate from those estimated by the ECM cause changes in the long-term fuel trim compensation value. The long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. Deviations from the ECM's estimated fuel injection volumes also affect the average fuel trim learning value, which is a combination of the average short-term fuel trim (fuel feedback compensation value) and the average long-term fuel trim (learning value of the air-fuel ratio). If the average fuel trim learning value exceeds the malfunction thresholds, the ECM interprets this as a fault in the fuel system and sets a DTC.

Example:

When the average fuel trim leaning value is more than +35% or less than -35%, the ECM interprets this as a fuel system malfunction.



MONITOR STRATEGY

Related DTCs	P0171: Fuel trim Lean (bank 1) P0172: Fuel trim Rich (bank 1)
Required Sensors/Components (Main)	Fuel system
Required Sensors/Components (Related)	Heated oxygen sensor (sensor 1), Mass air flow meter, Crankshaft position sensor
Frequency of Operation	Continuous
Duration	Within 10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever these DTCs not present	P0010 (VVT OCV 1) P0011 (VVT system 1 - advance) P0012 (VVT system 1 - retard) P0031, P0032 (heated oxygen sensor 1) P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0130 (heated oxygen sensor 1) P0134 (heated oxygen sensor 1) P0171, P0172 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0441 - P0456 (EVAP system) P0500 (VSS)
Battery voltage	11 V or more
Fuel system	Closed loop (for more than 13 seconds)
Either of following conditions (a) or (b) met:	-
(a) Engine RPM	Less than 1,100 rpm
(b) Intake air amount per revolution	0.15 g/rev or more

ES

TYPICAL MALFUNCTION THRESHOLDS

All:

EVAP purge-cut	Executing

Fuel trim Lean:

Average fuel trim learning value	35% or more (varies with engine coolant temperature [ECT])

Fuel trim Rich:

Average fuel trim learning value	-35% or less (varies with ECT)

WIRING DIAGRAM

Refer to DTC P0130 (see page ES-113).

INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Heated Oxygen (HO2) sensors and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

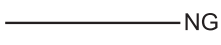
1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester ON.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage outputs of the HO2 sensors (O2S B1S1 and O2S B1S2) displayed on the tester.
   HINT:
   - The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
   - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
O2S B1S1 (Front HO2 Sensor)	+25%	Rich	More than 0.55
O2S B1S1 (Front HO2 Sensor)	-12.5%	Lean	Less than 0.4
O2S B1S2 (Rear HO2 Sensor)	+25%	Rich	More than 0.5
O2S B1S2 (Rear HO2 Sensor)	-12.5%	Lean	Less than 0.4

NOTICE:
The front HO2 sensor has an output delay of a few seconds and the rear HO2 sensor has a maximum output delay of approximately 20 seconds.

ES

Case	Front HO2 Sensor (Sensor 1) Output Voltage		Rear HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Front HO2 sensor • Front HO2 sensor heater • Front HO2 sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Rear HO2 sensor • Rear HO2 sensor heater • Rear HO2 sensor circuit
	Output Voltage More than 0.55 V Less than 0.4 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely rich or lean)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the front and rear HO2 sensors.
- To display the graph, enter the following menus on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST/ A/F CONTROL / USER DATA / O2S B1S1 and O2S B1S2; then press the YES button and ENTER button followed by the F4 button.
  NOTICE:
  If the vehicle is short of fuel, the air-fuel ratio becomes lean, HO2 sensor DTCs are recorded, and the ECM illuminates the MIL.

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.

- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high HO2 sensor (sensor 1) voltage (0.55 V or more) could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A low HO2 sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1 CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0171 OR P0172)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0171 or P0172	A
P0171 or P0172 and other DTCs	B

HINT:
If any DTCs other than P0171 or P0172 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 CHECK VENTILATION HOSE CONNECTIONS

OK:
Ventilation hose is connected correctly, and is not damaged.

NG → **REPAIR OR REPLACE VENTILATION HOSE**

OK

3 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

4 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (A/F CONTROL)

(a) Connect the intelligent tester to the DLC3.

(b) Start the engine and turn the tester ON.
(c) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the voltage output of the Heated Oxygen (HO2) sensors (O2S B1S1 and O2S B1S2) displayed on the tester.
HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
O2S B1S1 (Front HO2 Sensor)	+25%	Rich	More than 0.55
O2S B1S1 (Front HO2 Sensor)	-12.5%	Lean	Less than 0.4
O2S B1S2 (Rear HO2 Sensor)	+25%	Rich	More than 0.5
O2S B1S2 (Rear HO2 Sensor)	-12.5%	Lean	Less than 0.4

Result

Status O2S B1S1	Status O2S B1S2	A/F Condition and HO2 Sensor Condition	Misfires	Suspected Trouble Areas	Proceed to
Lean/Rich	Lean/Rich	Normal	-	-	C
Lean	Lean	Actual air-fuel ratio lean	May occur	• Ventilation valve and hose • Ventilation hose connections • Injector blockage • Gas leakage from exhaust system • Air induction system • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor	A
Rich	Rich	Actual air-fuel ratio rich	-	• Injector leakage or blockage • Gas leakage from exhaust system • Ignition system • Fuel pressure • MAF meter • ECT sensor	A
Lean	Lean/Rich	HO2 sensor malfunction	-	• HO2 sensor	B

Status O2S B1S1	Status O2S B1S2	A/F Condition and HO2 Sensor Condition	Misfires	Suspected Trouble Areas	Proceed to
Rich	Lean/Rich	HO2 sensor malfunction	-	• HO2 sensor	B

Lean: During A/F CONTROL, both the front and rear HO2 sensor output voltages (O2S) are consistently less than 0.4 V.
Rich: During A/F CONTROL, both of the O2S voltages are consistently more than 0.55 V.

B → **Go to step 11**

C → **Go to step 15**

ES

A

5 READ VALUE OF INTELLIGENT TESTER (COOLANT TEMP)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(d) Read the COOLANT TEMP twice, when the engine is cold and also when warmed up.
Standard:
With cold engine: Same as ambient air temperature.
With warm engine: 75°C to 95°C (167°F to 203°F)

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

6 READ VALUE OF INTELLIGENT TESTER (MAF)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF and COOLANT TEMP.
(d) Allow the engine to idle until the COOLANT TEMP reaches 75°C (167°F).
(e) Read the MAF with the engine in an idling condition and at an engine speed of 2,500 rpm.
Standard:
MAF while engine idling: 1.4 g/sec. to 2.3 g/sec. (A/C: OFF).
MAF at engine speed of 2,500 rpm: 5.4 g/sec. to 7.9 g/sec. (A/C: OFF).

NG → **REPLACE MASS AIR FLOW METER**

OK

7	CHECK FUEL PRESSURE

(a) Check the fuel pressure (high or low pressure) (see page FU-7).

NG → REPAIR OR REPLACE FUEL SYSTEM

OK

8	CHECK FOR EXHAUST GAS LEAKAGE

ES

OK:
No gas leakage.

NG → REPAIR OR REPLACE EXHAUST SYSTEM

OK

9	CHECK FOR SPARKS AND IGNITION

HINT:
If the spark plugs or ignition system malfunctions, engine misfire may occur. The misfire count can be read using the intelligent tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL #1 (to CYL #4).

NG → REPAIR OR REPLACE IGNITION SYSTEM

OK

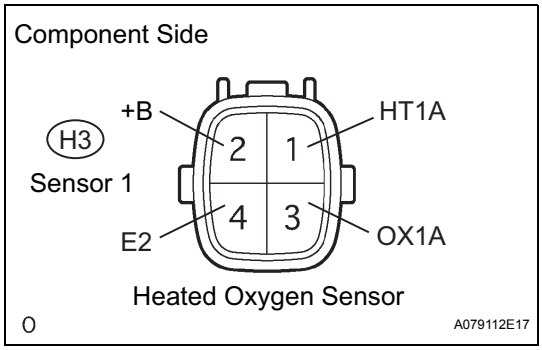
10	INSPECT FUEL INJECTOR (INJECTION AND VOLUME)

HINT:
If the injectors malfunction, engine misfire may occur. The misfire count can be read using the intelligent tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL #1 (to CYL #4).

NG → REPLACE FUEL INJECTOR

OK

11 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



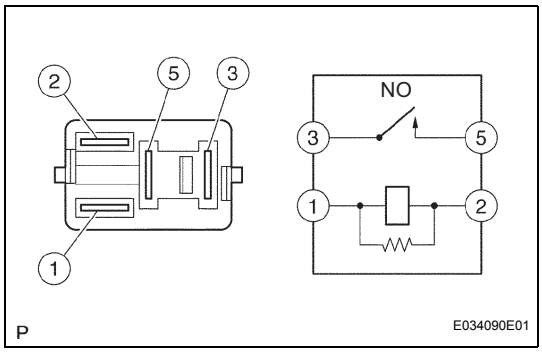
(a) Disconnect the H3 HO2 sensor connector.
(b) Measure the resistance of the HO2 sensor connector.
Standard resistance

Tester Connection	Specified Condition
HT1A (H3-1) - +B (H3-2)	11 to 16 Ω at 20°C (68°F)
HT1A (H3-1) - E2 (H3-4)	10 kΩ or higher

NG → REPLACE HEATED OXYGEN SENSOR

OK

12 INSPECT EFI RELAY (Marking: EFI)



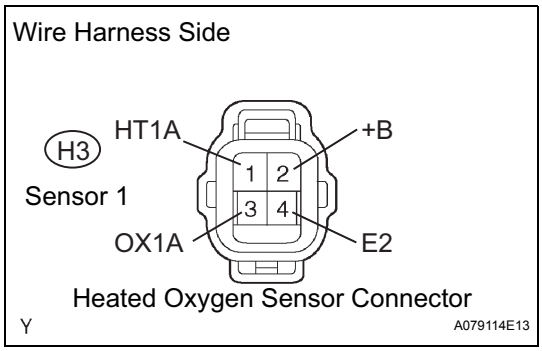
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the EFI relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → REPLACE EFI RELAY

OK

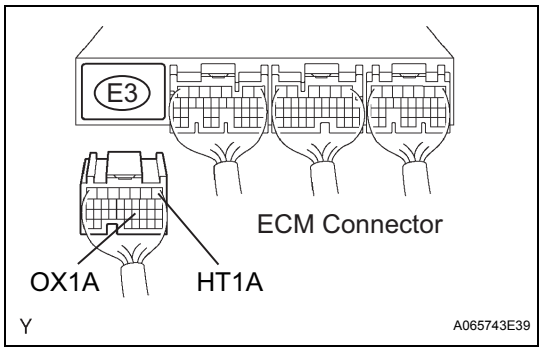
13 CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR (SENSOR 1) - ECM)



(a) Disconnect the H3 HO2 sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the +B terminal of the H3 HO2 sensor connector and body ground.
Standard voltage

Tester Connection	Specified Condition
+B (H3-2) - Body ground	9 to 14 V

(d) Turn the ignition switch OFF.



(e) Disconnect the E3 ECM connector.
(f) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

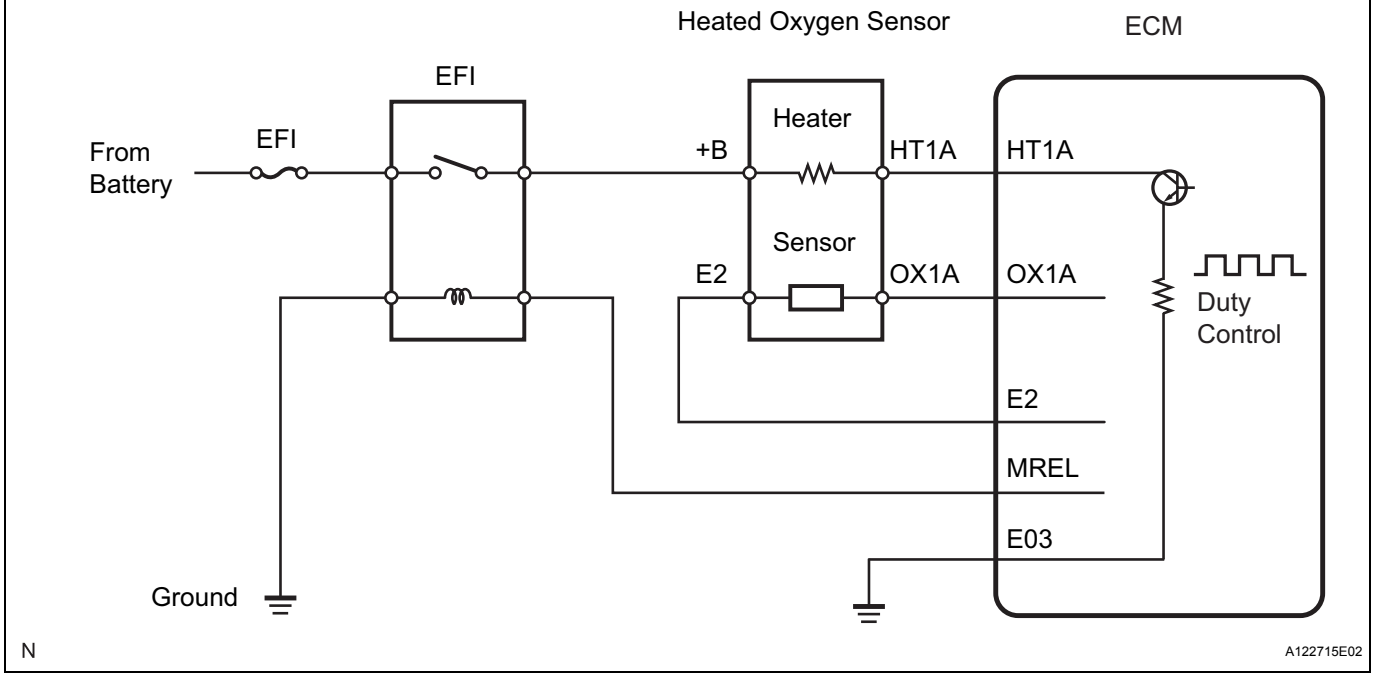
Tester Connection	Specified Condition
HT1A (H3-1) - HT1A (E3-1)	Below 1 Ω
OX1A (H3-3) - OX1A (E3-21)	Below 1 Ω
E2 (H3-4) - Body ground	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HT1A (H3-1) or HT1A (E3-1) - Body ground	10 kΩ or higher
OX1A (H3-3) or OX1A (E3-21) - Body ground	10 kΩ or higher

ES

Reference (System Diagram of Bank 1 Sensor 1)



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

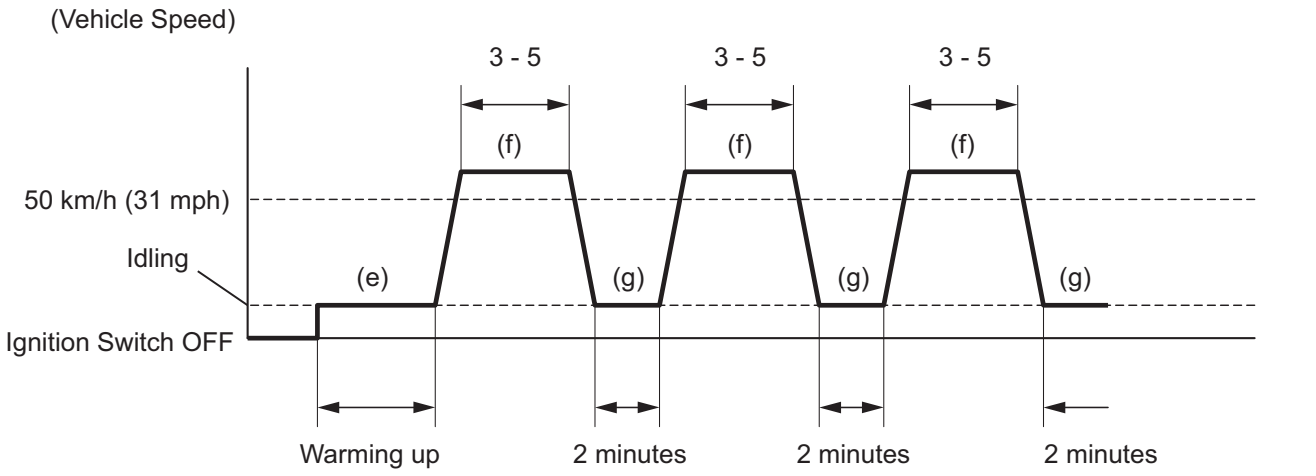
OK

14	REPLACE HEATED OXYGEN SENSOR (SENSOR 1)

(a) Replace the HO2 sensor (see page EC-20).

NEXT

15	PERFORM CONFIRMATION DRIVING PATTERN



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Clear DTCs (see page ES-36).
(d) Switch the ECM from normal mode to check mode using the tester (see page ES-40).
(e) Start the engine and warm it up with all accessories switched OFF.
(f) Drive the vehicle at 50 km/h (31 mph) or more for 3 to 5 minutes.
(g) Allow the engine to idle for 2 minutes.
(h) Perform steps (f) and (g) at least 3 times.

NEXT

16	CHECK WHETHER DTC OUTPUT RECURS (DTC P0171 OR P0172)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs (see page ES-47).

Result

Display (DTC Output)	Proceed to
No output	A
P0171 or P0172	B

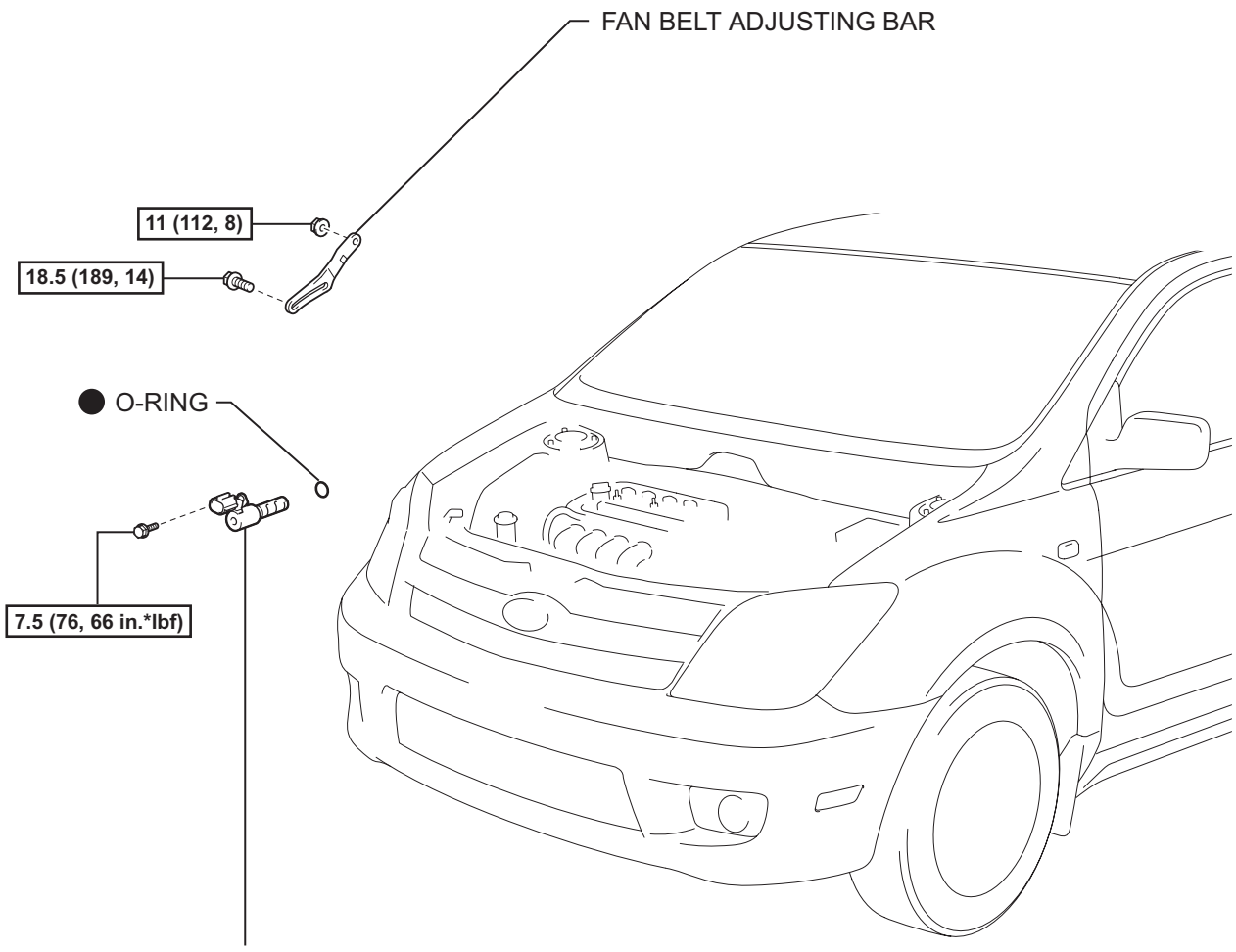
B → **Go to step 5**

A

END

CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

A114179E02

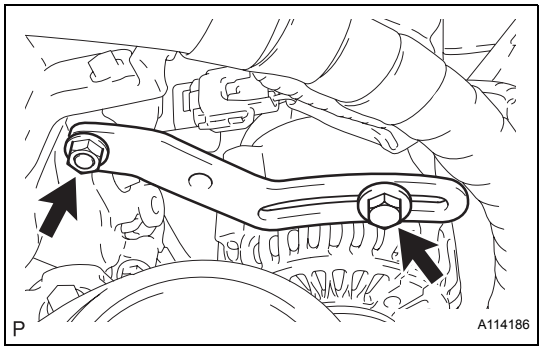
ES

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

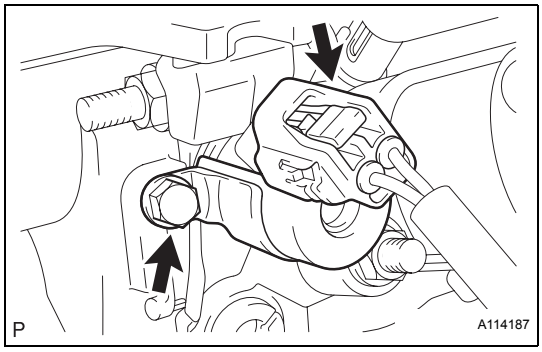
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



2. REMOVE FAN BELT ADJUSTING BAR

(a) Remove the bolt, nut and adjusting bar.



3. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Disconnect the oil control valve connector.

(b) Remove the bolt and oil control valve.

(c) Remove the O-ring from the oil control valve.

DTC	P0300	Random / Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

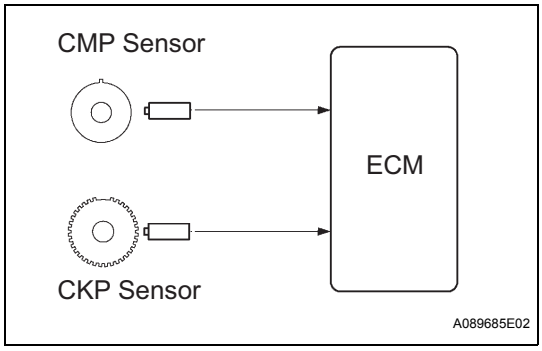
DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

ES

DESCRIPTION



When the engine misfires, high concentrations of hydrocarbons (HC) enter the exhaust gas. Extremely high HC concentration levels can cause increases in exhaust emission levels. High concentrations of HC can also cause increases in the Three-Way Catalytic Converter (TWC) temperature, which may cause damage to the TWC. To prevent these increases in emissions and to limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the TWC reaches the point of thermal degradation, the ECM blinks the MIL. To monitor misfires, the ECM uses both the Camshaft Position (CMP) sensor and the Crankshaft Position (CKP) sensor. The CMP sensor is used to identify any misfiring cylinders and the CKP sensor is used to measure variations in the crankshaft rotation speed. Misfires are counted when the crankshaft rotation speed variations exceed predetermined thresholds. If the misfire exceeds the threshold levels, and could cause emission deterioration, the ECM illuminates the MIL and sets a DTC.

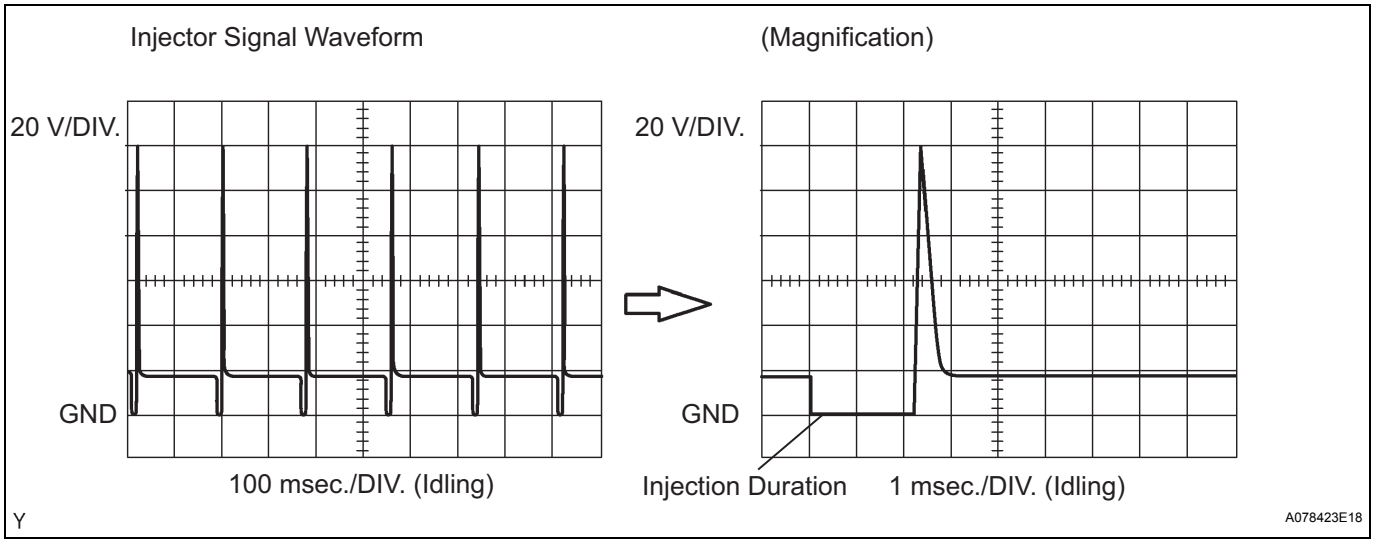
DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected (2 trip detection logic)	• Open or short in engine wire harness • Connector connections • Vacuum hose connections • Ignition system • Injector • Fuel pressure • Mass air flow meter • Engine coolant temperature sensor • Compression pressure • Valve clearance • Valve timing • Ventilation hose connections • Ventilation valve and hose • ECM
P0301 P0302 P0303 P0304	Misfiring of each cylinder is detected (2 trip detection logic)	

HINT:
When the DTCs for misfiring cylinders are recorded repeatedly but no random misfire DTC is recorded, it indicates that the misfires have been set and recorded at different times. Random misfire codes are recorded only when several misfires occur at the same time.
Reference: Inspection using the oscilloscope

With the engine idling, check the waveform between terminals #10 to #40 and E01 of the ECM connectors.

Item	Content
Terminals	#10 to #40 - E01
Equipment Settings	20 V/DIV., 100 or 1 ms/DIV.
Conditions	Idling

HINT:
The correct waveform is as shown.



MONITOR DESCRIPTION

The ECM illuminates the MIL and sets a DTC when either one of the following conditions, which could cause emission deterioration, is detected. (2 trip detection logic.)

- Within the first 1,000 crankshaft revolutions of the engine starting, an excessive misfiring rate (approximately 20 to 50 misfires per 1,000 crankshaft revolutions) occurs once.
- After the first 1,000 crankshaft revolutions, an excessive misfiring rate (approximately 20 to 60 misfires per 1,000 crankshaft revolutions) occurs 4 times in sequential crankshaft revolutions.

The ECM flashes the MIL and sets a DTC when either one of the following conditions, which could cause the Three-Way Catalytic Converter (TWC) damage, is detected (2 trip detection logic).

- In every 200 crankshaft revolutions at a high engine rpm, the threshold misfiring percentage is recorded once.
- In every 200 crankshaft revolutions at a normal engine rpm, the threshold misfiring percentage is recorded 3 times.

MONITOR STRATEGY

Related DTCs	P0300: Multiple cylinder misfire P0301: No. 1 cylinder misfire P0302: No. 2 cylinder misfire P0303: No. 3 cylinder misfire P0304: No. 4 cylinder misfire
Required sensors/ components (Main)	Injector, Ignition coil, Spark plug
Required sensors / components (Related)	Crankshaft, Camshaft, Engine coolant temperature, Intake air temperature sensors and Mass air flow meter
Frequency of operation	Continuous
Duration	1,000 to 4,000 crankshaft revolutions: Emission related misfire 200 to 600 crankshaft revolutions: Catalyst damaged misfire
MIL operation	2 driving cycles: Emission related misfire MIL flashes immediately: Catalyst damage misfire

Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0327 - P0328 (knock sensor) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0500 (VSS)
Battery voltage	8 V or more
Engine RPM	450 rpm to 6,600 rpm
Both of following 1 and 2 met	-
1. Engine coolant temperature	-10°C (14°F) or more
2. Either of following conditions (a) or (b) met	-
(a) Engine coolant temperature at engine start	More than -7°C (19°F)
(b) Engine coolant temperature	More than 20°C (68°F)

Throttle position learning	Completed
VVT system	Not operated by scan tool
Fuel cut	OFF

Monitor period of emission-related misfire:

First 1,000 revolutions after engine start, or Check Mode	Crankshaft 1,000 revolutions
Except above	Crankshaft 1,000 revolutions x 4

Monitor period of emission-related misfire:

Except above	Crankshaft 200 revolutions x 3
All of following conditions 1, 2 and 3 are met	Crankshaft 200 revolutions
1. Driving cycles	1st
2. Check Mode	OFF
3. RPM	Less that 3,800 revolutions

TYPICAL MALFUNCTION THRESHOLDS

P0301 to P0304:

With conditions of either emission related misfire or catalyst damaged misfire met, specific misfiring cylinder DTCs set when misfire counts of those cylinders exceed threshold	7 or more per 1,000 revolutions

Emission-related-misfire:

Misfire rate	1.63% or more

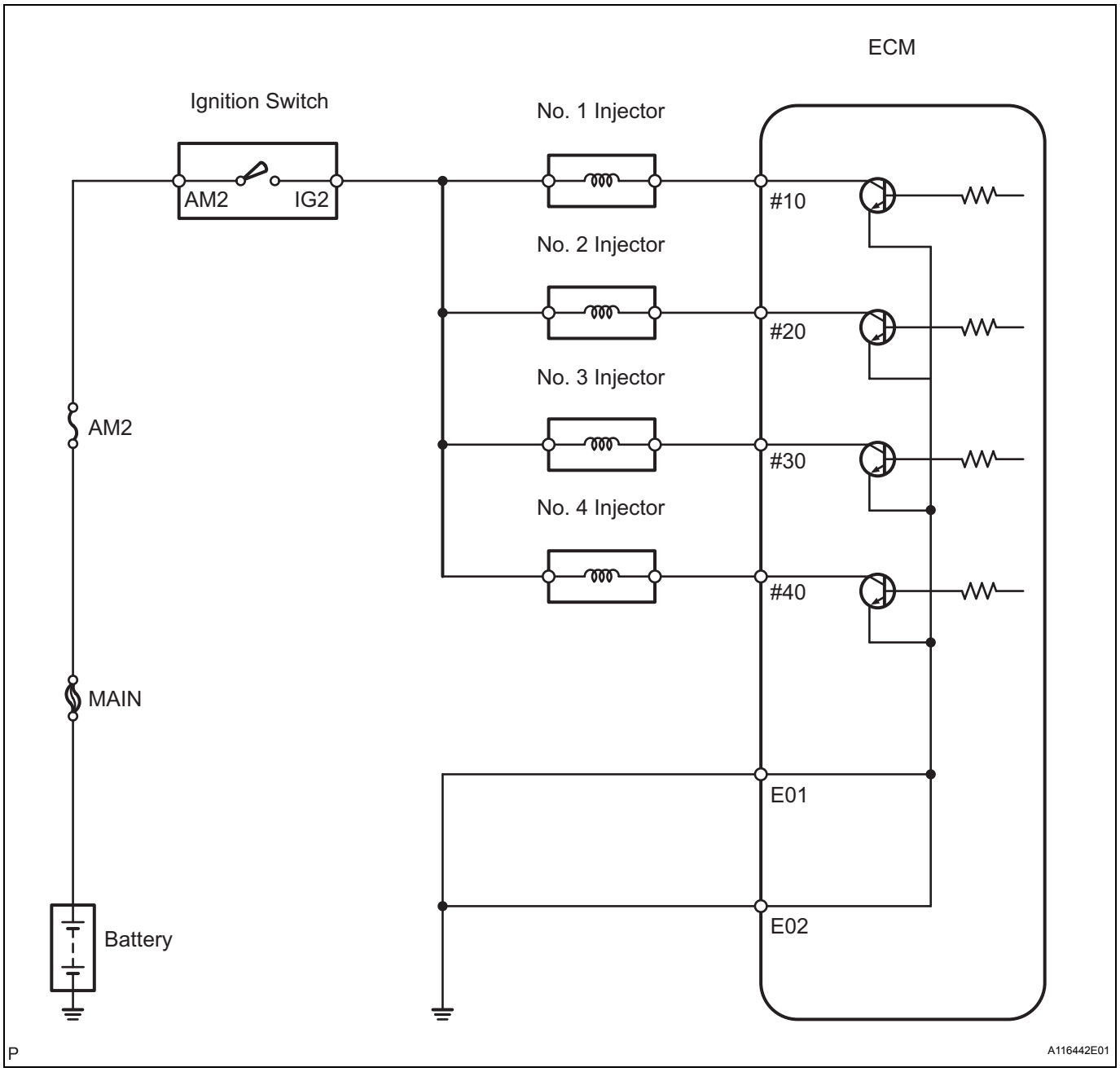
Catalyst-damage-misfire (MIL flashes immediately):

Misfire counts	136 or more* per 200 revolutions (at intake air amount: 0.3 g/rev and engine RPM: 1,600 rpm)

HINT:
*:The threshold value varies with the intake air amount and the engine RPM.

WIRING DIAGRAM

Refer to DTC P0351 (see page ES-188).



CONFIRMATION DRIVING PATTERN

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Record the DTC(s) and freeze frame data.
(d) Using the tester, switch the ECM from normal mode to check mode (see page ES-40).
(e) Read the misfire counts of each cylinder (CYL #1 to #4) with the engine in an idling condition. If any misfire count is displayed, skip the following confirmation driving pattern.
(f) Drive the vehicle several times with the conditions, such as engine rpm and engine load, shown in MISFIRE RPM, MISFIRE LOAD in the DATA LIST.
HINT:
In order to store misfire DTCs, it is necessary to drive the vehicle for the period of time shown in the table below, with the MISFIRE RPM and MISFIRE LOAD in the DATA LIST.

Engine RPM	Duration
Idling	3.5 minutes or more

Engine RPM	Duration
1,000 rpm	3 minutes or more
2,000 rpm	1.5 minutes or more
3,000 rpm	1 minute or more

(g) Check whether misfires have occurred by checking DTCs and freeze frame data.
HINT:
Do not turn the ignition switch OFF until the stored DTC(s) and freeze frame data have been recorded. When the ECM returns to normal mode (default), the stored DTC(s), freeze frame data and other data will be erased.
(h) Record the DTC(s), freeze frame data and misfire counts.
(i) Turn the ignition switch OFF and wait for at least 5 seconds.

ES

INSPECTION PROCEDURE

HINT:

- If any DTCs other than the misfire DTCs are output, troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the misfire does not recur when the vehicle is brought to the workshop, reproduce the conditions stored in the freeze frame data.
- If the misfire still cannot be reproduced even though the conditions stored in the freeze frame data have been duplicated, one of the following factors is considered to be a possible cause of the problem:
  (a) The fuel in the fuel tank is low.
  (b) Improper fuel is used.
  (c) The ignition plugs have been contaminated.
  (d) The problem is complex.
- After finishing repairs, check the misfire counts of the cylinders (CYL #1, #2, #3 and #4).
- Be sure to confirm that no misfiring cylinder DTCs are set again by conducting the confirmation driving pattern after repairs.
- For 6 and 8 cylinder engines, the ECM intentionally does not set the specific misfiring cylinder DTCs at high engine RPM. If misfires occur only in high engine RPM areas, only DTC P0300 is set.
  In the event of DTC P0300 being present, perform the following operations:
  (a) Clear the DTC (see page ES-36).
  (b) Start the engine and conduct the confirmation driving pattern.
  (c) Read the misfiring rates of each cylinder or DTC(s) using the tester.
  (d) Repair the cylinder(s) that has a high misfiring rate or is indicated by the DTC.
  (e) After finishing repairs, conduct the confirmation driving pattern again in order to verify that DTC P0300 is not set.
- When one of SHORT FT #1, LONG FT #1 in the freeze frame data is outside the range of +-20%, the air-fuel ratio may be rich (-20% or less) or lean (+20% or more).
- When the COOLANT TEMP in the freeze frame data is less than 75°C (167°F), the misfires have occurred only while warming up the engine.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO MISFIRE DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs (see page ES-47).

Result

Display (DTC Output)	Proceed to
P0300, P0301, P0302, P0303 and/or P0304	A
P0300, P0301, P0302, P0303 and/or P0304 and other DTCs	B

HINT:
If any other DTCs besides P0300, P0301, P0302, P0303 and P0304 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

ES

2 READ VALUE OF INTELLIGENT TESTER (MISFIRE RPM, MISFIRE LOAD)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / MISFIRE RPM and MISFIRE LOAD.
(d) Read and note the MISFIRE RPM and the MISFIRE LOAD (engine load) values.
HINT:
The MISFIRE RPM and MISFIRE LOAD indicate the vehicle conditions under which the misfire occurred.

NEXT

3 CHECK VENTILATION HOSE CONNECTIONS

OK:
Ventilation hose is connected correctly, and is not damaged.

NG → REPAIR OR REPLACE VENTILATION HOSE

OK

4 CHECK MISFIRE COUNT (CYL #1, #2, #3, #4)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Clear DTC (see page ES-36).
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL #1, #2, #3 and #4.
(e) Allow the engine to idle.
(f) Read each value of CYL #1 to #4 displayed on the tester. If no misfire counts occur in any cylinders, perform the following operations:
(1) Move the gear selector lever to the D position.
(2) Repeat steps (c) and (d) above.
(3) Check the CYL #1 to #4.

(4) If misfire counts are still not displayed, repeat (e) and then check the misfire counts again.

(g) Drive the vehicle with the MISFIRE RPM and MISFIRE LOAD noted in step 2.

(h) Read the CYL #1 to #4 or DTCs displayed on the tester.

Result

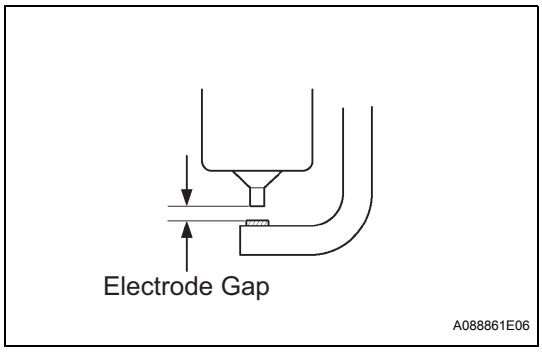
Misfire Count	Proceed to
1 or 2 cylinders have misfire counts	A
3 cylinders or more have misfire counts	B

B → **Go to step 13**

ES

A

5 CHECK SPARK PLUG



(a) Remove the No. 2 cylinder head cover (see page EM-40).

(b) Remove the ignition coil and the spark plug of misfire cylinder.

(c) Measure the spark plug electrode gap.

Standard gap:
0.7 to 0.8 mm (0.028 to 0.032 in.)
Maximum electrode gap:
1.16 mm (0.046 in.)

(d) Check the electrode for carbon deposits.

Recommended spark plug

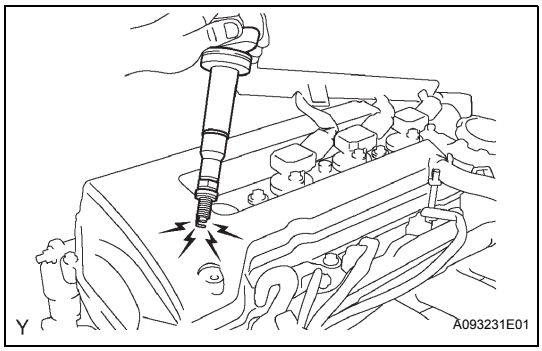
Manufacturer	Product
DENSO	K16R-U
NGK	BKR5EYA

NOTICE:
If the electrode gap is larger than the standard, replace the spark plug. Do not adjust the electrode gap.

NG → **REPLACE SPARK PLUG**

OK

6 CHECK SPARK AND IGNITION



(a) Disconnect the injector connectors to prevent the engine starting.

(b) Install the spark plug to the ignition coil.

(c) Attach the spark plug to the cylinder head cover.

(d) Crank the engine within 2 seconds and check the spark.

OK:
Spark jumps across electrode gap.

NG → **Go to step 8**

OK

7	CHECK CYLINDER COMPRESSION PRESSURE OF MISFIRING CYLINDER

(a) Measure the cylinder compression pressure of the misfiring cylinder.

OK → Go to step 9

NG

REPAIR OR REPLACE MALFUNCTIONING PARTS

ES

8	CHANGE TO NORMAL SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER

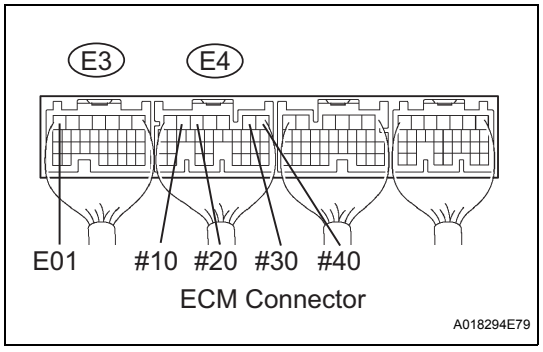
(a) Change to a normal spark plug.
(b) Perform a spark test.
CAUTION:
Always disconnect each injector connector.
NOTICE:
Do not crank the engine for more than 2 seconds.
(1) Install the spark plug to the ignition coil and connect the ignition coil connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if sparks occur while the engine is being cranked.
OK:
Spark jumps across electrode gap.

NG → REPLACE IGNITION COIL, THEN CONFIRM THAT THERE IS NO MISFIRE

OK

REPLACE SPARK PLUG

9	INSPECT ECM TERMINAL OF MISFIRING CYLINDER (#10, #20, #30 AND/OR #40 VOLTAGE)



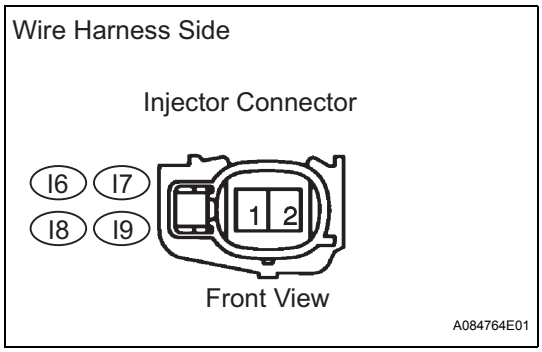
(a) Turn the ignition switch ON.
(b) Measure the voltage of the E3 and E4 ECM connector.
Standard voltage

Tester Connection	Specified Condition
#10 (E4-6) - E01 (E3-7)	9 to 14 V
#20 (E4-5) - E01 (E3-7)	9 to 14 V
#30 (E4-2) - E01 (E3-7)	9 to 14 V
#40 (E4-1) - E01 (E3-7)	9 to 14 V

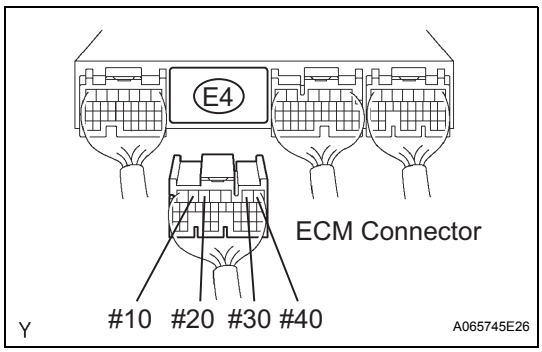
OK → Go to step 11

NG

10 CHECK HARNESS AND CONNECTOR (INJECTOR - ECM)



(a) Disconnect the injector connector (of the misfire cylinder).



(b) Disconnect the E4 ECM connector.
(c) Turn the ignition switch ON.
(d) Measure the resistance and voltage between the injector and the ECM connector terminals.

Standard voltage

Tester Connection	Specified Condition
I6-1 - Body ground	11 to 14 V
I7-1 - Body ground	11 to 14 V
I8-1 - Body ground	11 to 14 V
I9-1 - Body ground	11 to 14 V

(e) Measure the resistance of the wire harness side connectors.

Standard resistance

Cylinder	Tester Connection	Specified Condition
No. 1	I6-2 - Body ground	10 kΩ or higher
No. 1	I6-2 - #10 (E4-6)	Below 1 Ω
No. 2	I7-2 - Body ground	10 kΩ or higher
No. 2	I7-2 - #20 (E4-5)	Below 1 Ω
No. 3	I8-2 - Body ground	10 kΩ or higher
No. 3	I8-2 - #30 (E4-2)	Below 1 Ω
No. 4	I9-2 - Body ground	10 kΩ or higher
No. 4	I9-2 - #40 (E4-1)	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

11 CHECK FUEL INJECTOR OF MISFIRING CYLINDER

(a) Check the injector injection (whether fuel volume is high or low, and whether injection pattern is poor).

NG → REPLACE FUEL INJECTOR

OK

12	CHECK VALVE CLEARANCE OF MISFIRING CYLINDER

NG → ADJUST VALVE CLEARANCE

OK

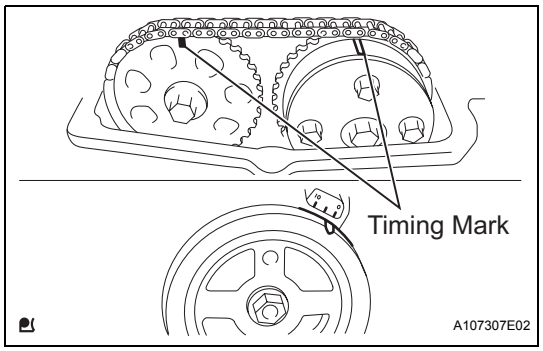
13	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leaks.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

14	CHECK VALVE TIMING



(a) Remove the cylinder head cover (see page EM-40).
(b) Turn the crankshaft pulley, then align its groove with the timing mark "0" of the timing chain cover.
(c) Check that both timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
OK:
Timing marks on camshaft timing gears are aligned with timing chain cover surface.

NG → **ADJUST VALVE TIMING**

OK

15	CHECK FUEL PRESSURE

(a) Check the fuel pressure (see page FU-7).

NG → **CHECK AND REPLACE FUEL PUMP, PRESSURE REGULATOR, FUEL PIPE LINE AND FILTER**

OK

16	READ VALUE OF INTELLIGENT TESTER (COOLANT TEMP)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(d) Read the COOLANT TEMP twice when the engine is both cold and warmed up.
Standard:
With cold engine: Same as ambient air temperature.
With warm engine: 75°C to 95°C (167°F to 203°F).

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

ES

17	READ VALUE OF INTELLIGENT TESTER (MAF)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF and COOLANT TEMP.
(d) Allow the engine to idle until the COOLANT TEMP reaches 75°C (167°F) or more.
(e) Read the MAF with the engine in an idling condition and at an engine speed of 2,500 rpm.
Standard:
MAF while engine idling: Between 1.4 g/sec. and 2.3 g/sec. (shift position: N; A/C: OFF).
MAF at engine speed of 2,500 rpm: 5.4 g/sec. to 7.9 g/sec. (shift position: N; A/C: OFF).

NG → **REPLACE MASS AIR FLOW METER**

OK

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)

DTC	P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)

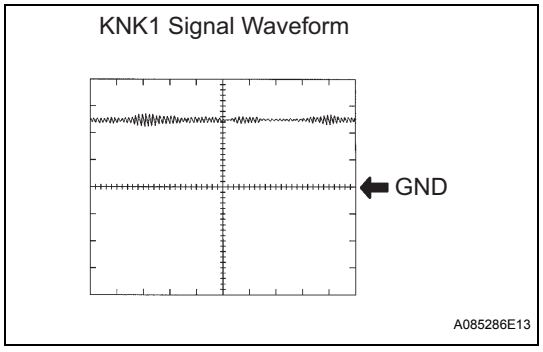
DESCRIPTION

A flat type knock sensor (non-resonant type) has a structure that can detect vibrations between approximately 6 kHz and 15 kHz.
Knock sensors are fitted onto the engine block to detect engine knocking.
The knock sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The voltage is generated when the engine block vibrates due to knocking. Any occurrence of engine knocking can be suppressed by delaying the ignition timing.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0327	Output voltage of knock sensor 0.5 V or less (1 trip detection logic)	• Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of knock sensor 4.5 V or more (1 trip detection logic)	• Open in knock sensor circuit • Knock sensor • ECM

HINT:
When any of DTCs P0327 and P0328 are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the ignition switch is turned OFF.



Reference: Inspection using an oscilloscope.
The correct waveform is as shown.

Items	Contents
Terminals	KNK1 - EKNK
Equipment Settings	0.01 to 10 V/DIV., 0.01 to 10 msec./DIV.
Conditions	keep engine speed at 4,000 rpm with warm engine

MONITOR DESCRIPTION

If the output voltage transmitted by the knock sensor remains low or high for more than 1 second, the ECM interprets this as a malfunction in the sensor circuit, and sets a DTC.
The monitor for DTCs P0327 and P0328 begins to run when 5 seconds have elapsed since the engine was started.
If the malfunction is not repaired successfully, either DTC P0327 or P0328 is set 5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0327: Knock sensor range check (low voltage) P0328: Knock sensor range check (high voltage)
Required Sensors/Components (Main)	Knock sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Battery voltage	10.5 V or more
Starter	OFF
Engine	Running

TYPICAL MALFUNCTION THRESHOLDS

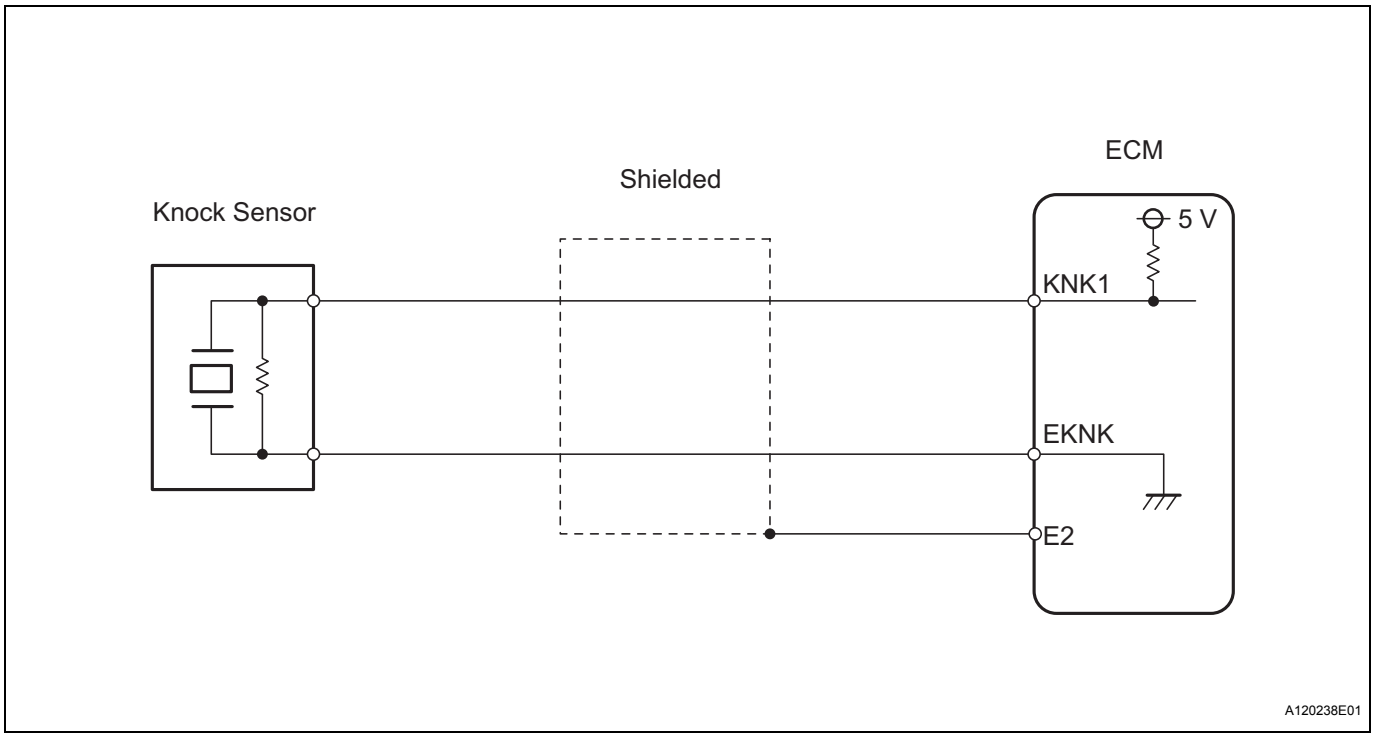
Knock Sensor Range Check (Low voltage) P0327:

Knock sensor voltage	Less than 0.5 V

Knock Sensor Range Check (High voltage) P0328:

Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM

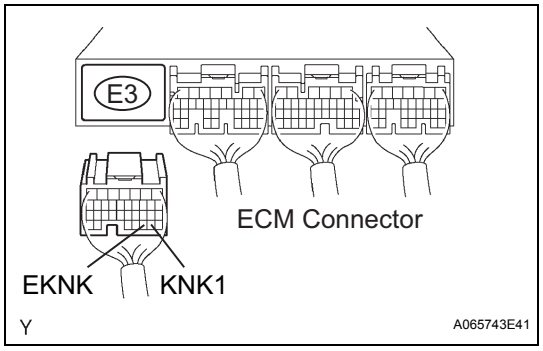


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK WIRE HARNESS (ECM - KNOCK SENSOR)



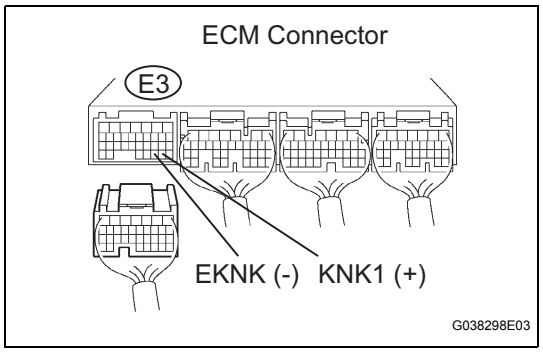
(a) Disconnect the E3 ECM connector.
(b) Measure the resistance of the ECM connector.
Standard resistance

Tester Connection	Specified Condition
KNK1 (E3-29) - EKNK (E3-30)	120 to 280 kΩat 20°C (68°F)

NG → **Go to step 3**

OK

2 INSPECT ECM (KNK1 VOLTAGE)



(a) Disconnect the E3 ECM connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM connector.
Standard voltage

Tester Connection	Specified Condition
KNK1 (E3-29) - EKNK (E3-30)	4.5 to 5.5 V

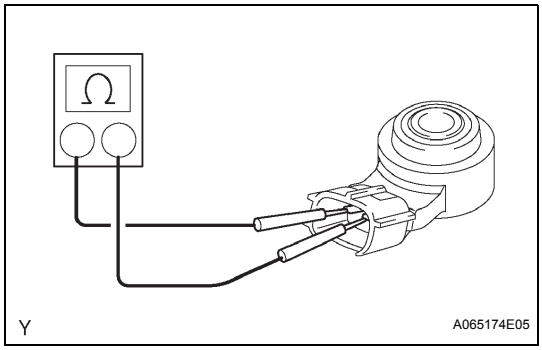
NOTICE:
Fault may be intermittent. Check the wire harness and connectors carefully.

NG → **REPLACE ECM**

OK

CHECK FOR INTERMITTENT PROBLEMS

3	INSPECT KNOCK SENSOR



(a) Remove the knock sensor (see page ES-357).
(b) Measure the resistance of the sensor.
Standard resistance

Tester Connection	Specified Condition
KNK1 (K1-2) - EKNK (K1-1)	120 to 280 kΩ at 20°C (68°F)

NG → **REPLACE KNOCK SENSOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

ES

DTC	P0335	Crankshaft Position Sensor "A" Circuit

DTC	P0339	Crankshaft Position Sensor "A" Circuit Intermittent

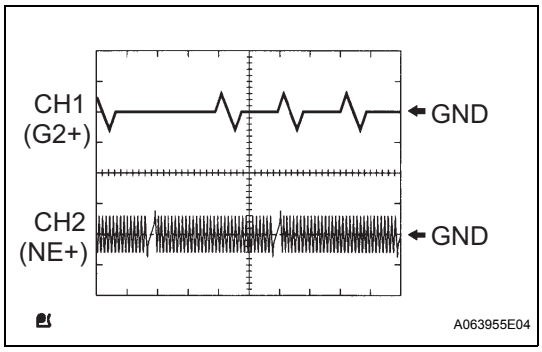
DESCRIPTION

The Crankshaft Position (CKP) sensor system consists of a CKP sensor plate and a pickup coil. The sensor plate has 34 teeth and is installed on the crankshaft. The pickup coil is made of an iron core and a magnet. The sensor plate rotates and, as each tooth passes through the pickup coil, a pulse signal is created. The pickup coil generates 34 signals per engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0335	• No Crankshaft Position (CKP) sensor signal to ECM while cranking (2 trip detection logic) • No CKP sensor signal to ECM at engine speed of 600 rpm or more (2 trip detection logic)	• Open or short in Crankshaft Position (CKP) sensor circuit • CKP sensor • Crankshaft (sensor plate) • ECM
P0339	Under conditions (a), (b) and (c), no CKP sensor signal to ECM for 0.05 seconds or more (1 trip detection logic): (a) Engine speed 1,000 rpm or more (b) Starter signal OFF (c) 3 seconds or more has lapsed since starter signal switched from ON to OFF	• Open or short in CKP sensor circuit • CKP sensor • Crankshaft (sensor plate) • ECM

Reference: Inspection using an oscilloscope.



HINT:

- The correct waveform is as shown in the illustration.
- G2+ stands for the Camshaft Position (CMP) sensor signal, and NE+ stands for the CKP sensor signal.

Items	Contents
Terminals	CH1: G2+ - NE- CH2: NE+ - NE-
Equipment Settings	5V/DIV., 20ms/DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION

If there is no signal from the CKP sensor despite the engine revolving, the ECM interprets this as a malfunction of the sensor.
If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0335: Crankshaft position sensor range check during cranking P0335: Crankshaft position sensor range check during engine running
Required sensors/components (Main)	Crankshaft Position (CKP) sensor
Required sensors/components (Related)	-
Frequency of operation	Continuous
Duration	4.7 seconds: CKP sensor range check during cranking 0.5 seconds: CKP sensor range check during engine running
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

Crankshaft Position Sensor Range Check during Cranking P0335:

Starter	ON
Minimum battery voltage while starter ON	Less than 11 V

Crankshaft Position Sensor Range Check during Engine Running P0335:

Engine speed	600 rpm or more
Starter	OFF
Time after starter from ON to OFF	3 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

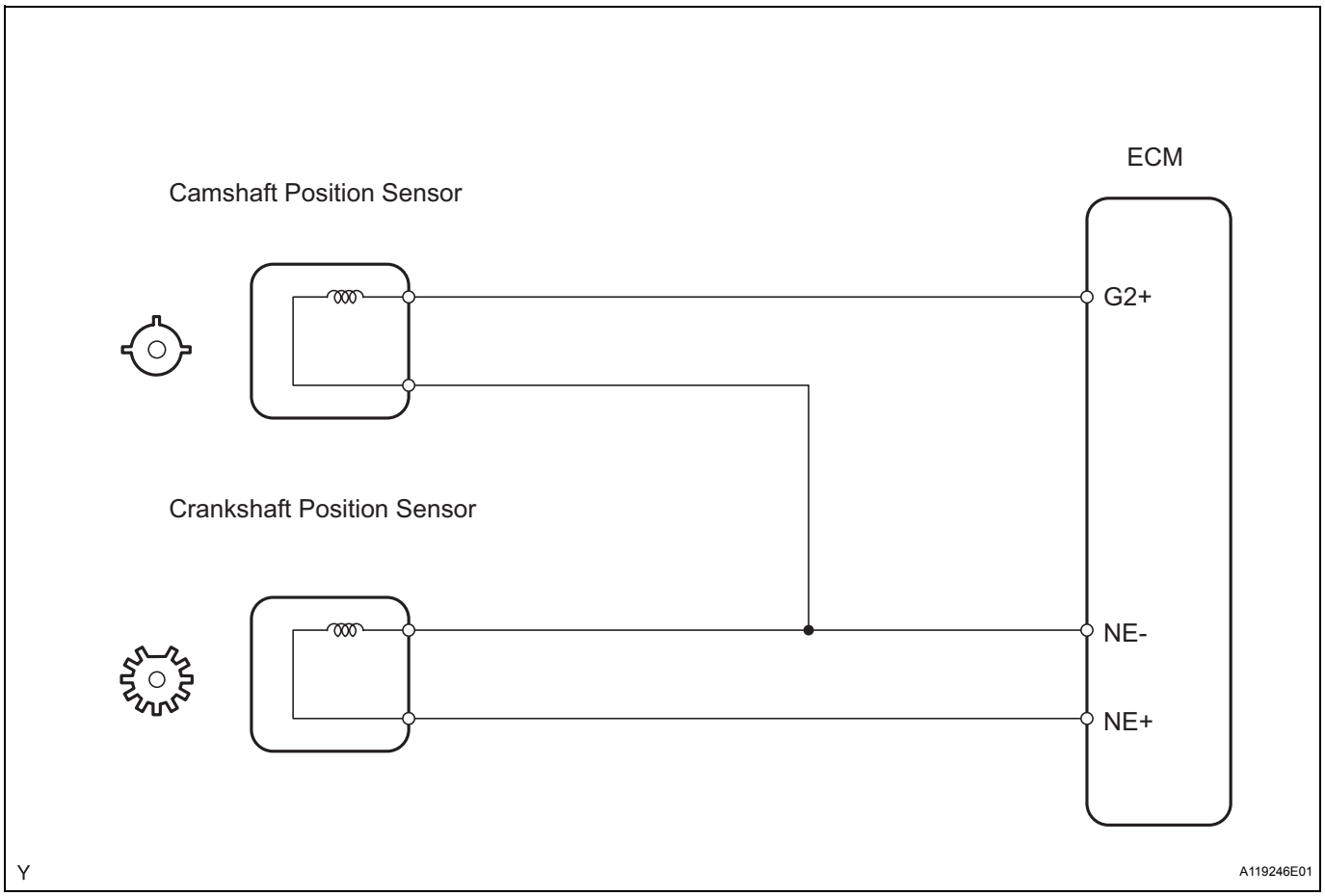
P0335, P0339:

CKP signal during cranking	No signal for 0.5 seconds
CKP signal during engine running	No signal for 4.7 seconds

COMPONENT OPERATING RANGE

CKP sensor	• CKP sensor output voltage fluctuates while crankshaft revolving • 34 CKP sensor signals per crankshaft revolution

WIRING DIAGRAM

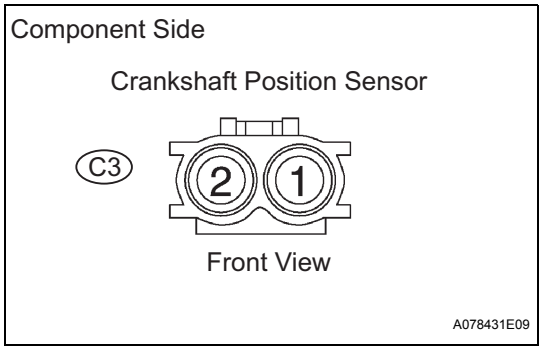


INSPECTION PROCEDURE

HINT:

- If no problem is found by this diagnostic troubleshooting procedure, troubleshoot the engine mechanical systems.
- Check the engine speed. The engine speed can be checked by using the intelligent tester. To check, follow the operation below:
  (a) Connect the intelligent tester to the DLC3.
  (b) Start the engine.
  (c) Turn the tester ON.
  (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.
  The engine speed may be indicated as zero despite the engine revolving normally. This is caused by a lack of NE signals from the Crankshaft Position (CKP) sensor. Alternatively, the engine speed may be indicated as lower than the actual engine speed if the CKP sensor voltage output is insufficient.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT CRANKSHAFT POSITION SENSOR (RESISTANCE)



(a) Disconnect the C3 Crankshaft Position (CKP) sensor connector.
(b) Measure the resistance between terminals 1 and 2.
Standard resistance

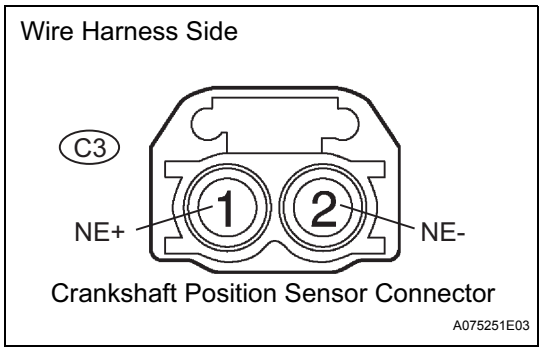
Tester Connection	Specified Condition
1 - 2	985 to 1,600 Ω at cold
1 - 2	1,265 to 1,890 Ω at hot

HINT:
The terms cold and hot refer to the temperature of the sensor. Cold means approximately -10 to 50°C (14 to 122°F). Hot means approximately 50 to 100°C (122 to 212°F).

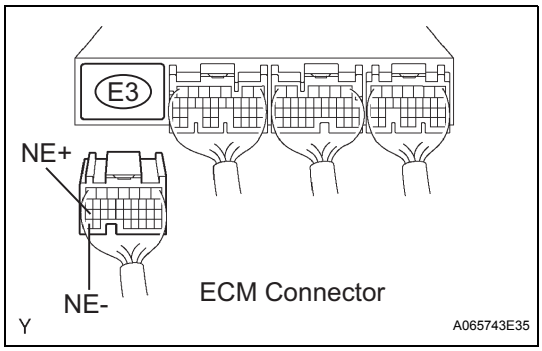
NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

2	CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C3 CKP sensor connector.



(b) Disconnect the E3 ECM connector.
(c) Measure the resistance of the harness and connectors.
Standard resistance (Check for open)

Tester connection	Specified Condition
NE+ (C3-1) - NE+ (E3-27)	Below 1 Ω
NE- (C3-2) - NE- (E3-34)	Below 1 Ω

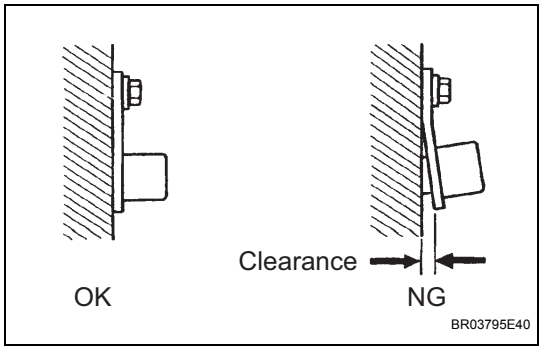
Standard resistance (Check for short)

Tester connection	Specified Condition
NE+ (C3-1) or NE+ (E3-27) - Body ground	10 kΩ or higher
NE- (C3-2) or NE- (E3-34) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK SENSOR INSTALLATION (CRANKSHAFT POSITION SENSOR)



(a) Check the CKP sensor installation.
OK:
Sensor is installed correctly.

NG → **SECURELY REINSTALL SENSOR**

OK

4	CHECK CRANKSHAFT (TEETH OF SENSOR PLATE)

(a) Check the teeth of the sensor plate.
OK:
Sensor plate teeth do not have any cracks or deformation.

NG → **REPLACE CRANKSHAFT**

OK

REPLACE ECM

ES

DTC	P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)

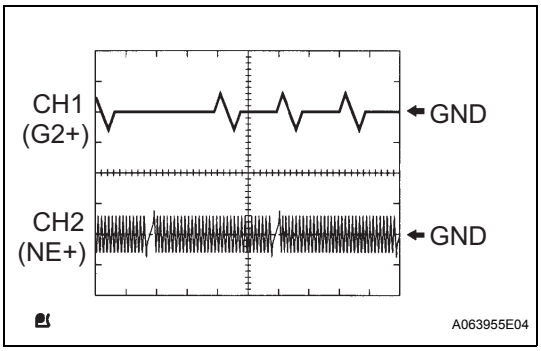
DESCRIPTION

The Camshaft Position (CMP) sensor consists of a magnet and an iron core which is wrapped with copper wire, and is installed on the cylinder head. When the camshaft rotates, each of the 3 teeth on the camshaft pass through the CMP sensor. This activates the internal magnet in the sensor, generating a voltage in the copper wire. The camshaft rotation is synchronized with the crankshaft rotation. When the crankshaft turns twice, the voltage is generated 3 times in the CMP sensor. The generated voltage in the sensor acts as a signal, allowing the ECM to locate the camshaft position. This signal is then used to control ignition timing, fuel injection timing, and the VVT system.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0340	Case 1 Either of following conditions is met: • Crankshaft position/Camshaft position misalignment • No CMP sensor signal to ECM at engine speed of 600 rpm or more (1 trip detection logic) Case 2 • No CMP sensor signal to ECM while cranking (2 trip detection logic)	• Open or short in CMP sensor circuit • CMP sensor • Camshaft • Timing chain has jumped tooth • ECM

HINT:
DTC P0340 indicates a malfunction relating to the CMP sensor (+) circuit (the wire harness between the ECM and CMP sensor, and the CMP sensor itself).
Reference: Inspection using an oscilloscope.



HINT:
- The correct waveform is as shown in the illustration.
- G2+ stands for the CMP sensor signal, and NE+ stands for the Crankshaft Position (CKP) sensor signal.

Items	Contents
Terminals	CH1: G2+ - NE- CH2: NE+ - NE-
Equipment Settings	5V/DIV., 20msec./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION

If no signal is transmitted by the CMP sensor despite the engine revolving, or the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.
If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0340: Camshaft position sensor range check P0340: Camshaft position/crankshaft position misalignment
Required sensors / components (Main)	Camshaft Position (CMP) sensor
Required sensors / components (Related)	Crankshaft Position (CKP) sensor
Frequency of operation	Continuous
Duration	5 seconds
MIL operation	2 driving cycles: CMP sensor range check Immediate: Camshaft position/crankshaft position misalignment
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

Camshaft Position Sensor Range Check P0340:

Starter	ON
Minimal battery voltage while starter ON	11 V

Camshaft Position/Crankshaft Position Misalignment P0340:

Engine speed	600 rpm or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Camshaft Position Sensor Range Check P0340:

CMP sensor signal	No signal

Camshaft Position/Crankshaft Position Misalignment P0340:

Camshaft position and crankshaft position phase	Misaligned

COMPONENT OPERATING RANGE

CMP sensor	• CMP sensor output voltage fluctuates while camshaft revolving • 3 CMP sensor signals per 2 crankshaft revolutions

WIRING DIAGRAM

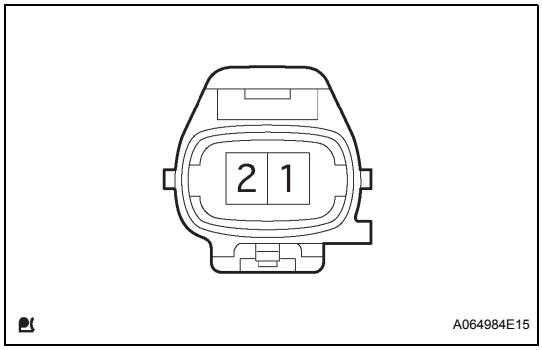
Refer to DTC P0335 (see page ES-177).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT CAMSHAFT POSITION SENSOR (RESISTANCE)



(a) Disconnect the C1 Camshaft Position (CMP) sensor connector.
(b) Measure the resistance between terminals 1 and 2.
Standard resistance

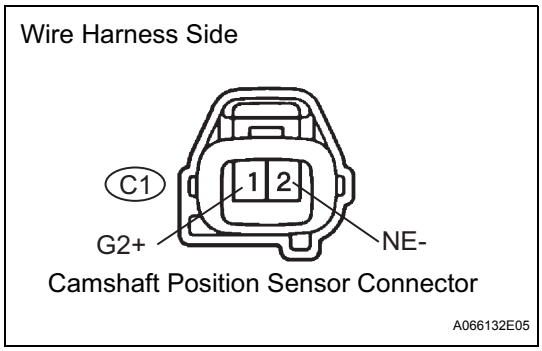
Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
1 - 2	2,065 to 3,225 Ω at hot

HINT:
The terms cold and hot refer to the temperature of the sensor. Cold means approximately -10 to 50°C (14 to 122°F). Hot means approximately 50 to 100°C (122 to 212°F).

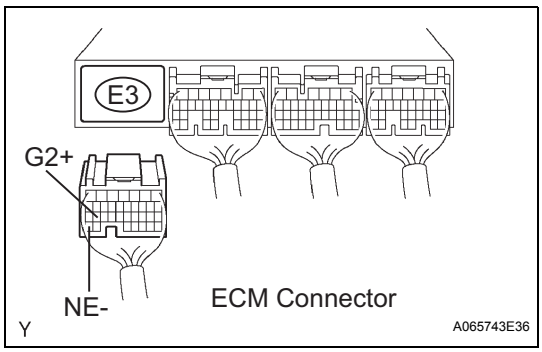
NG → **REPLACE CAMSHAFT POSITION SENSOR**

OK

2	CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C1 CMP sensor connector.



(b) Disconnect the E3 ECM connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
G2+ (C1-1) - G2+ (E3-26)	Below 1 Ω
NE- (C1-2) - NE- (E3-34)	Below 1 Ω

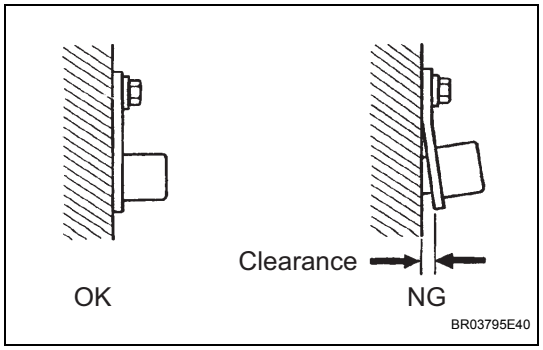
Standard resistance (Check for short)

Tester Connection	Specified Condition
G2+ (C1-1) or G2+ (E3-26) - Body ground	10 kΩ or higher
NE- (C1-2) or NE- (E3-34) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK SENSOR INSTALLATION (CAMSHAFT POSITION SENSOR)



(a) Check the CMP sensor installation.
OK:
Sensor is installed correctly.

NG → **SECURELY REINSTALL SENSOR**

OK

4	CHECK CAMSHAFT (TEETH OF PLATE)

(a) Check the teeth of the camshaft.
OK:
Camshaft teeth do not have any cracks or deformation.

NG → **REPLACE CAMSHAFT**

OK

REPLACE ECM

ES

DTC	P0351	Ignition Coil "A" Primary / Secondary Circuit

DTC	P0352	Ignition Coil "B" Primary / Secondary Circuit

DTC	P0353	Ignition Coil "C" Primary / Secondary Circuit

DTC	P0354	Ignition Coil "D" Primary / Secondary Circuit

DESCRIPTION

HINT:

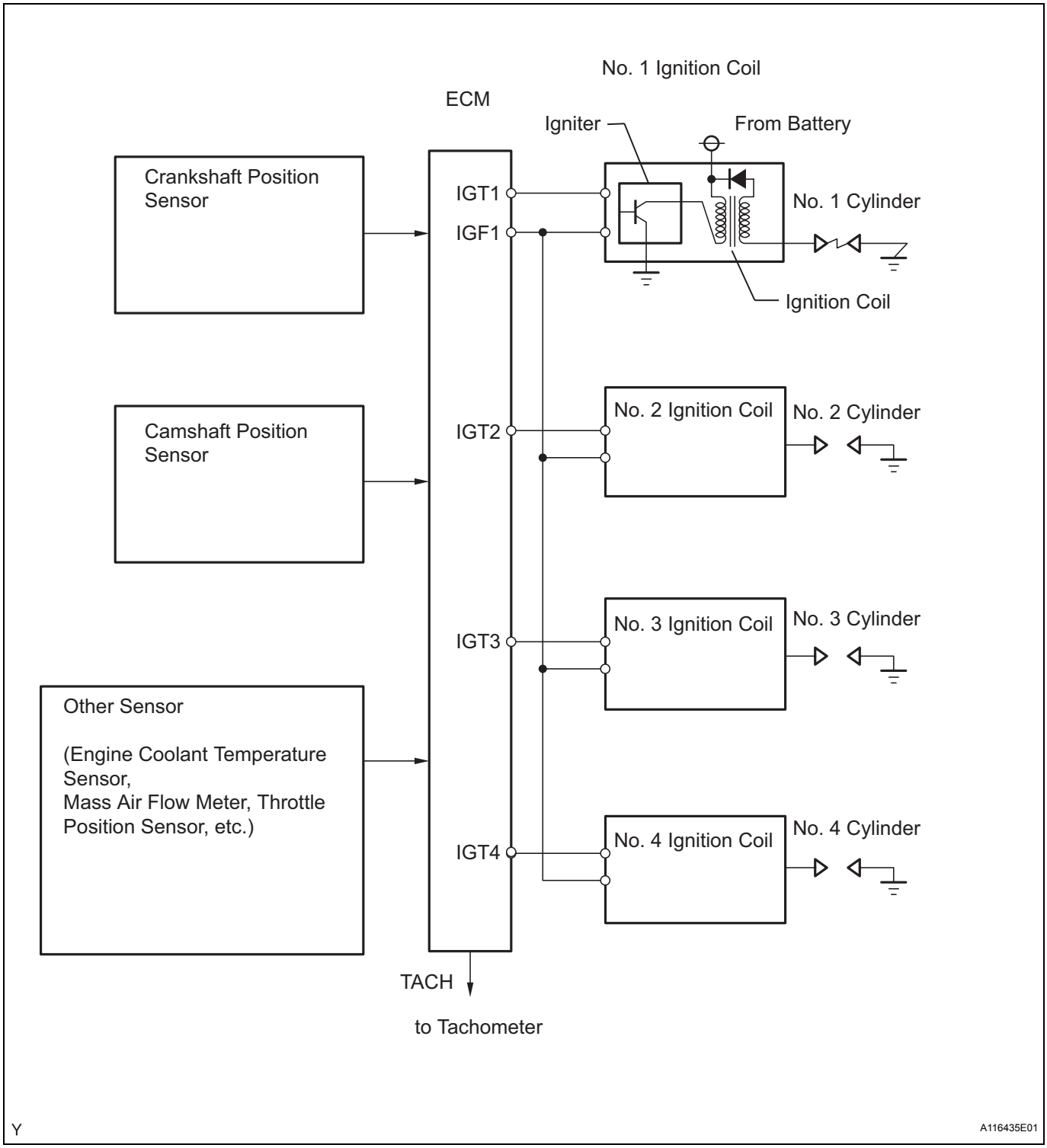
ES

- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check No. 1 ignition coil circuit.
- If DTC P0352 is set, check No. 2 ignition coil circuit.
- If DTC P0353 is set, check No. 3 ignition coil circuit.
- If DTC P0354 is set, check No. 4 ignition coil circuit.

A Direct Ignition System (DIS) is used on this vehicle.

The DIS is a 1-cylinder ignition system in which each cylinder is ignited by 1 ignition coil, and 1 spark plug is connected to the end of each secondary wiring. A powerful voltage, generated in the secondary wiring, is applied directly to each spark plug. The sparks of the spark plugs pass from the center electrodes to the ground electrodes.

The ECM determines the ignition timing and transmits the ignition (IGT) signals to each cylinder. Using the IGT signal, the ECM turns the power transistor inside the igniter on and off. The power transistor, in turn, switches on and off the current to the primary coil. When the current to the primary coil is cut off, a powerful voltage is generated in the secondary coil. This voltage is applied to the spark plugs, causing them to spark inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back an ignition confirmation (IGF1) signal to the ECM, for each cylinder ignition.



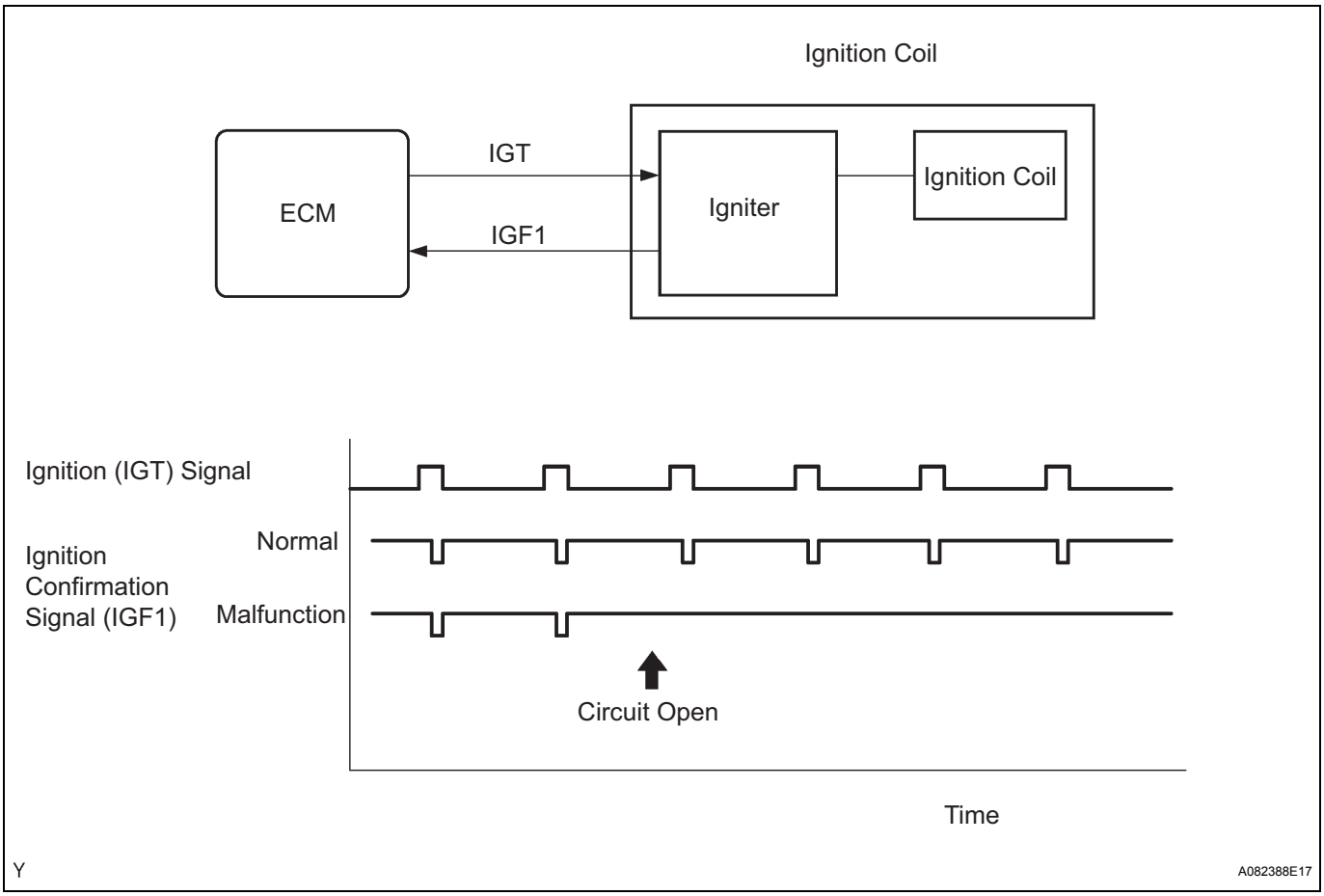
DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354	No IGF1 signal to ECM while engine is running (1 trip detection logic)	• Ignition system • Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil and ECM • No. 1 to No. 4 ignition coil • ECM

Reference: Inspection using an oscilloscope.

While cranking or idling, check the waveform between terminals IGT (1 to 4) and E1, and IGF1 and E1 of the E3 and E4 ECM connectors.

Item	Content
Terminals	CH1: IGT1, IGT2, IGT3, IGT4 - E1 CH2: IGF1 - E1
Equipment Settings	2 V/DIV., 20 msec./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION



If the ECM does not receive any IGF1 signals despite transmitting the IGT signal, it interprets this as a fault in the igniter and sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 1 second after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0351: Igniter (Cylinder 1) malfunction P0352: Igniter (Cylinder 2) malfunction P0353: Igniter (Cylinder 3) malfunction P0354: Igniter (Cylinder 4) malfunction
Required sensors / components (Main)	Igniter
Required sensors / components (Related)	Crankshaft position sensor
Frequency of operation	Continuous
Duration	0.256 seconds
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Either of following conditions met	-
Engine RPM	1,500 rpm or less
Starter	OFF

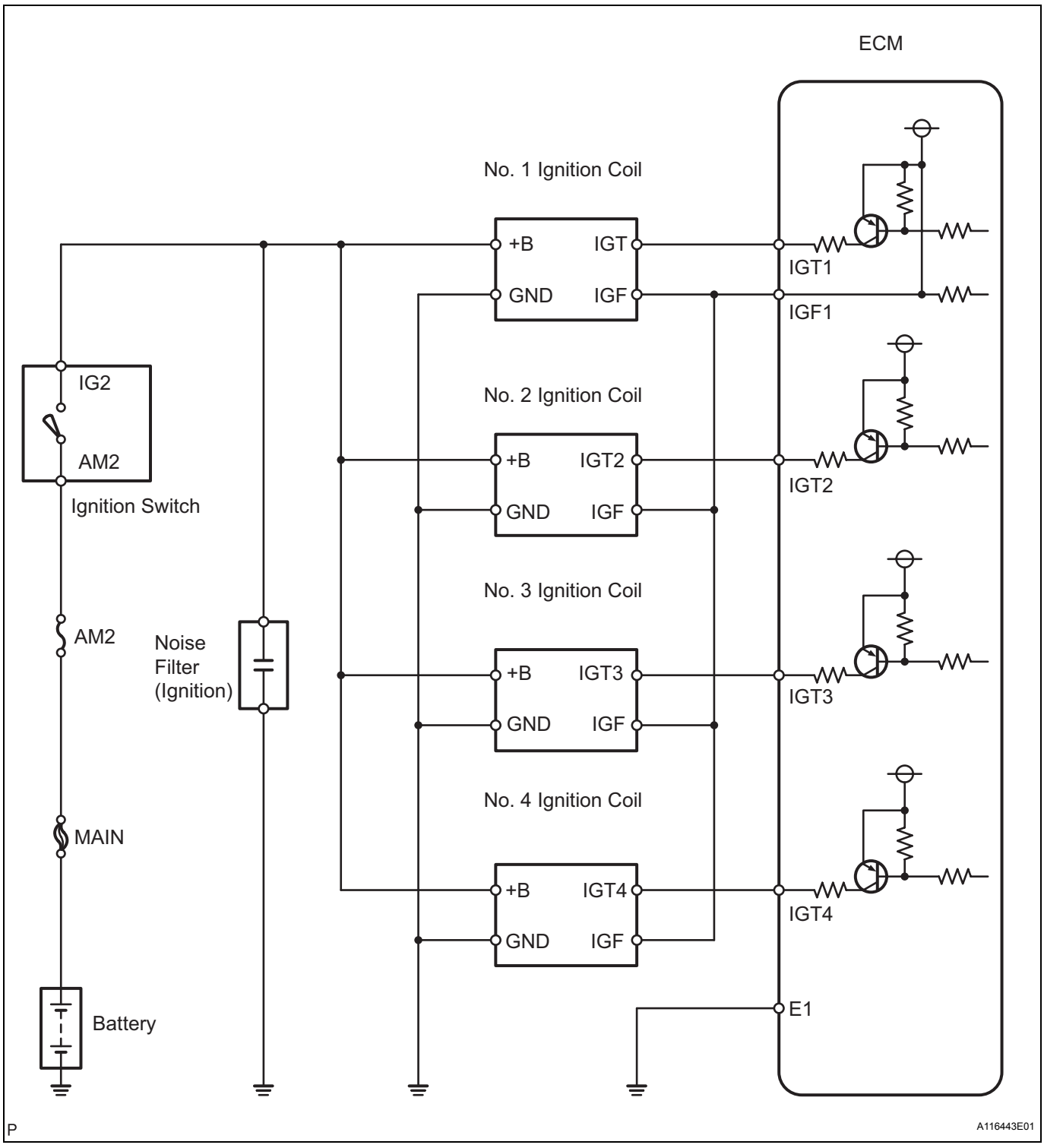
TYPICAL MALFUNCTION THRESHOLDS

IGF1 signal	ECM does not receive any IGF1 signal despite ECM sending IGT signal to igniter

COMPONENT OPERATING RANGE

IGF1 signal	Igniter transmits IGF1 signal when it receives IGT signal from ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK WHETHER DTC OUTPUT RECURS (DTC P0351, P0352, P0353 OR P0354)

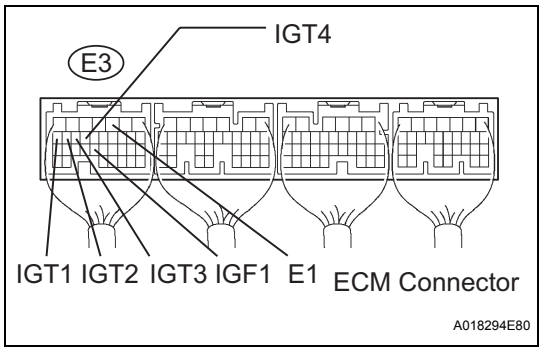
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Clear DTCs (see page ES-36).
(d) Shuffle arrangement of the ignition coils (among No. 1 to No. 4 cylinders).
NOTICE:
Do not shuffle the connectors.
(e) Perform a simulation test.
(f) Check DTCs displayed on the tester.
Result

Display (DTC Output)	Proceed to
P0351, P0352, P0353 or P0354	A
Other ignition coil DTC output	B

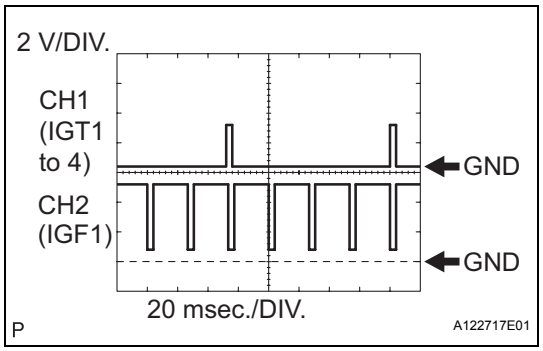
B → REPLACE IGNITION COIL

A

2	INSPECT ECM (IGT1, IGT2, IGT3, IGT4 AND IGF SIGNAL)



(a) Inspect the ECM using an oscilloscope.



(b) While cranking or idling, check the waveform between the terminals of the E3 and E4 ECM connectors.
Standard voltage

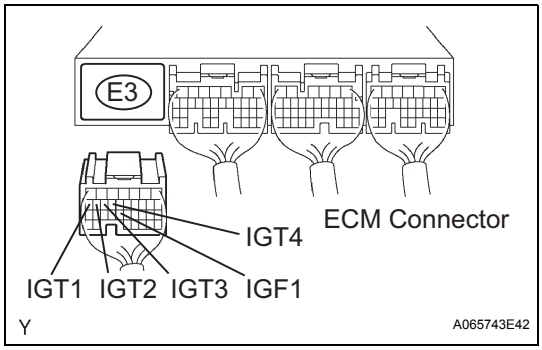
Tester Connection	Specified Condition
IGT1 (E3-17) - E1 (E3-3)	Correct waveform is as shown
IGT2 (E3-16) - E1 (E3-3)	Correct waveform is as shown
IGT3 (E3-15) - E1 (E3-3)	Correct waveform is as shown
IGT4 (E3-14) - E1 (E3-3)	Correct waveform is as shown
IGF1 (E3-23) - E1 (E3-3)	Correct waveform is as shown

OK → REPLACE ECM

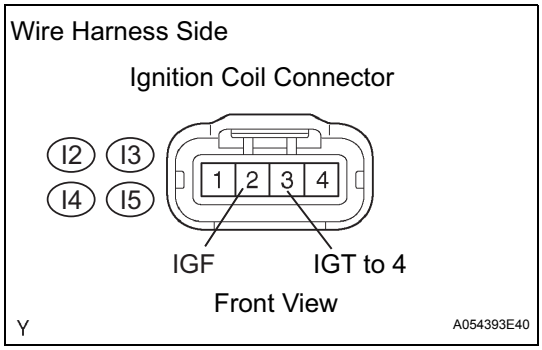
NG

3	CHECK HARNESS AND CONNECTOR (IGNITION COIL - ECM)

(a) Disconnect the I2, I3, I4 or I5 ignition coil connector.



(b) Disconnect the E3 ECM connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGF (I2-2) - IGF1 (E3-23)	Below 1 Ω
IGF (I3-2) - IGF1 (E3-23)	Below 1 Ω
IGF (I4-2) - IGF1 (E3-23)	Below 1 Ω
IGF (I5-2) - IGF1 (E3-23)	Below 1 Ω

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGT (I2-3) - IGT1 (E3-17)	Below 1 Ω
IGT2 (I3-3) - IGT2 (E3-16)	Below 1 Ω
IGT3 (I4-3) - IGT3 (E3-15)	Below 1 Ω
IGT4 (I5-3) - IGT4 (E3-14)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
IGF (I2-2) or IGF1 (E3-23) - Body ground	10 kΩ or higher
IGF (I3-2) or IGF1 (E3-23) - Body ground	10 kΩ or higher
IGF (I4-2) or IGF1 (E3-23) - Body ground	10 kΩ or higher
IGF (I5-2) or IGF1 (E3-23) - Body ground	10 kΩ or higher

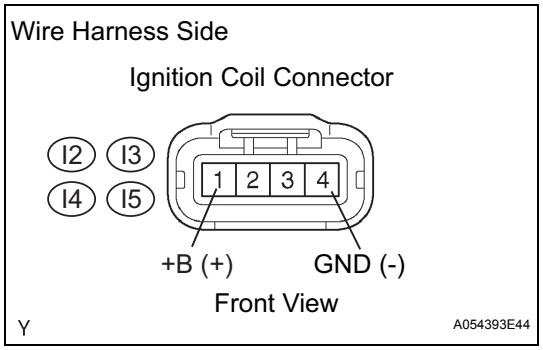
Standard resistance (Check for short)

Tester Connection	Specified Condition
IGT (I2-3) or IGT1 (E3-17) - Body ground	10 kΩ or higher
IGT2 (I3-3) or IGT2 (E3-16) - Body ground	10 kΩ or higher
IGT3 (I4-3) or IGT3 (E3-15) - Body ground	10 kΩ or higher
IGT4 (I5-3) or IGT4 (E3-14) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT IGNITION COIL (POWER SOURCE)



(a) Disconnect the I2, I3, I4 or I5 ignition coil connector.
(b) Measure the resistance of the ignition coil connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
GND (I2-4) - Body ground	Below 1 Ω
GND (I3-4) - Body ground	
GND (I4-4) - Body ground	
GND (I5-4) - Body ground	

(c) Turn the ignition switch ON.
(d) Measure the voltage between the terminals of the wire harness side connectors.
Standard voltage

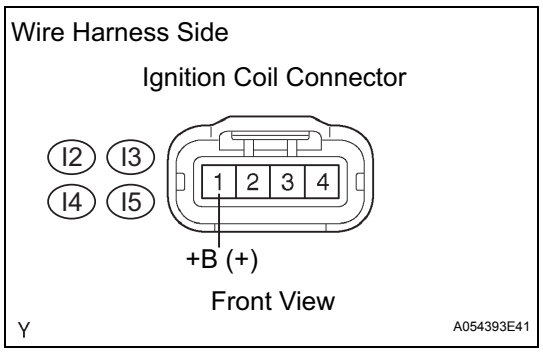
Tester Connection	Specified Condition
+B (I2-1) - GND (I2-4)	9 to 14 V
+B (I3-1) - GND (I3-4)	9 to 14 V
+B (I4-1) - GND (I4-4)	9 to 14 V
+B (I5-1) - GND (I5-4)	9 to 14 V

NG → **Go to step 5**

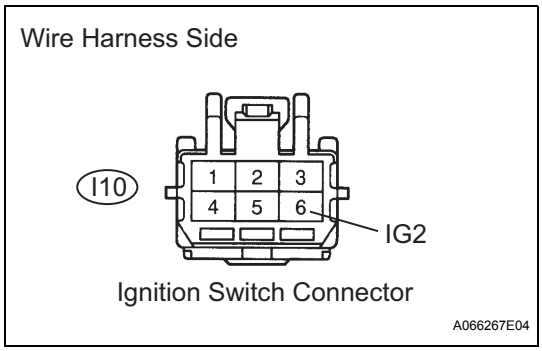
OK ↓

REPLACE IGNITION COIL

5 CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - IGNITION SWITCH)



(a) Disconnect the I2, I3, I4 or I5 ignition coil connector.



(b) Disconnect the I10 ignition switch connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (I2-1) - IG2 (I10-6)	Below 1 Ω
+B (I3-1) - IG2 (I10-6)	Below 1 Ω
+B (I4-1) - IG2 (I10-6)	Below 1 Ω
+B (I5-1) - IG2 (I10-6)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
+B (I2-1) or IG2 (I10-6) - Body ground	10 kΩ or higher
+B (I3-1) or IG2 (I10-6) - Body ground	10 kΩ or higher
+B (I4-1) or IG2 (I10-6) - Body ground	10 kΩ or higher
+B (I5-1) or IG2 (I10-6) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE IGNITION COIL

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

MONITOR DESCRIPTION

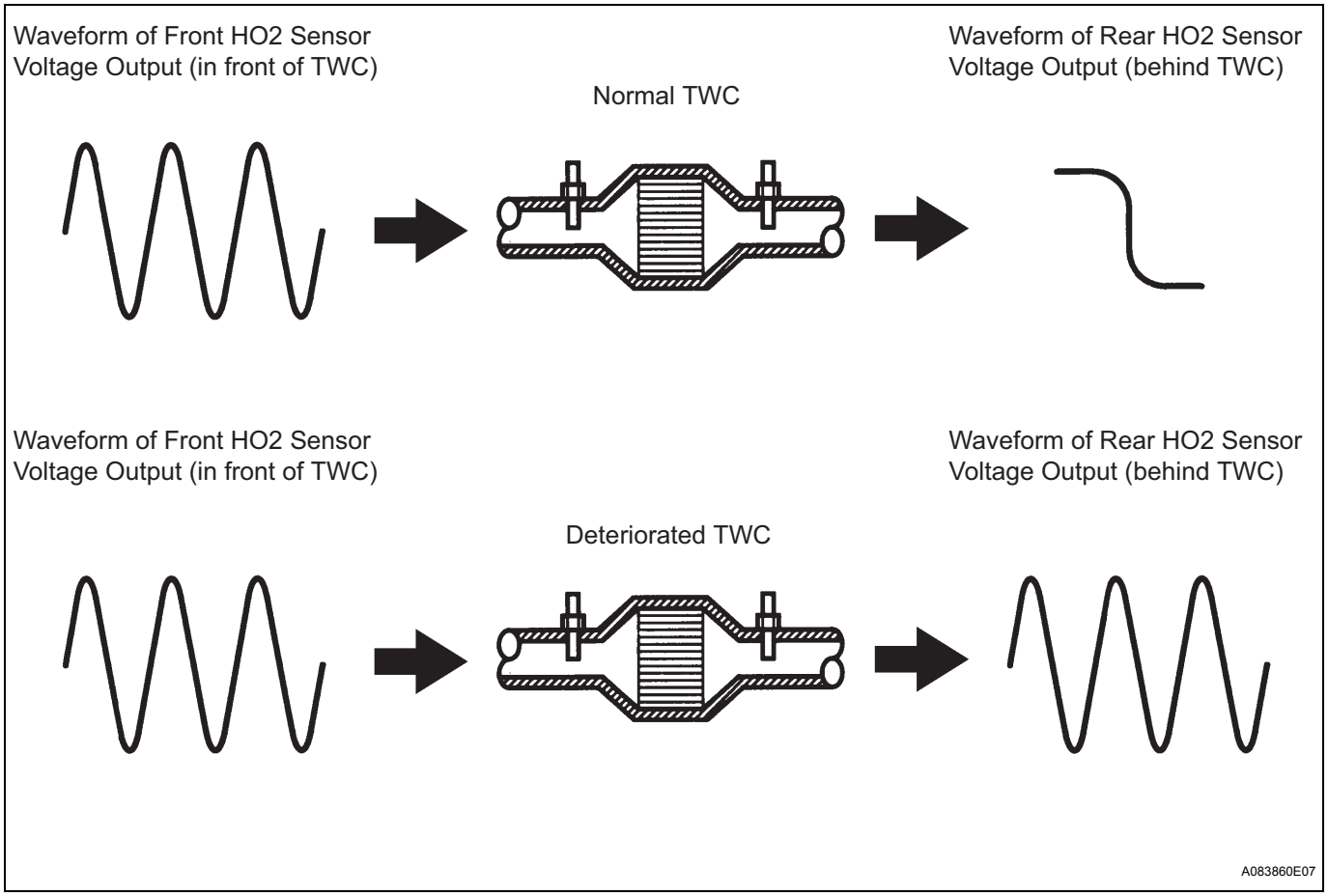
The ECM uses the 2 Heated Oxygen (HO2) sensors, mounted in front of and behind the Three-Way Catalytic Converter (TWC), to monitor its efficiency.

The first sensor, Sensor 1, sends pre-catalyst information to the ECM. The second sensor, Sensor 2, sends post-catalyst information to the ECM. The ECM compares the information transmitted by these 2 sensors to determine the efficiency of the TWC performance and its ability to store oxygen.

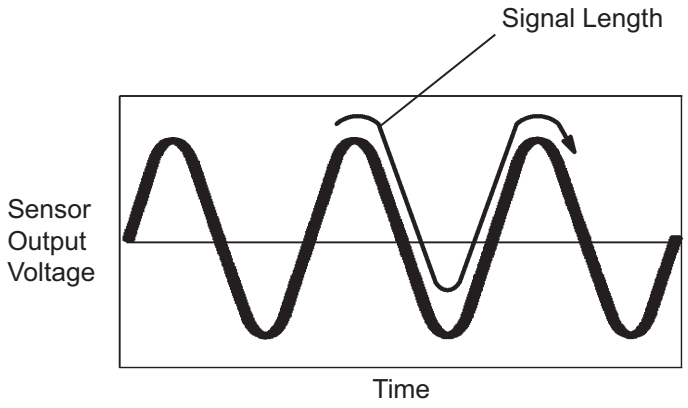
When the TWC is functioning properly, the variation in the oxygen concentration in the exhaust gas, after it has passed through the TWC, is small. In this condition, the voltage output of sensor 2 slowly alternates between the rich and lean signal voltages (shown in the illustration below). As the TWC performance efficiency deteriorates, its oxygen storage capacity decreases, and the variation in the oxygen concentration in the exhaust gas increases. As a result, the sensor voltage output fluctuates frequently. While the catalyst monitor is running, the ECM measures the signal lengths of both sensors 1 and 2, and calculates the ratio of the signal lengths to determine the extent of the TWC deterioration. If the deterioration level exceeds the preset threshold, the ECM interprets this as the TWC malfunction. The ECM then illuminates the MIL and sets the DTC.

This monitor begins to run when the following preconditions apply:

- The engine has warmed up (the engine coolant temperature is 75°C [167° F] or more).
- The vehicle has driven at between 60 km/h and 100 km/h (37 mph and 63 mph) for 15 minutes.



Heated Oxygen Sensor Signal Length



A082718E04

ES

DTC No.	DTC Detection Condition	Trouble Area
P0420	Under conditions (a) and (b), front and rear Heated Oxygen (HO2) sensor voltage output fluctuation amplitudes similar: (a) Engine and Three-Way Catalytic Converter (TWC) warmed up (b) Vehicle driven with vehicle and engine speeds within predetermined ranges	• Gas leakage from exhaust system • Heated Oxygen (HO2) sensor (bank 1 sensors 1, 2) • TWC

MONITOR STRATEGY

Related DTCs	P0420: Catalyst deterioration
Required Sensors/Components (Main)	TWC
Required Sensors/Components (Related)	HO2 sensor, Intake Air Temperature (IAT) sensor, Mass Air Flow (MAF) meter, Crankshaft Position (CKP) sensor, Engine Coolant Temperature (ECT) sensor
Frequency of Operation	Once per driving cycle
Duration	60 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever these DTCs not present	P0011 (VVT system 1 - advance) P0012 (VVT system - retard) P0031, P0032 (heated oxygen sensor 1) P0037, P0038 (heated oxygen sensor 2) P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0120 - P0123 (TP sensor) P0125 (insufficient ECT for closed loop) P0130 (heated oxygen sensor 1) P0134 (heated oxygen sensor 1) P0136 (heated oxygen sensor 2) P0171, P0712 (fuel system) P0300 - P0304 (misfire) P0335 (crankshaft position sensor) P0340 (camshaft position sensor) P0351 - P0354 (igniter) P0500 (VSS)
Accumulated time that following conditions met	20 seconds
Battery voltage	11 V or more
IAT	-10°C (14°F) or more
Idle	OFF

MAF	8 to 25 g/sec.
Engine RPM	Less than 4,500 rpm
ECT	75°C (167°F) or more
Estimated TWC temperature	Up stream catalyst: 600 to 750°C (1,112 to 1,382°F) Down stream catalyst: 600 to 750°C (1,112 to 1,382°F)
Fuel system status	Closed loop

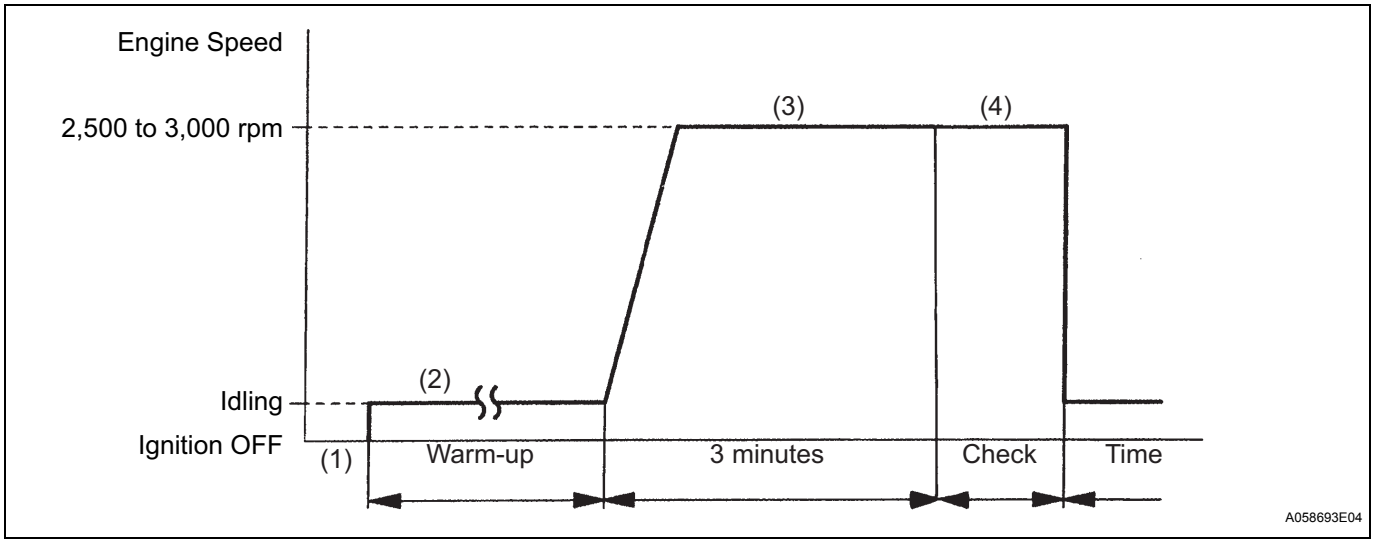
TYPICAL MALFUNCTION THRESHOLDS

Rear HO2 sensor locus length	0.5 V or more (varies with A/F sensor locus length)
Frequency of the monitor	2 times

MONITOR RESULT

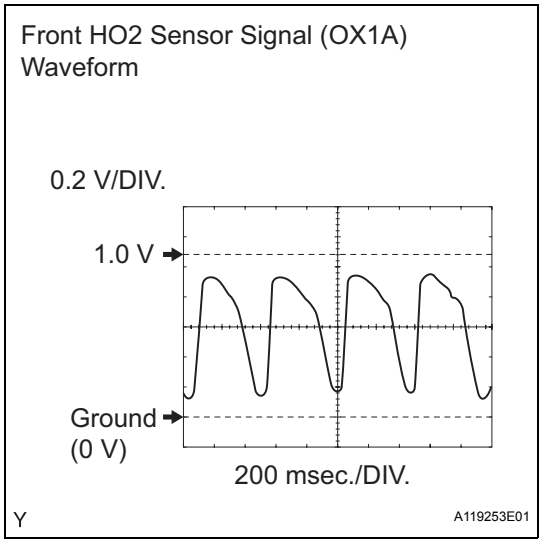
Refer to CHECKING MONITOR STATUS (see page ES-18).

CONFIRMATION DRIVING PATTERN



(1) If using the intelligent tester: Connect the intelligent tester to the DLC3.
(2) If not using the intelligent tester: Connect oscilloscope tester probes to terminals OX1A (front Heated Oxygen [HO2] sensor: Sensor 1), OX1B (rear HO2 sensor: Sensor 2) and E1 of the ECM connector.
(3) Start the engine.
(4) Warm up the engine with all the accessories switched OFF until the engine coolant temperature stabilizes.
(5) Run the engine at an engine speed between 2,500 rpm and 3,000 rpm for approximately 3 minutes.

(6) Check that the waveform of the OX1A (rear HO2 sensor) signal.



HINT:
If there is still a malfunction in the system, the waveform of OX1B may become similar to the OX1A waveform shown in the diagram above.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0420)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs (see page ES-47).

Result

Display (DTC Output)	Proceed to
P0420	A
P0420 and other DTCs	B

HINT:
If any DTCs other than P0420 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (A/F CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Start the engine.

(d) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(f) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(g) Monitor the voltage outputs of the HO2 sensors (O2S B1S1 and O2S B1S2) displayed on the tester.
HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
O2S B1S1 (Front HO2 Sensor)	+25%	Rich	More than 0.55
O2S B1S1 (Front HO2 Sensor)	-12.5%	Lean	Less than 0.4
O2S B1S2 (Rear HO2 Sensor)	+25%	Rich	More than 0.5
O2S B1S2 (Rear HO2 Sensor)	-12.5%	Lean	Less than 0.4

Status O2S B1S1	Status O2S B1S2	A/F Condition and HO2 Sensors (sensors 1 and 2) Condition	Misfires	Main Suspected Trouble Areas	Proceed to
Lean / Rich	Lean / Rich	Normal	-	• TWC • Gas leakage from exhaust system	A
Lean	Lean / Rich	HO2 sensor (sensor 1) malfunction	-	• HO2 sensor (sensor 1)	B
Rich	Lean / Rich	HO2 sensor (sensor 1) malfunction	-	• HO2 sensor (sensor 1)	B
Lean / Rich	Lean	HO2 sensor (sensor 2) malfunction	-	• HO2 sensor (sensor 2) • Gas leakage from exhaust system	C
Lean / Rich	Rich	HO2 sensor (sensor 2) malfunction	-	• HO2 sensor (sensor 2) • Gas leakage from exhaust system	C
Lean	Lean	Actual air-fuel ratio (A/F) lean	May occur	• Extremely rich or lean actual A/F • Gas leakage from exhaust system	A
Rich	Rich	Actual A/F rich	-	• Extremely rich or lean actual A/F • Gas leakage from exhaust system	A

Result:

Status O2S B1S1	Status O2S B1S2	A/F Condition and HO2 Sensors (sensors 1 and 2) Condition	Misfires	Main Suspected Trouble Areas	Proceed to
Lean / Rich	Lean / Rich	Normal	-	• TWC • Gas leakage from exhaust system	A
Lean	Lean / Rich	HO2 sensor (sensor 1) malfunction	-	• HO2 sensor (sensor 1)	B
Rich	Lean / Rich	HO2 sensor (sensor 1) malfunction	-	• HO2 sensor (sensor 1)	B

Status O2S B1S1	Status O2S B1S2	A/F Condition and HO2 Sensors (sensors 1 and 2) Condition	Misfires	Main Suspected Trouble Areas	Proceed to
Lean / Rich	Lean	HO2 sensor (sensor 2) malfunction	-	• HO2 sensor (sensor 2) • Gas leakage from exhaust system	C
Lean / Rich	Rich	HO2 sensor (sensor 2) malfunction	-	• HO2 sensor (sensor 2) • Gas leakage from exhaust system	C
Lean	Lean	Actual air-fuel ratio (A/F) lean	May occur	• Extremely rich or lean actual A/F • Gas leakage from exhaust system	A
Rich	Rich	Actual A/F rich	-	• Extremely rich or lean actual A/F • Gas leakage from exhaust system	A

ES

Lean: During A/F CONTROL, the HO2 sensor (sensors 1 and 2) output voltages are consistently less than 0.4 V.
Rich: During A/F CONTROL, the HO2 sensor (sensors 1 and 2) output voltages are consistently more than 0.50 to 0.55 V.

B → **CHECK AND REPLACE OXYGEN SENSOR (SENSOR 1)**

C → **CHECK AND REPLACE HEATED OXYGEN SENSOR (SENSOR 2), OR CHECK AND REPAIR EXHAUST GAS LEAKAGE**

A

3 CHECK FOR EXHAUST GAS LEAKAGE

OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

4 REPLACE THREE-WAY CATALYTIC CONVERTER (EXHAUST MANIFOLD)

NOTICE:
Replace both the front and rear catalysts (front exhaust pipe).

NEXT

END

DTC	P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow

DTC	P043F	Evaporative Emission System Reference Orifice High Flow

DTC SUMMARY

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timing	Detection Logic
P043E	Reference orifice clogged	P043E, P043F, P2401, P2402 and P2419 are present when one of the following conditions is met during key-off EVAP monitor: • EVAP pressure just after reference pressure measurement greater than -1 kPa-g (755 mmHg-a) • Reference pressure less than -4.85 kPa-g (726 mmHg-a) • Reference pressure greater than -1 kPa-g (755 mmHg-a) • Reference pressure is not saturated • Reference pressure difference between first and second is 0.7 kPa-g (5 mmHg-g) or more HINT: These values are typical	• Canister pump module (Reference orifice, leak detection pump, vent valve) • Connector/wire harness (Canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	Ignition switch OFF	2 trip

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timing	Detection Logic
P043F	Reference orifice high-flow	P043E, P043F, P2401, P2402 and P2419 are present when one of the following conditions is met during key-off EVAP monitor: • EVAP pressure just after reference pressure measurement greater than -1 kPa-g (755 mmHg-a) • Reference pressure less than -4.85 kPa-g (726 mmHg-a) • Reference pressure greater than -1 kPa-g (755 mmHg-a) • Reference pressure is not saturated • Reference pressure difference between first and second is 0.7 kPa-g (5 mmHg-g) or more HINT: These values are typical	• Canister pump module (Reference orifice, leak detection pump, vent valve) • Connector/wire harness (Canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	Ignition switch OFF	2 trip

ES

DESCRIPTION

The circuit description can be found in the Evaporative Emission (EVAP) system (see page ES-272).

INSPECTION PROCEDURE

Refer to the EVAP system (see page ES-272).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:

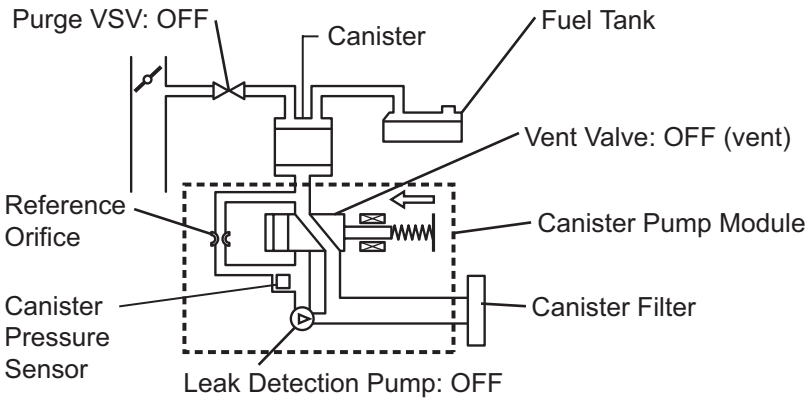
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned OFF, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned OFF, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch OFF.	-

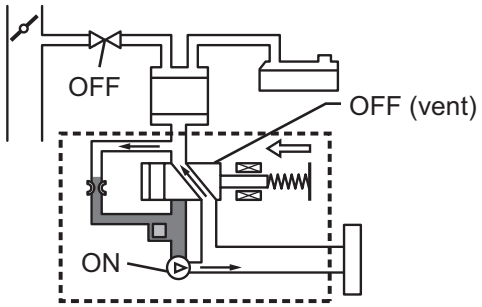
Sequence	Operations	Descriptions	Duration
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak criterion measurement	In order to determine 0.02 inch leak criterion, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 900 seconds, ECM cancels EVAP system monitor.	900 seconds*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak criterion measurement	After second 0.02 inch leak criterion measurement, leak check performed by comparing first and second 0.02 inch leak criterion. If stabilized system pressure higher than second 0.02 inch leak criterion, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

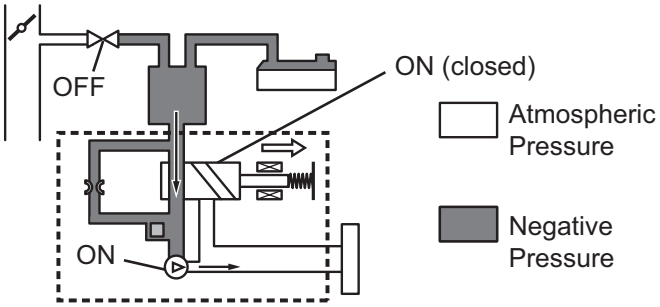
Operation A: Atmospheric Pressure Measurement



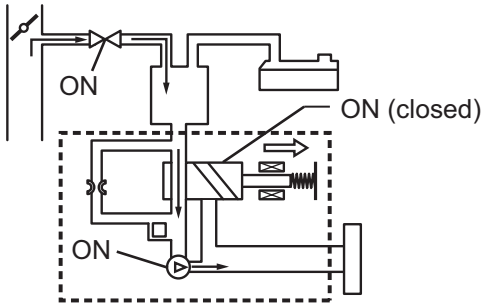
Operation B, E: 0.02 Inch Leak Criterion Measurement



Operation C: EVAP System Pressure Measurement



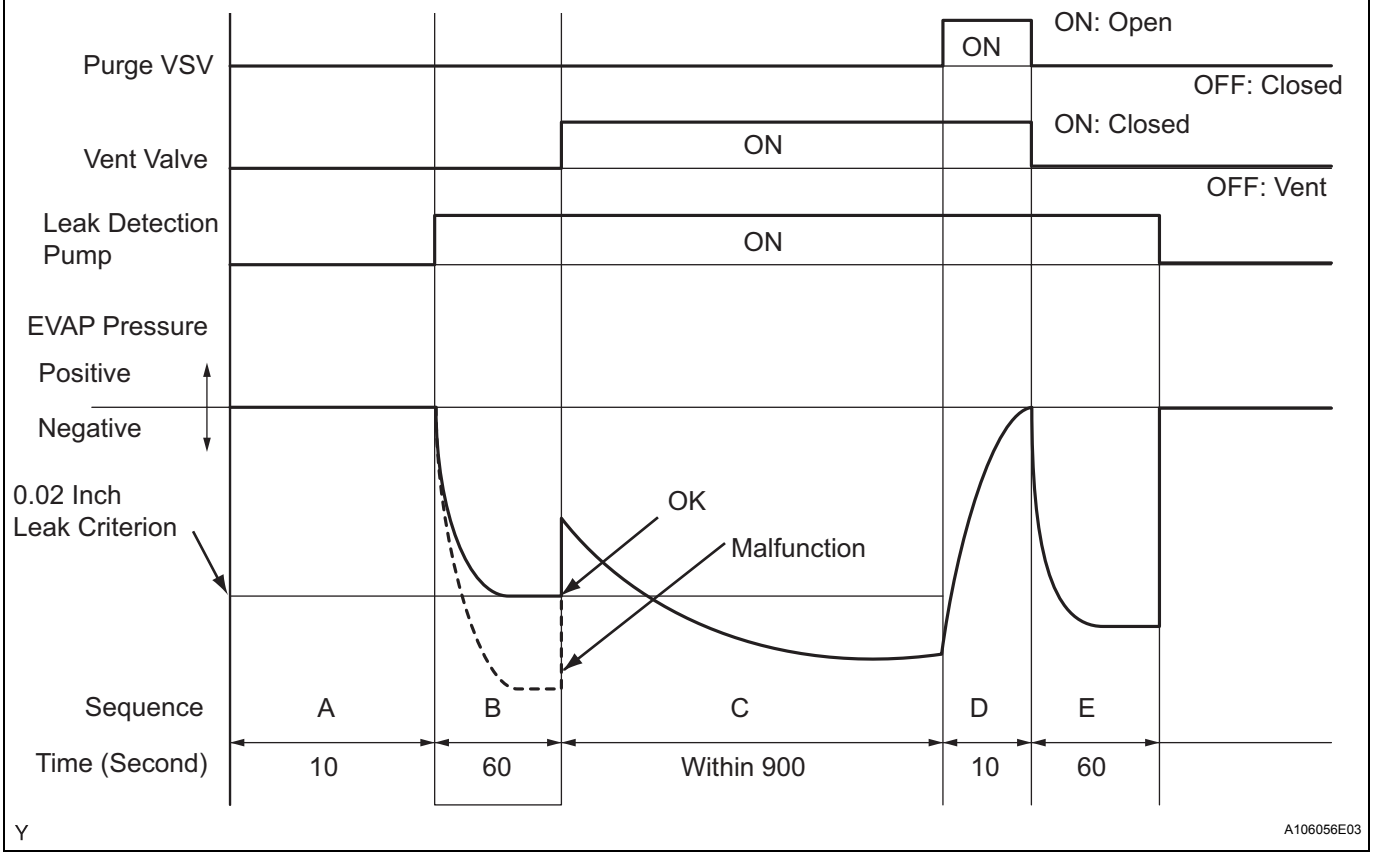
Operation D: Purge VSV Monitor



A122912E01

1. P043E: Reference orifice clogged
   In operation B, the leak detection pump creates negative pressure (vacuum) through the reference orifice. The EVAP system pressure is then measured by the ECM using the canister pressure sensor to determine the 0.02 inch leak criterion. If the pressure is lower than -4.85 kPa (-36.38 mmHg)*, the ECM interprets this as a clog malfunction in the reference orifice, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (2 trip detection logic).
   *: The threshold varies according to the atmospheric pressure measured in operation A. The value described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.

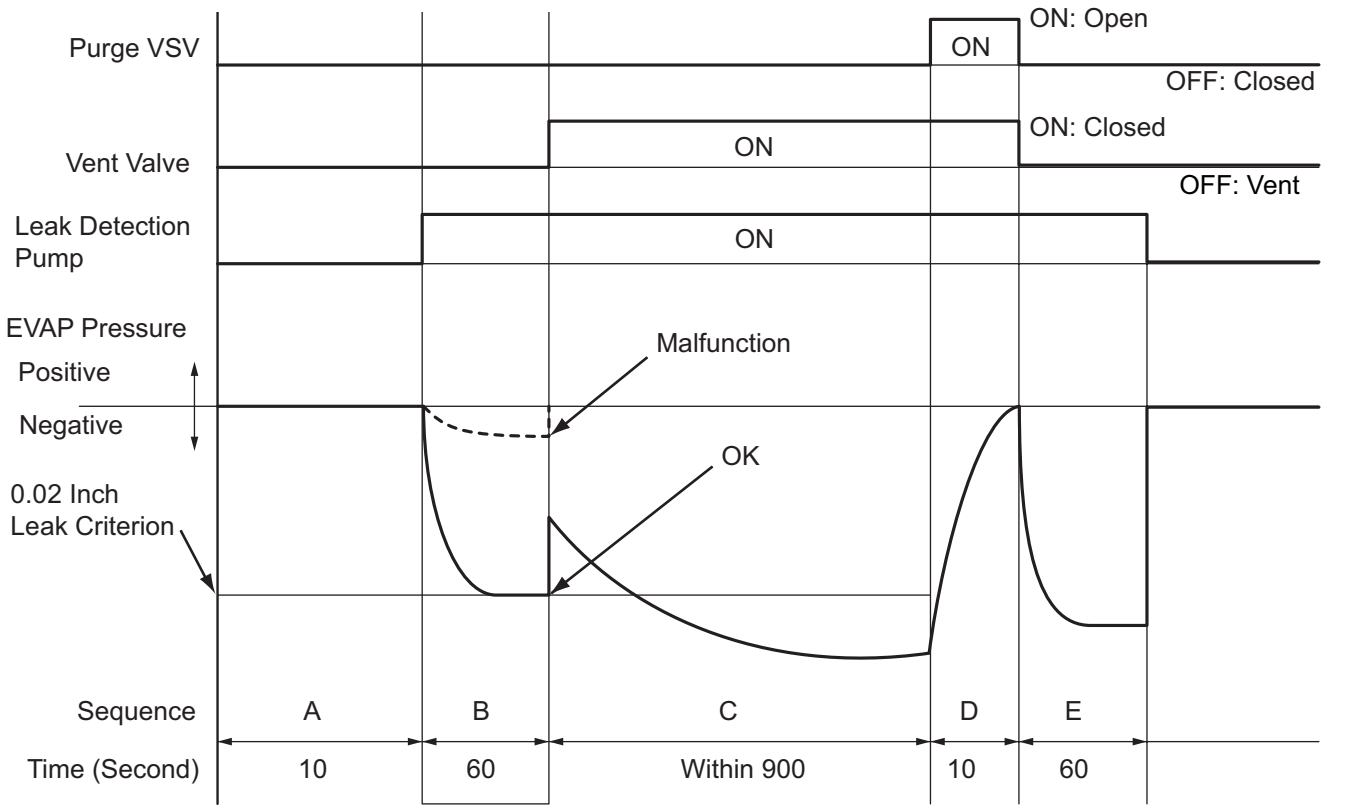
EVAP Pressure when Reference Orifice Clogged:



ES

2. P043F: Reference orifice high-flow
   In operation B, the leak detection pump creates negative pressure (vacuum) through the reference orifice. The EVAP system pressure is then measured by the ECM using the canister pressure sensor to determine the 0.02 inch leak criterion. If the pressure is lower than -1.06 kPa (-7.95 mmHg)*, the ECM interprets this as a high-flow malfunction in the reference orifice, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (2 trip detection logic).
   *: The threshold varies according to the atmospheric pressure measured in operation A. The value described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.

EVAP Pressure when Reference Orifice High-flow Malfunction:



MONITOR STRATEGY

Required Sensors/Components	Canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 900 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Enabling conditions of EVAP key-OFF monitor

P043E (Reference orifice - low flow) P043F (Reference orifice - high flow) P0441 (Purge VSV - stuck open) P0441 (Purge VSV - stuck closed) P0451 (Canister pressure sensor - noise) P0455 (EVAP gross leak) P0456 (EVAP 0.02 inch leak) P2401 (Leak detection pump - stuck OFF) P2402 (Leak detection pump - stuck ON) P2419 (Vent valve - stuck ON) P2420 (Vent valve - stuck OFF)	
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or higher
Vehicle speed	4 km/h (2.5 mph) or less
Ignition switch	OFF
Time after key off	5 or 7 or 9.5 hours
Canister pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions 1 and 2 are met before key off	-
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

ES

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met	-
Atmospheric pressure change	Within 0.3 kPa (2.25 mmHg) in 1 second

2. First reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement start	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction

Next sequence is run if the following condition is met	-
EVAP pressure	Saturated within 900 seconds

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated within 60 seconds
Reference pressure difference between first and second	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if the following condition is met	-
EVAP pressure when vacuum introduction is complete	Lower than second reference pressure

8. Atmospheric pressure measurement

EVAP monitor is complete if the following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa (2.25 mmHg)

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

One of following conditions met	-
FTP when just after reference pressure measurement started	-1 kPa (755 mmHg) or higher
Reference pressure	-4.85 kPa (726 mmHg) or lower
Reference pressure	-1.05 kPa (754 mmHg) or higher
Reference pressure	Not saturated within 60 seconds
Difference between first reference pressure and second reference pressure	0.7 kPa (5.25 mmHg)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC SUMMARY

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timing	Detection Logic
P0441	Purge Vacuum Switching Valve (VSV) stuck open	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak criterion measured at start and at end of leak check. If stabilized pressure higher than [second 0.02 inch leak criterion x 0.2], ECM determines that purge VSV stuck open.	• Purge VSV • Connector/wire harness (purge VSV - ECM) • ECM • Canister pump module • Leakage from EVAP system	While ignition switch OFF	2 trip
P0441	Purge VSV stuck closed	After EVAP leak check performed, purge VSV turned ON (open), and atmospheric air introduced into EVAP system. 0.02 inch leak criterion measured at start and at end of leak check. If pressure does not return to near atmospheric pressure, ECM determines that purge VSV stuck closed.	• Purge VSV • Connector/wire harness (purge VSV - ECM) • ECM • Canister pump module • Leakage from EVAP system	While ignition switch OFF	2 trip
P0441	Purge flow	While engine running, following conditions are met: • Negative pressure not created in EVAP system when purge VSV turned ON (open) • EVAP system pressure change less than 0.5 kPa (3.75 mmHg) when vent valve turned ON (closed) • Atmospheric pressure change before and after purge flow monitor less than 0.1 kPa (0.75 mmHg)	• Purge VSV • Connector/wire harness (purge VSV - ECM) • Leakage from EVAP line (purge VSV - Intake manifold) • ECM	While engine running	2 trip

ES

DESCRIPTION

The circuit description can be found in the Evaporative Emission (EVAP) system (see page ES-272).

INSPECTION PROCEDURE

Refer to the EVAP system (see page ES-272).

MONITOR DESCRIPTION

The 2 monitors, key-off and purge flow, are used to detect malfunctions relating to DTC P0441. The key-off monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours* after the ignition switch is turned OFF. The purge flow monitor runs while the engine is running.

1. Key-off monitor

   5 hours* after the ignition switch is turned OFF, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

   HINT:

   *: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned OFF, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned OFF, the monitor check starts 2.5 hours later.

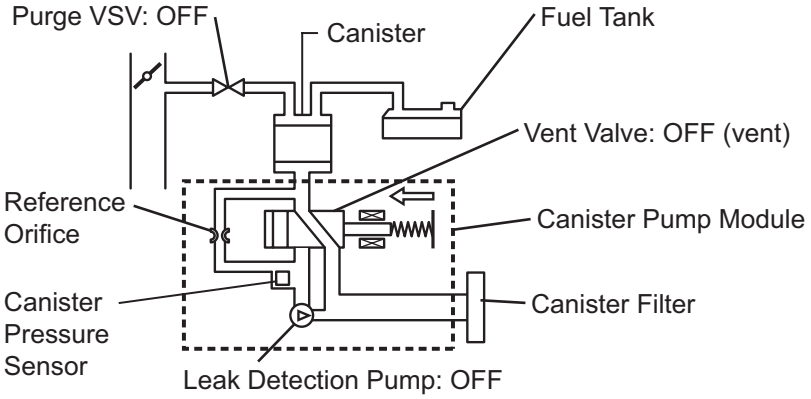
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak criterion measurement	In order to determine 0.02 inch leak criterion, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 900 seconds, ECM cancels EVAP system monitor.	900 seconds*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds

Sequence	Operations	Descriptions	Duration
E	Second 0.02 inch leak criterion measurement	After second 0.02 inch leak criterion measurement, leak check performed by comparing first and second 0.02 inch leak criterion. If stabilized system pressure higher than second 0.02 inch leak criterion, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

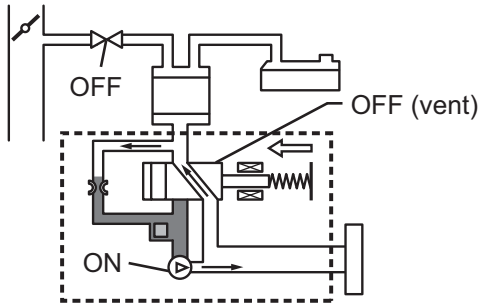
*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

ES

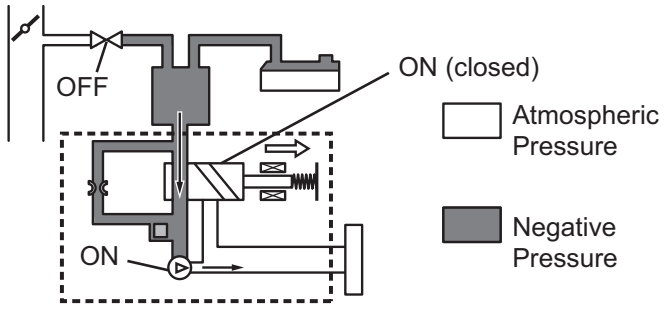
Operation A: Atmospheric Pressure Measurement



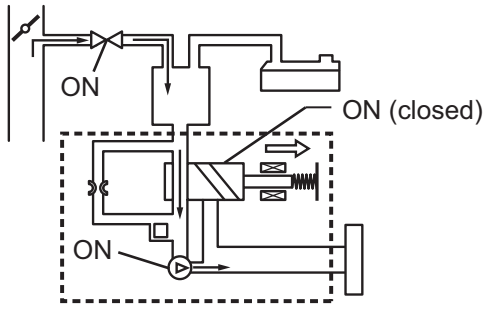
Operation B, E: 0.02 Inch Leak Criterion Measurement



Operation C: EVAP System Pressure Measurement



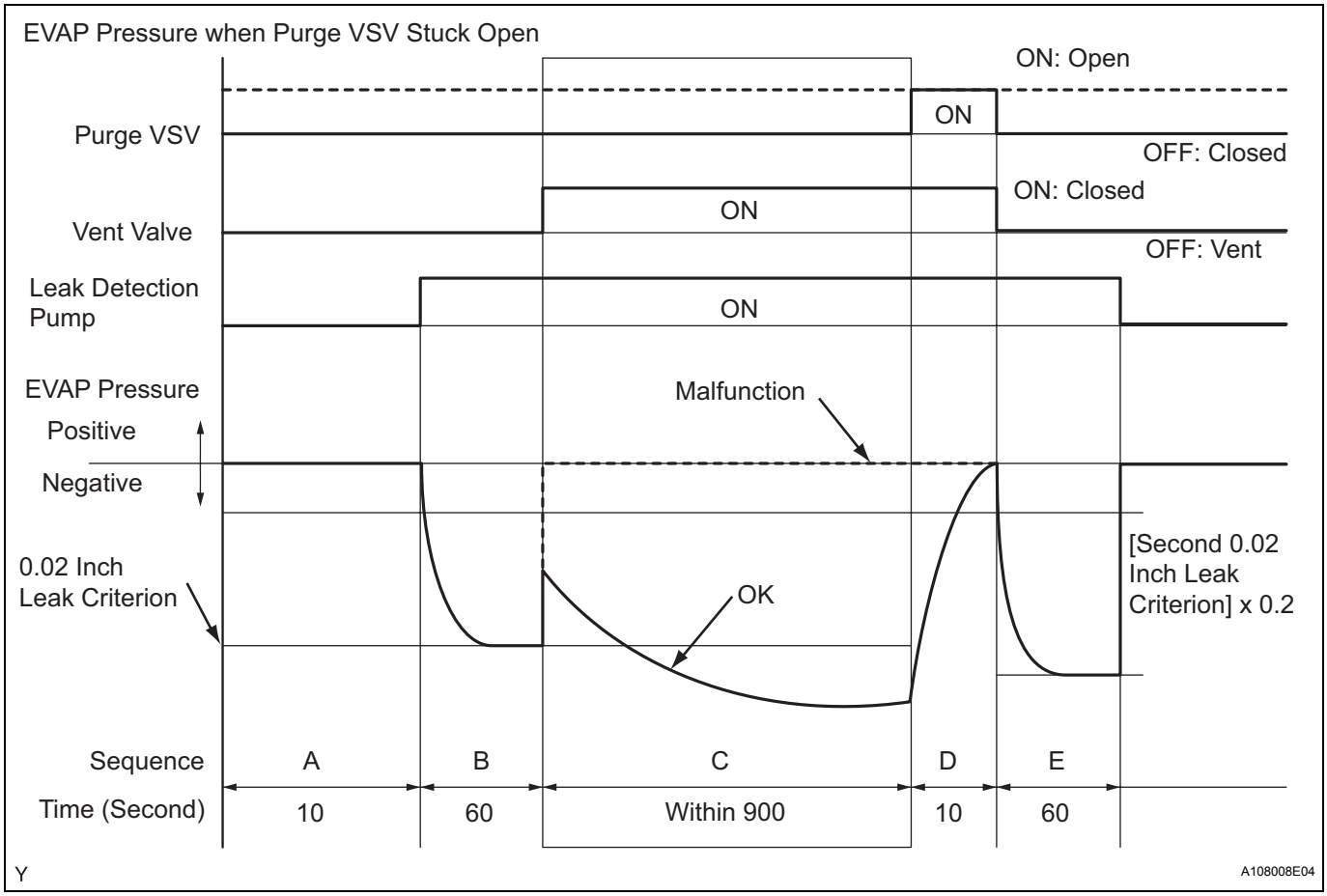
Operation D: Purge VSV Monitor



A122912E01

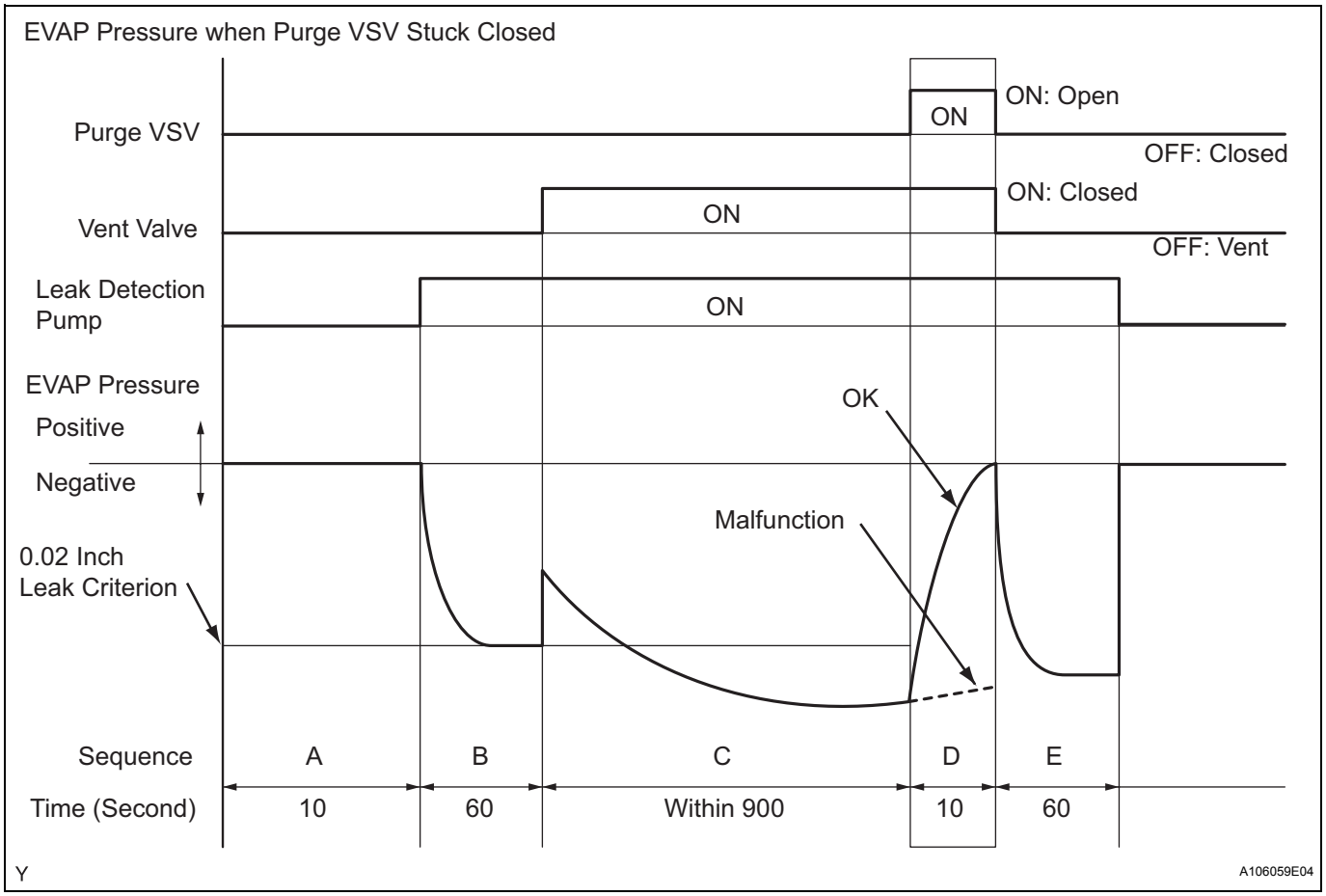
(a)Purge VSV stuck open

In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The EVAP system pressure is then measured by the ECM using the canister pressure sensor. If the stabilized system pressure is higher than [second 0.02 inch leak criterion x 0.2], the ECM interprets this as the purge Vacuum Switching Valve (VSV) being stuck open. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

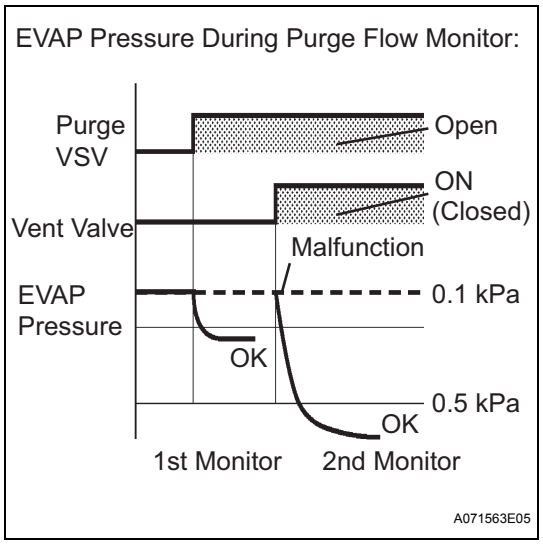


(b) Purge VSV stuck closed

In operation D, the canister pressure sensor measures the EVAP system pressure. The pressure measurement for the purge VSV monitor begins when the purge VSV is turned ON (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa (2.25 mmHg) or more, the purge VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the purge VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).



2. Purge flow monitor



The purge flow monitor consists of the 2 step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the purge VSV is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:
In order to ensure reliable malfunction detection, the variation between the atmospheric pressure before and after conduction of the purge flow monitor is measured by the ECM.

MONITOR STRATEGY

Related DTCs	P0441: Purge VSV stuck open P0441: Purge VSV stuck closed P0441: Purge flow
Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 900 seconds (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Purge Flow Monitor:

Monitor runs whenever following DTC not present	-
Engine	Running
ECT	4.4°C (40°F) or more
IAT	4.4°C (40°F) or more
FTP sensor malfunction	Not detected
Purge VSV	Not detected by scan tool
EVAP system check	Not detected by scan tool
Battery voltage	10 V or higher
Purge duty cycle	8% or more

Purge VSV Stuck:

Enabling conditions of EVAP key-OFF monitor	
P043E (Reference orifice - low flow) P043F (Reference orifice - high flow) P0441 (Purge VSV - stuck open) P0441 (Purge VSV - stuck closed) P0451 (Canister pressure sensor - noise) P0455 (EVAP gross leak) P0456 (EVAP 0.02 inch leak) P2401(Leak detection pump - stuck OFF) P2402 (Leak detection pump - stuck ON) P2419 (Vent valve - stuck ON) P2420 (Vent valve - stuck OFF)	
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or higher
Vehicle speed	4 km/h (2.5 mph) or less
Ignition switch	OFF
Time after key off	5 or 7 or 9.5 hours
Canister pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool

Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions 1 and 2 are met before key off	-
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met	-
Atmospheric pressure change	Within 0.3 kPa (2.25 mmHg) in 1 second

2. First reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement start	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction

Next sequence is run if the following condition is met	-
EVAP pressure	Saturated within 900 seconds

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated within 60 seconds
Reference pressure difference between first and second	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if the following condition is met	-
EVAP pressure when vacuum introduction is complete	Lower than second reference pressure

8. Atmospheric pressure measurement

EVAP monitor is complete if the following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa (2.25 mmHg)

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

Purge Flow Monitor:

Both of the following conditions are met	-
EVAP pressure change when purge flow is started	Lower than 0.1 kPa (0.75 mmHg)
EVAP pressure change during purge flow when EVAP pressure switching valve is ON (closed)	0.5 kPa (3.75 mmHg) or more

ES

Key-off Monitor: Purge VSV stuck open

FTP when vacuum introduction complete	Higher than reference pressure x 0.2

Key-off Monitor: Purge VSV stuck closed

FTP change after purge VSV ON (open)	Less than 0.3 kPa (2.25 mmHg)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range / Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input

DTC SUMMARY

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Area	Detection Timing	Detection logic
P0450	Canister pressure sensor voltage abnormal fluctuation	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	• Canister pump module • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition switch OFF) • Ignition switch ON	1 trip
P0451	Canister pressure sensor noisy	Sensor output voltage fluctuates frequently in certain time period.	• Canister pump module • Connector/wire harness (canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition switch OFF) • Engine running	2 trip
P0451	Canister pressure sensor stuck	Sensor output voltage does not vary in certain time period.	• Canister pump module • Connector/wire harness (canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition switch OFF)	2 trip

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Area	Detection Timing	Detection logic
P0452	Canister pressure sensor voltage low	Sensor output voltage less than 0.45 V for 0.5 seconds.	• Canister pump module • Connector/wire harness (canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition switch OFF) • Ignition switch ON	1 trip
P0453	Canister pressure sensor voltage high	Sensor output voltage more than 4.9 V for 0.5 seconds.	• Canister pump module • Connector/wire harness (canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition switch OFF) • Ignition switch ON	1 trip

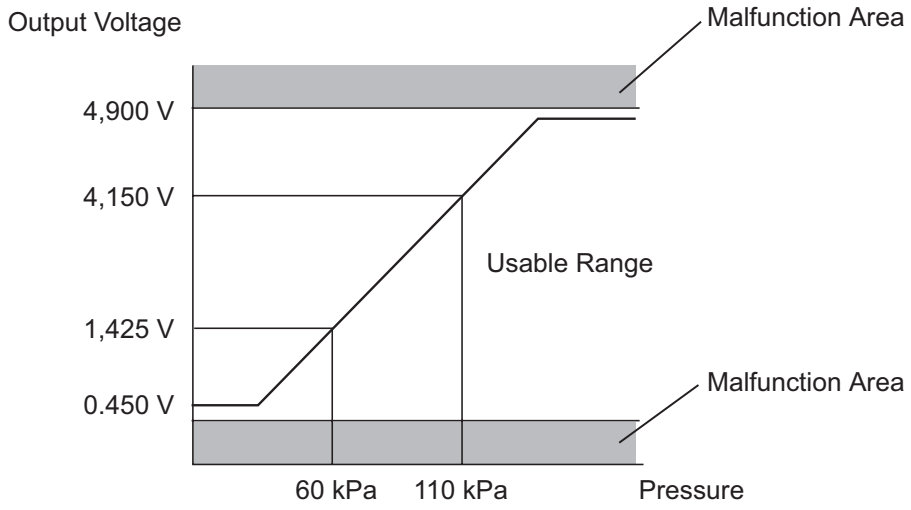
HINT:
The canister pressure sensor is built into the canister pump module.

DESCRIPTION

The circuit description can be found in the Evaporative Emission (EVAP) system (see page ES-272).

MONITOR DESCRIPTION

Canister Pressure Sensor Specification



HINT:

Standard atmospheric pressure is 101.3 kPa

A115543E03

(a) DTC P0450: Canister pressure sensor voltage abnormal fluctuation
If the canister pressure sensor voltage output rapidly fluctuates between less than 0.45 V and more than 4.9 V, the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

(b) DTC P0451: Canister pressure sensor noisy or stuck
If the canister pressure sensor voltage output fluctuates rapidly for 10 seconds, the ECM stops the EVAP system monitor. The ECM interprets this as noise from the canister pressure sensor, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
Alternatively, if the sensor voltage output does not change for 10 seconds, the ECM interprets this as the sensor being stuck, and stops the monitor. The ECM then illuminates the MIL and sets the DTC. (Both of the malfunctions are detected by 2 trip detection logic).

(c) DTC P0452: Canister pressure sensor voltage low
If the canister pressure sensor voltage output is below 0.45 V, the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

(d) DTC P0453: Canister pressure sensor voltage high
If the canister pressure sensor voltage output is 4.9 V or more, the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	Canister pump module
Frequency of Operation	Continuous
Duration	Within 15 minutes

MIL Operation	Immediate: P0450, P0452, P0453 2 driving cycles: P0451
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P0451 (Noise Monitor):

Monitor runs whenever following DTCs are not present	None
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg) [absolute pressure]
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35 °C (40 to 95°F)
EVAP canister pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Either of following conditions is met	A or B
A. Engine	Running
B. Soak time (ignition switch OFF time)	5 hours

Example of restart time

First time	7 hours
Second time	9 hours and 30 minutes

P0451 (Stuck Monitor):

Monitor runs whenever following DTCs are not present	None
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction	Not detected
Soak time (ignition switch OFF time)	5 hours

Example of restart time

First time	7 hours
Second time	9 hours and 30 minutes

P0450, P0452 and P0453:

Monitor runs whenever following DTCs are not present	None
Either of following conditions is met	A or B
A. Ignition switch	ON
B. Soak timer	ON

TYPICAL MALFUNCTION THRESHOLDS

1. P0450: Canister pressure sensor chattering

EVAP pressure	Less than 42.1 kPa (317 mmHg) or more than 123.8 kPa (928.5 mmHg)

2. P0451: Canister pressure sensor noise

Pressure variation indicated by canister pressure sensor in 10 seconds	More than +-0.3 kPa (+-2.25 mmHg) 10 times

3. P0451: Canister pressure sensor stuck

EVAP pressure change during reference pressure in 10 seconds	0.65 kPa (4.87 mmHg) or less

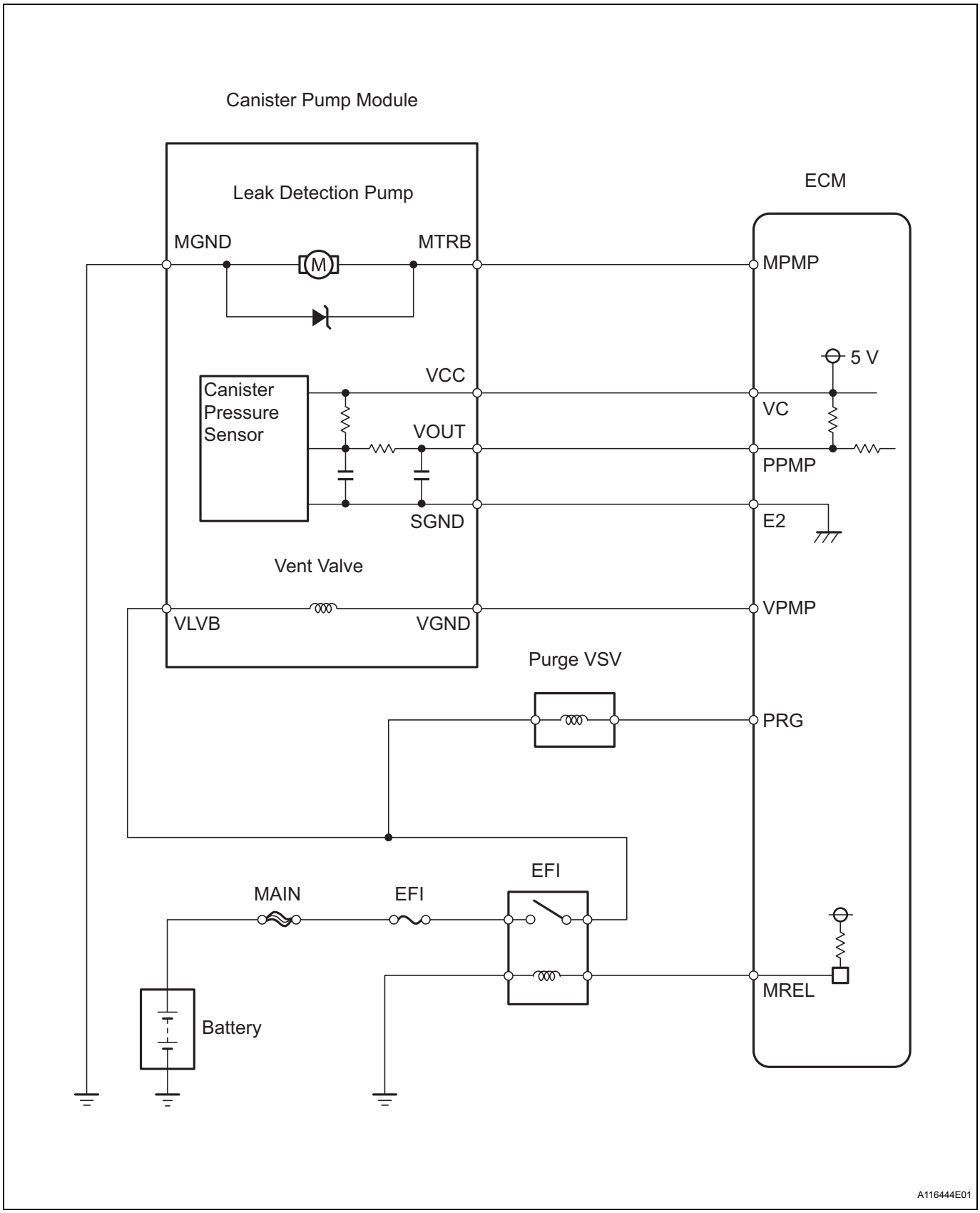
4. P0452: Canister pressure sensor low voltage

EVAP pressure	Less than 42.1 kPa (317 mmHg)

5. P0453: Canister pressure sensor high voltage

EVAP pressure	More than 123.8 kPa (928.5 mmHg)

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel cap.**
- **Do not disassemble the canister pump module.**
- **The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.**

1	CONFIRM DTC AND EVAP PRESSURE

ES

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the values.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / EVAP / VAPOR PRESS.
(f) Read the EVAP pressure displayed on the intelligent tester.

Result

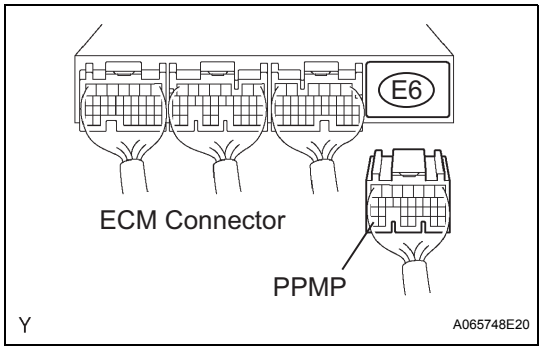
Display (DTC Output)	Test Result	Suspected Trouble Areas	Proceed to
P0451	-	• Canister pressure sensor	A
P0452	Less than 45 kPa (430 mmHg)	• Wire harness/connector (ECM - canister pressure sensor) • Canister pressure sensor • Short in ECM circuit	B
P0453	More than 120 kPa (900 mmHg)	• Wire harness/connector (ECM - canister pressure sensor) • Canister pressure sensor • Open in ECM circuit	C

A → GO TO EVAP SYSTEM

C → Go to step 4

B

2	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



(a) Turn the ignition switch OFF.
(b) Disconnect the E6 ECM connector.
(c) Measure the resistance between the PPMP (E6-31) terminal of the ECM connector and the body ground.

Result

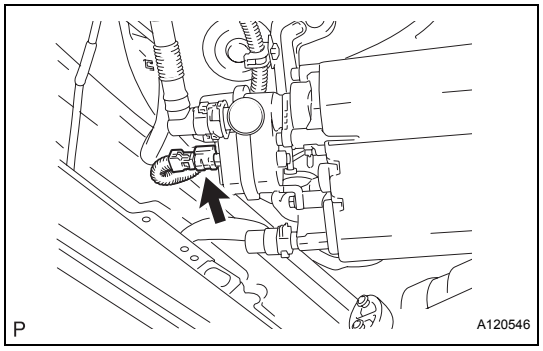
Test Results	Suspected Trouble Areas	Proceed to
10 Ω or less	• Wire harness/connector (ECM - canister pressure sensor) • Short in canister pressure sensor circuit	A
10 kΩ or more	• Wire harness/connector (ECM - canister pressure sensor) • Short in ECM circuit	B

B → Go to step 7

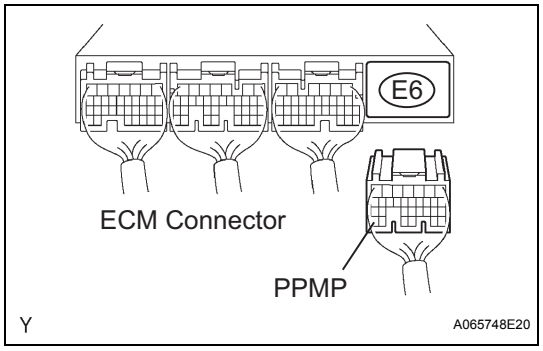
A

ES

3 CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



(a) Disconnect the C17 canister connector.



(b) Disconnect the E6 ECM connector.
(c) Measure the resistance between the PPMP (E6-31) terminal of the ECM connector and the body ground.

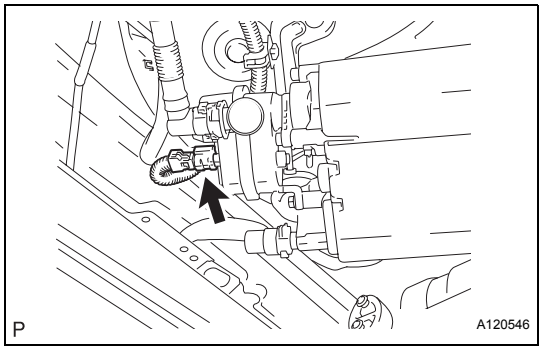
Result

Test Results	Suspected Trouble Areas	Proceed to
10 kΩ or more	• Short in canister pressure sensor circuit	A
10 kΩ or less	• Short in wire harness/connector (ECM - canister pressure sensor)	B

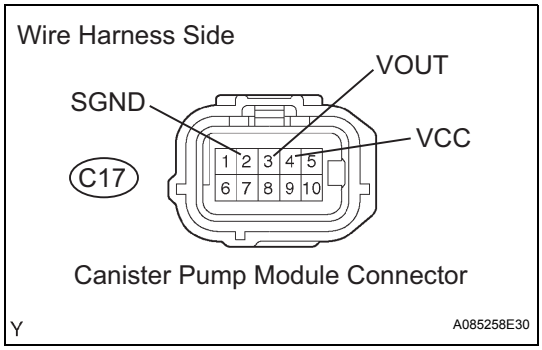
B → Go to step 6

A

4	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



(a) Disconnect the C17 canister connector.



(b) Turn the ignition switch ON.

(c) Measure the voltage and resistance of the canister pump module connector.

Standard voltage

Tester Connection	Specified Condition
VCC (C17-4) - Body ground	4.5 to 5.0 V
VOUT (C17-3) - Body ground	4.5 to 5.0 V

Standard resistance

Tester Connection	Specified Condition
SGND (C17-2) - Body ground	100 Ω or less

Result

Test Results	Suspected Trouble Areas	Proceed to
Voltage and resistance within standard ranges	• Open in canister pressure sensor circuit	A
Voltage and resistance outside standard ranges	• Open in wire harness/connector (ECM - canister pressure sensor)	B

B → Go to step 6

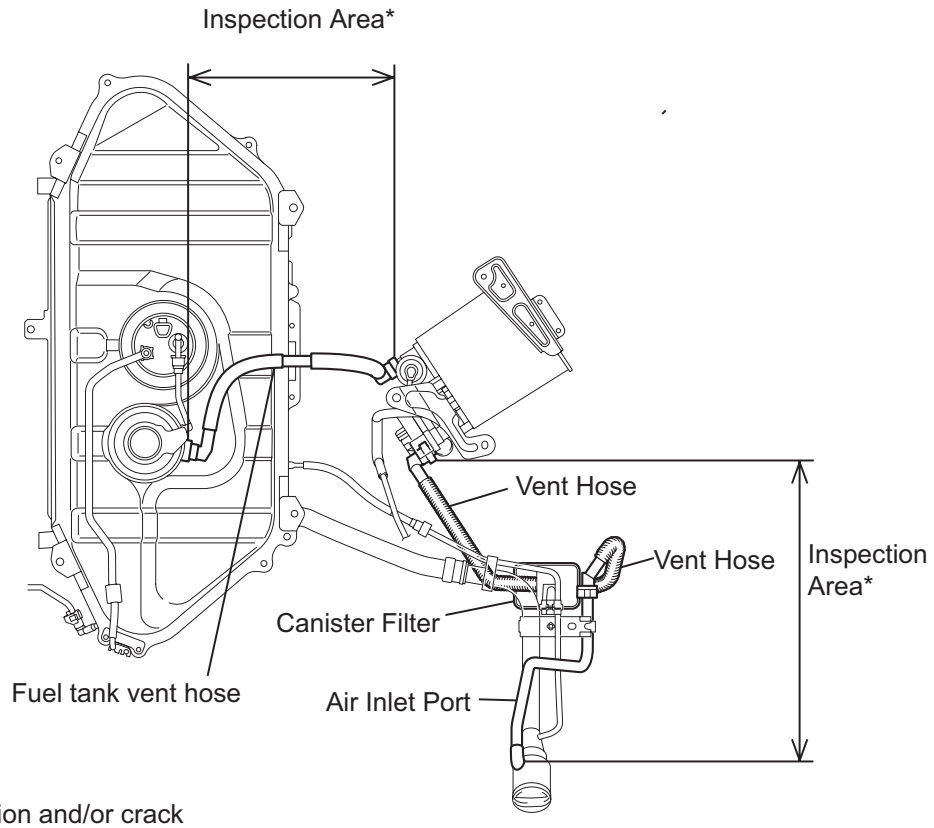
A

5	REPLACE CANISTER ASSEMBLY

(a) Replace the canister assembly (see page EC-9).

NOTICE:

When replacing the canister, check the canister pump module interior and related pipes for water, fuel or other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.



*: Check for disconnection and/or crack

P A122262E02

ES

NEXT → Go to step 8

6	REPAIR OR REPLACE HARNESS OR CONNECTOR

HINT:
If the exhaust tailpipe has been removed, go to the next step before reinstalling it.

NEXT → Go to step 8

7	REPLACE ECM

(a) Replace the ECM (see page ES-362).

NEXT → Go to step 8

8	CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester ON.
(c) Wait for at least 60 seconds.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

HINT:
If no pending DTC is displayed on the intelligent tester, the repair has been successfully completed.

NEXT

COMPLETED

REGISTRATION

NOTICE:
The Vehicle Identification Number (VIN) must be input into the replacement ECM.
HINT:
The VIN is a 17-digit alphanumeric vehicle identification number. The intelligent tester is required to register the VIN.

1. INPUT INSTRUCTIONS

HINT:
Below are the general VIN input instructions using the intelligent tester.

(a) General
The arrow buttons (UP, DOWN, RIGHT and LEFT) and numerical buttons (0 to 9) are used to input the VIN.

(b) Cursor Operation
To move the cursor around the tester screen, press the RIGHT and LEFT buttons.

(c) Alphabetical Character Input
(1) Press the UP and DOWN buttons to select the desired alphabetical character.
(2) After selection, the cursor should move.

(d) Numeric Character Input
(1) Press the numerical button corresponding to the number that you want to input.
HINT:
Numerical characters can also be selected and input using the UP and DOWN buttons.

(e) Correction
(1) After input, the cursor should move.
(2) When correcting the input character(s), put the cursor onto the character using the RIGHT or LEFT buttons.

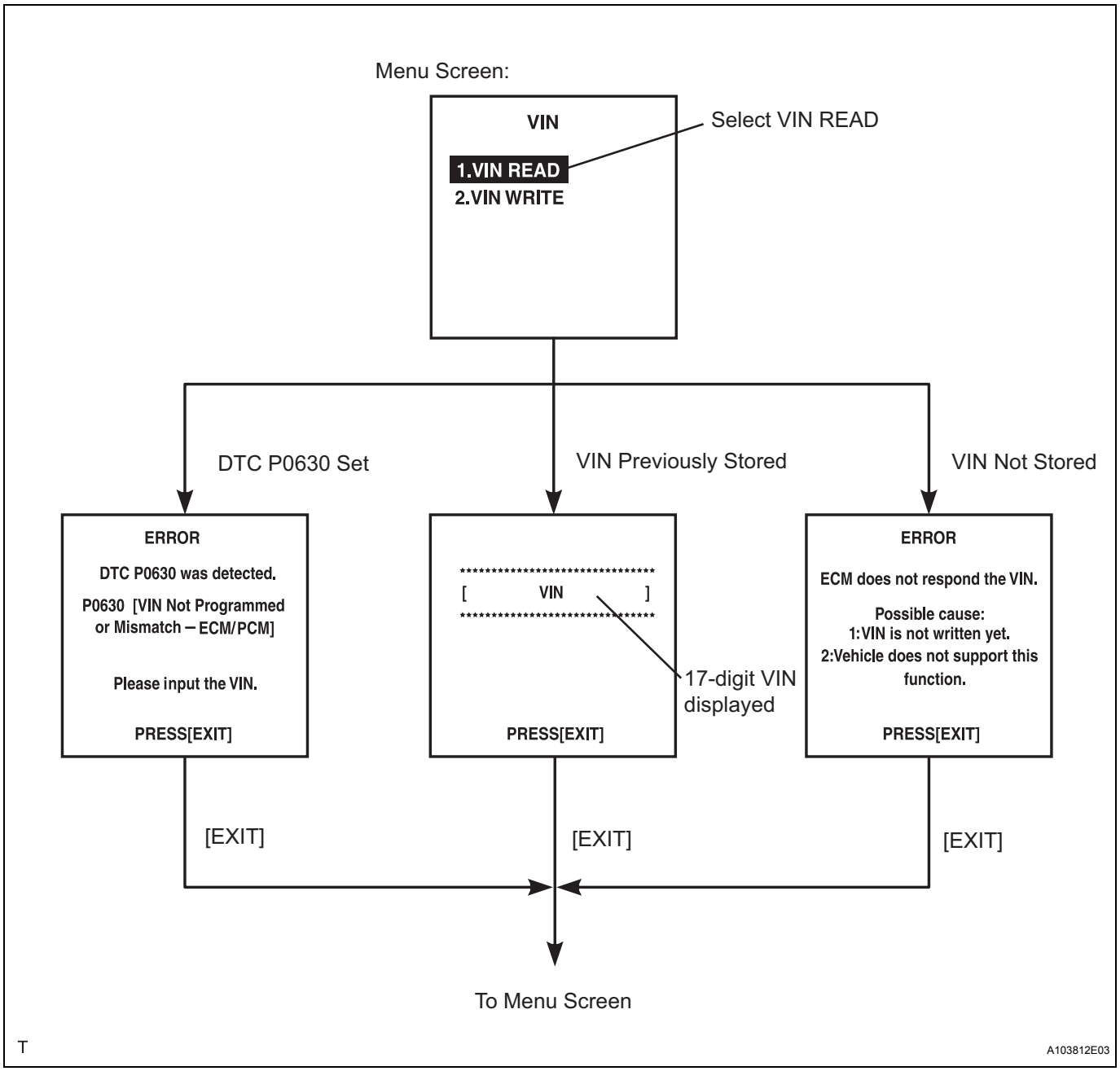
(f) Finishing Input Operation
(1) Make sure that the input VIN matches the vehicle VIN after input.
(2) Press the ENTER button on the tester.

2. READ VIN (Vehicle Identification Number)

HINT:
Below are the VIN reading instructions. Use the procedures and flowchart below. Reading the VIN stored in the ECM is necessary when comparing it to the VIN provided with the vehicle.

(a) Read VIN using the intelligent tester.
(b) Check the vehicle's VIN.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Turn the tester ON.

(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / VIN.



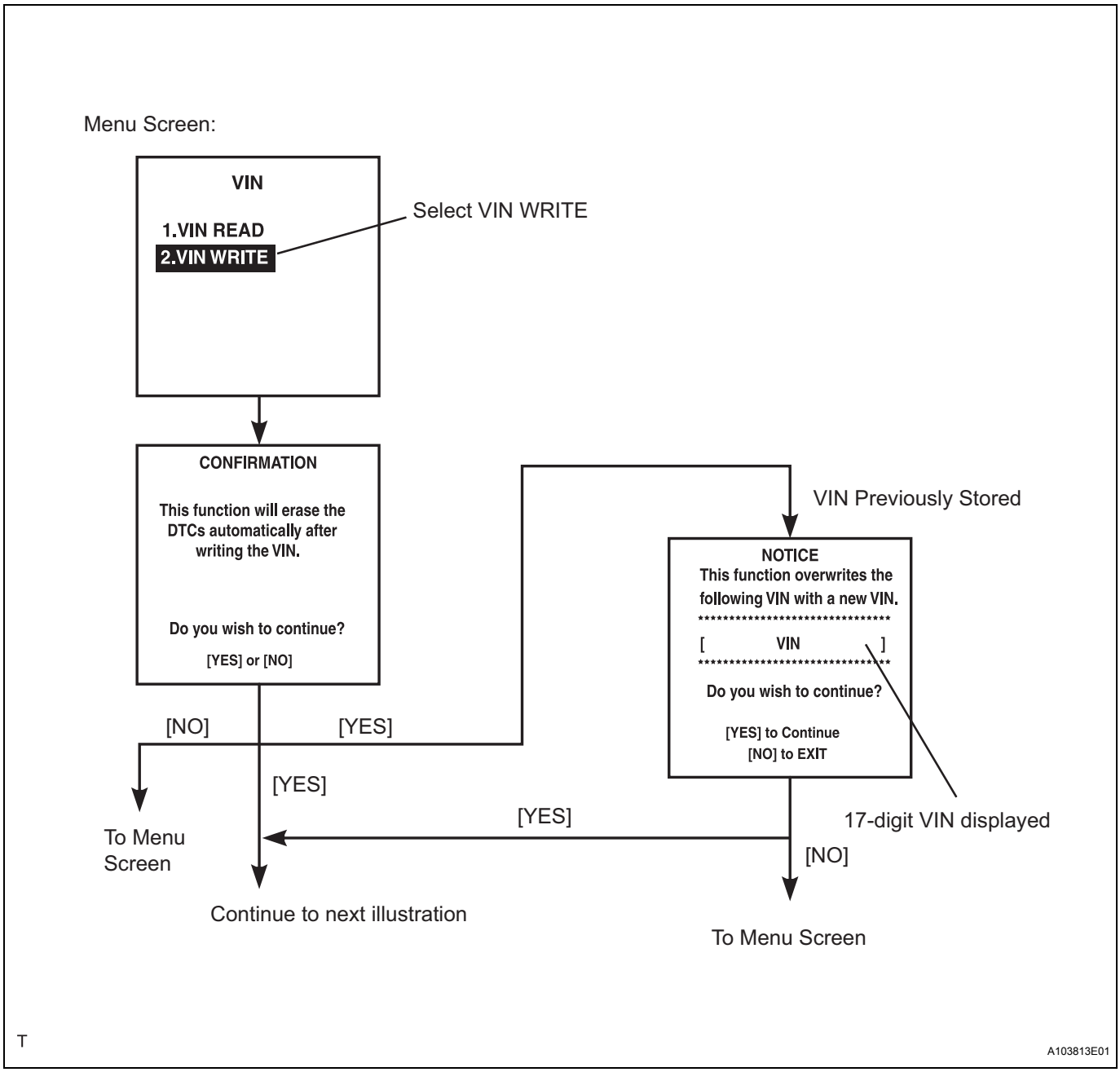
3. WRITE VIN

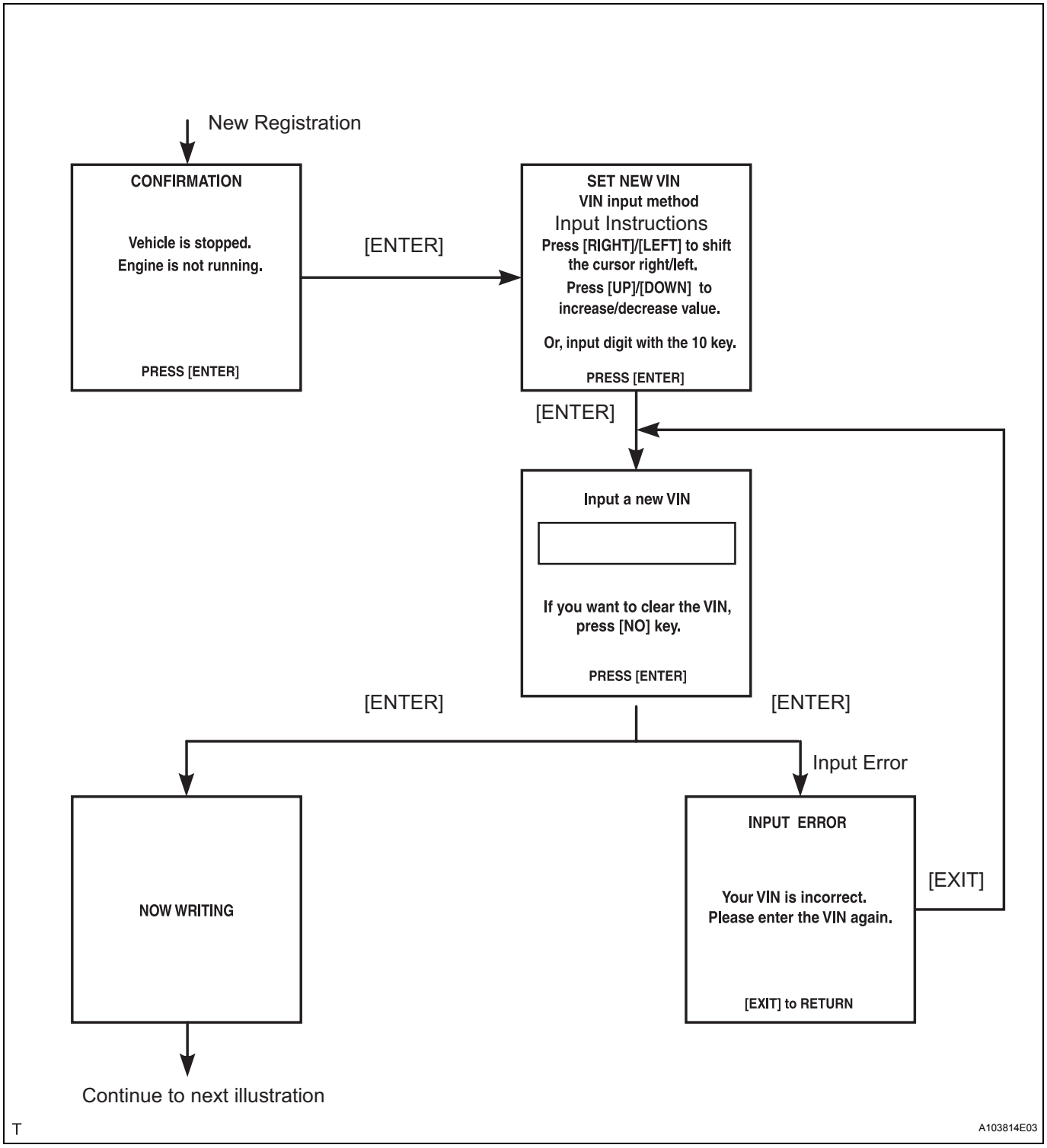
HINT:

Below are the VIN writing instructions. Use the procedures and flowchart below. This process allows the VIN to be input into the ECM. If the ECM is changed, or the ECM VIN and vehicle VIN do not match, the VIN can be registered or overwritten in the ECM by following this procedure.

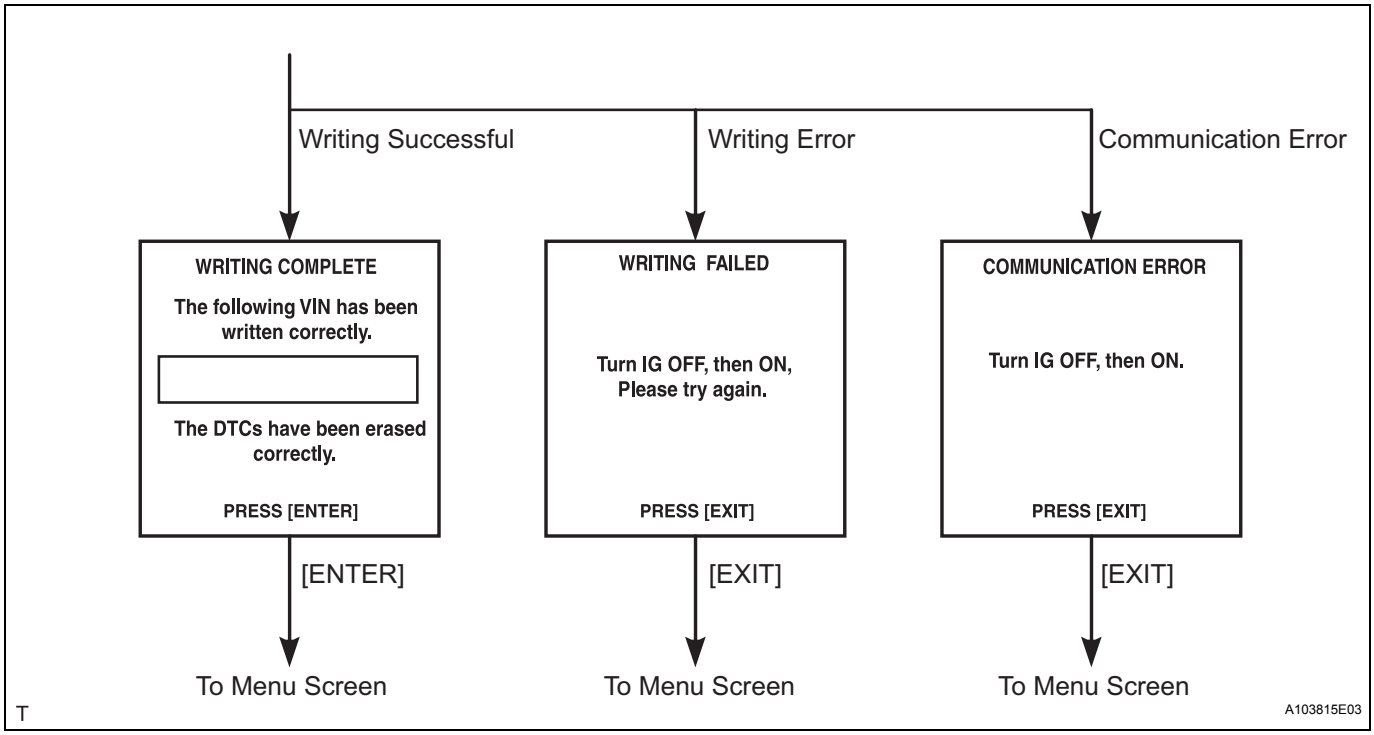
(a) Write VIN using the intelligent tester.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON.
(d) Turn the tester ON.

(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / VIN.




New Registration
CONFIRMATION
Vehicle is stopped.
Engine is not running.
PRESS [ENTER]
[ENTER]
SET NEW VIN
VIN input method
Input Instructions
Press [RIGHT]/[LEFT] to shift the cursor right/left.
Press [UP]/[DOWN] to increase/decrease value.
Or, input digit with the 10 key.
PRESS [ENTER]
[ENTER]
Input a new VIN
If you want to clear the VIN, press [NO] key.
PRESS [ENTER]
[ENTER]
[ENTER]
Input Error
NOW WRITING
INPUT ERROR
Your VIN is incorrect.
Please enter the VIN again.
[EXIT] to RETURN
[EXIT]
Continue to next illustration
T
A103814E03

ES


Writing Successful
Writing Error
Communication Error
WRITING COMPLETE
The following VIN has been written correctly.
The DTCs have been erased correctly.
PRESS [ENTER]
WRITING FAILED
Turn IG OFF, then ON, Please try again.
PRESS [EXIT]
COMMUNICATION ERROR
Turn IG OFF, then ON.
PRESS [EXIT]
[ENTER]
[EXIT]
[EXIT]
To Menu Screen
To Menu Screen
To Menu Screen
T
A103815E03

ES

DTC	P0455	Evaporative Emission Control System Leak Detected (Gross Leak)

DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

DTC SUMMARY

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Area	Detection Timing	Detection Logic
P0455	EVAP gross leak	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak criterion measured at start and at end of leak check. If stabilized pressure higher than [second 0.02 inch leak criterion x 0.2], ECM determines that EVAP system has large leakage.	• Fuel cap (loose) • Leakage from EVAP line (canister - fuel tank) • Leakage from EVAP line (purge VSV - canister) • Canister pump module • Leakage from fuel tank • Leakage from canister	While ignition switch OFF	2 trip
P0456	EVAP small leak	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak criterion measured at start and at end of leak check. If stabilized pressure higher than second 0.02 inch leak criterion, ECM determines that EVAP system has small leakage.	Same as above	While ignition switch OFF	2 trip

ES

DESCRIPTION

The circuit description can be found in the Evaporative Emission (EVAP) system (see page ES-272).

INSPECTION PROCEDURE

Refer to the EVAP system (see page ES-272).

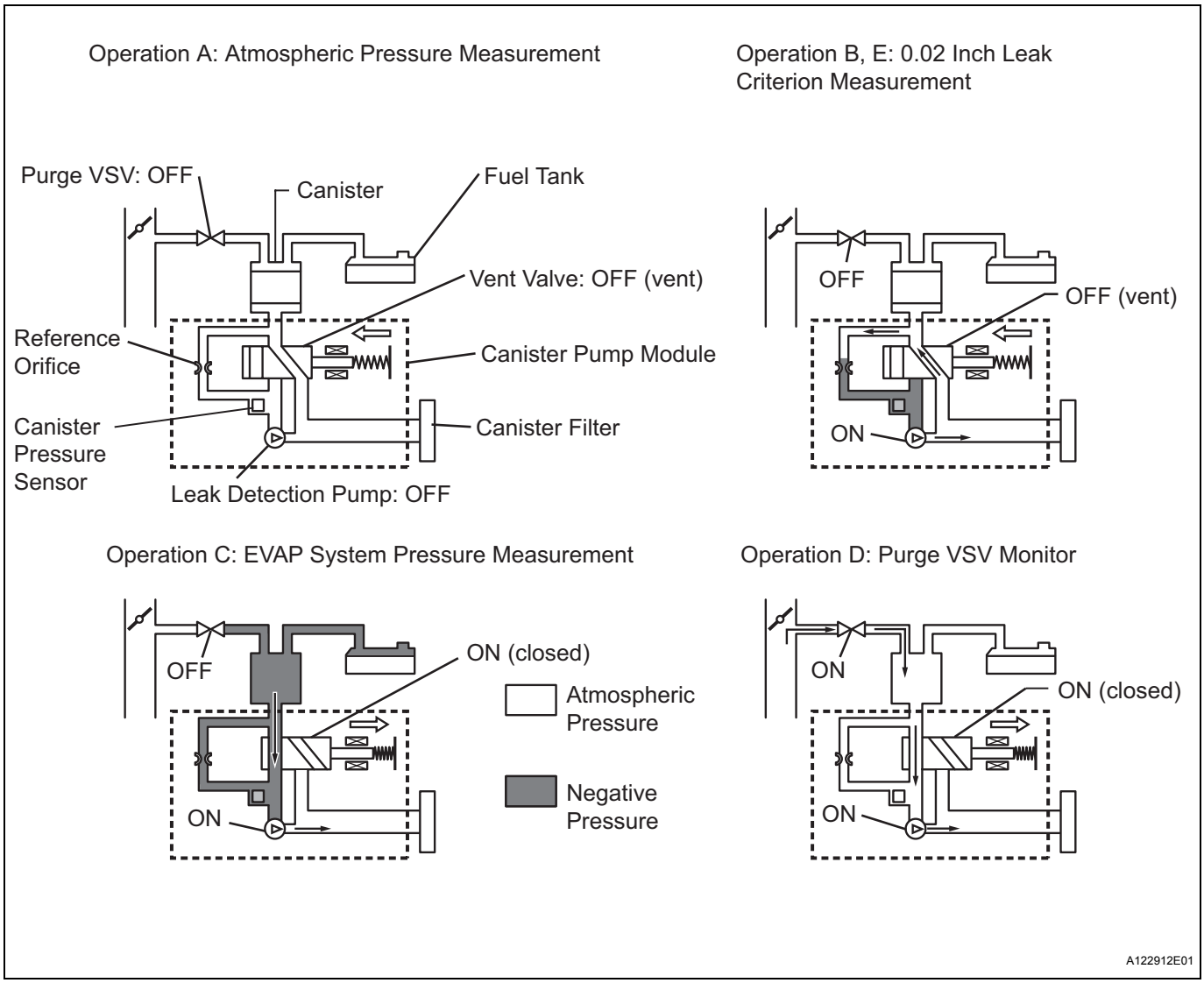
MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned OFF, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned OFF, the monitor check starts 2.5 hours later.

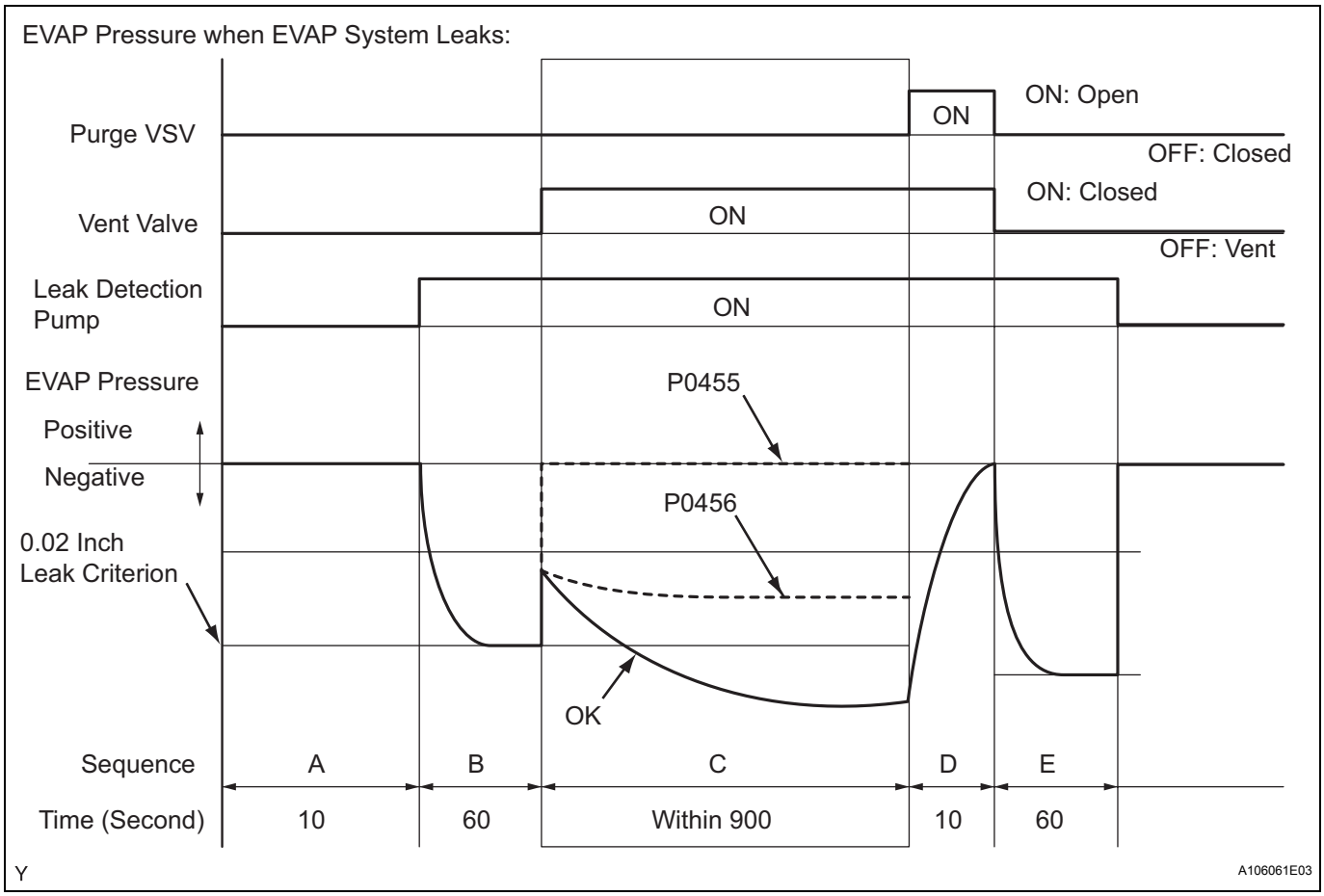
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak criterion measurement	In order to determine 0.02 inch leak criterion, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 900 seconds, ECM cancels EVAP system monitor.	900 seconds*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak criterion measurement	After second 0.02 inch leak criterion measurement, leak check performed by comparing first and second 0.02 inch leak criterion. If stabilized system pressure higher than second 0.02 inch leak criterion, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.



1. P0455: EVAP gross leak
   In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than [second 0.02 inch leak criterion x 0.2] (near atmospheric pressure), the ECM determines that the EVAP system has a large leakage, illuminates the MIL and sets the DTC (2 trip detection logic).

2. P0456: EVAP very small leak
In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than the second 0.02 inch leak criterion, the ECM determines that the EVAP system has a small leakage, illuminates the MIL and sets the DTC (2 trip detection logic).



MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 900 seconds (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Enabling conditions of EVAP key-OFF monitor	
P043E (Reference orifice - low flow) P043F (Reference orifice - high flow) P0441 (Purge VSV - stuck open) P0441 (Purge VSV - stuck closed) P0451 (Canister pressure sensor - noise) P0455 (EVAP gross leak) P0456 (EVAP 0.02 inch leak) P2401 (Leak detection pump - stuck OFF) P2402 (Leak detection pump - stuck ON) P2419 (Vent valve - stuck ON) P2420 (Vent valve - stuck OFF)	
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)

Battery voltage	10.5 V or higher
Vehicle speed	4 km/h (2.5 mph) or less
Ignition switch	OFF
Time after key off	5 or 7 or 9.5 hours
Canister pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions 1 and 2 are met before key off	-
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met	-
Atmospheric pressure change	Within 0.3 kPa (2.25 mmHg) in 1 second

2. First reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement start	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction

Next sequence is run if the following condition is met	-
EVAP pressure	Saturated within 900 seconds

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated within 60 seconds
Reference pressure difference between first and second	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if the following condition is met	-
EVAP pressure when vacuum introduction is complete	Lower than second reference pressure

8. Atmospheric pressure measurement

EVAP monitor is complete if the following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa (2.25 mmHg)

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

P0455: EVAP gross leak

FTP when vacuum introduction complete	Higher than reference pressure x 0.2

P0456: EVAP small leak

FTP when vacuum introduction complete	Between "reference pressure" and "reference pressure x 0.2"

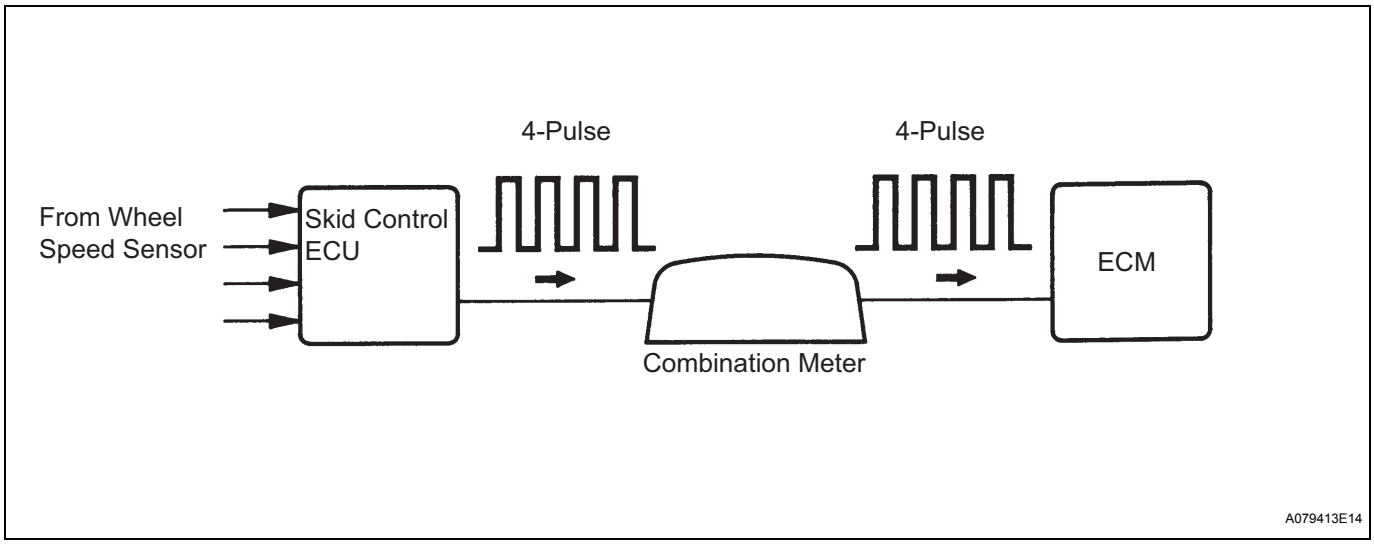
MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

DTC	P0500	Vehicle Speed Sensor "A"

DESCRIPTION

Vehicles, which are equipped with ABS (Anti-lock Brake System), detect the vehicle speed using the skid control ECU and wheel speed sensor. The wheel speed sensor monitors the wheel rotation speed and sends a signal to the skid control ECU. The skid control ECU converts the wheel speed signal into a 4-pulse signal and transmits it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of the pulse signal.



DTC No.	DTC Detection Condition	Trouble Area
P0500	While vehicle being driven, no vehicle speed sensor signal to ECM (1 trip detection logic: Automatic transaxle) (2 trip detection logic: Manual transaxle)	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Combination meter • ECM • Skid control ECU

MONITOR DESCRIPTION

Automatic Transaxle Models:
The ECM assumes that the vehicle is being driven when the indicated engine speed is more than 2,300 rpm and 30 seconds have elapsed since the Park/Neutral Position (PNP) switch was turned OFF. If there is no signal from vehicle speed sensor, despite these conditions being met, the ECM interprets this as a malfunction in the sensor. The ECM then illuminates the MIL and sets the DTC.
Manual Transaxle Models:
The ECM assumes that the vehicle is being driven while the vehicle speed sensor signal is being transmitted by the combination meter. If there is no signal from the vehicle speed sensor despite this condition being met, the ECM interprets this as a malfunction in the sensor. The ECM then illuminates the MIL and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0500: Vehicle speed sensor "A" pulse input error
Required sensors / components (Main)	Vehicle Speed Sensor (VSS), Combination meter and Skid control ECU
Required sensors / components (Related)	PNP switch, Engine Coolant Temperature (ECT) sensor, Crankshaft Position (CKP) sensor and Mass Air Flow (MAF) meter
Frequency of operation	Continuous
Duration	2 seconds: Automatic transaxle, Intake air temperature -10°C (14°F) or more 8 seconds: Automatic transaxle, Intake air temperature less than -10°C (14°F) 8 seconds: Manual transaxle

MIL operation	Immediate: Automatic transaxle 2 driving cycles: Manual transaxle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

M/T:

Engine coolant temperature	70°C (158°F) or more
Engine speed	2,000 to 5,000 rpm
Fuel cut at high engine speed	Not executing

ES

A/T:

Either of following conditions (a) or (b) met:	-
(a) Following conditions 1 and 2 met:	-
1. ECT and ECT sensor	20°C (68°F) or more, and sensor does not malfunction (P0115 or P0116)
2. Time after PNP switch turned OFF	10 seconds or more
(b) Following conditions 1 and 2 met:	
1. ECT and ECT sensor	Less than 20°C (68°F), and sensor malfunction (P0115 or P0116)
2. Time after ignition switch turned ON	30 seconds or more
Engine speed	2,800 rpm or more (varies with throttle valve opening angle)
Fuel cut at high engine speed	Not executing
Time after ignition switch turned ON	3 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

Vehicle speed sensor signal	No pulse input

WIRING DIAGRAM

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OPERATION OF SPEEDOMETER

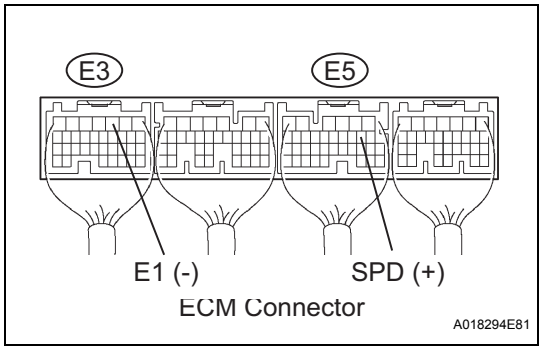
(a) Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer reading is normal.

NG → **CHECK SPEEDOMETER CIRCUIT**

OK

ES

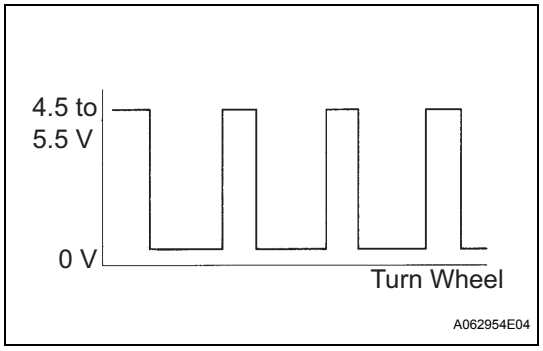
2	INSPECT ECM (SPD VOLTAGE)



(a) Move the transmission gear selector lever to the neutral position.
(b) Jack up the vehicle.
(c) Turn the ignition switch ON.
(d) Measure the voltage between the terminals of the E3 and E5 ECM connectors as the front wheel is turned slowly.

Standard voltage

Tester Connection	Specified Condition
SPD (E5-8) - E1 (E3-3)	Voltage generated intermittently



HINT:
The output voltage should fluctuate up and down similarly to the diagram when the wheel is turned slowly.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

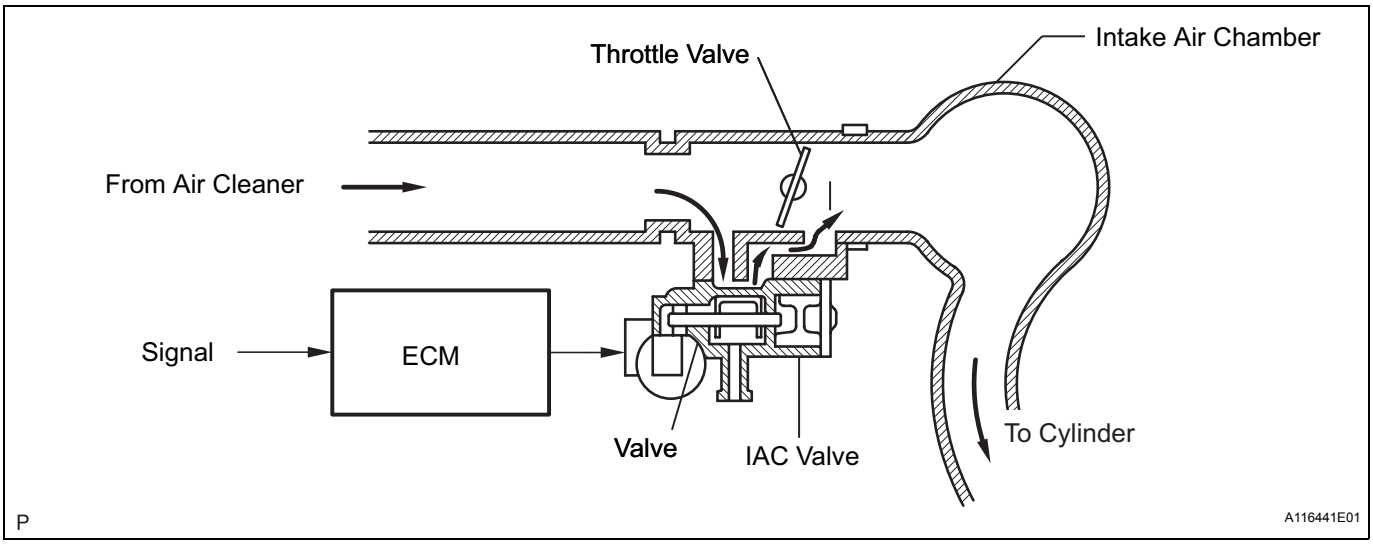
DTC	P0505	Idle Control System Malfunction

DTC	P0511	Idle Air Control Circuit

DESCRIPTION

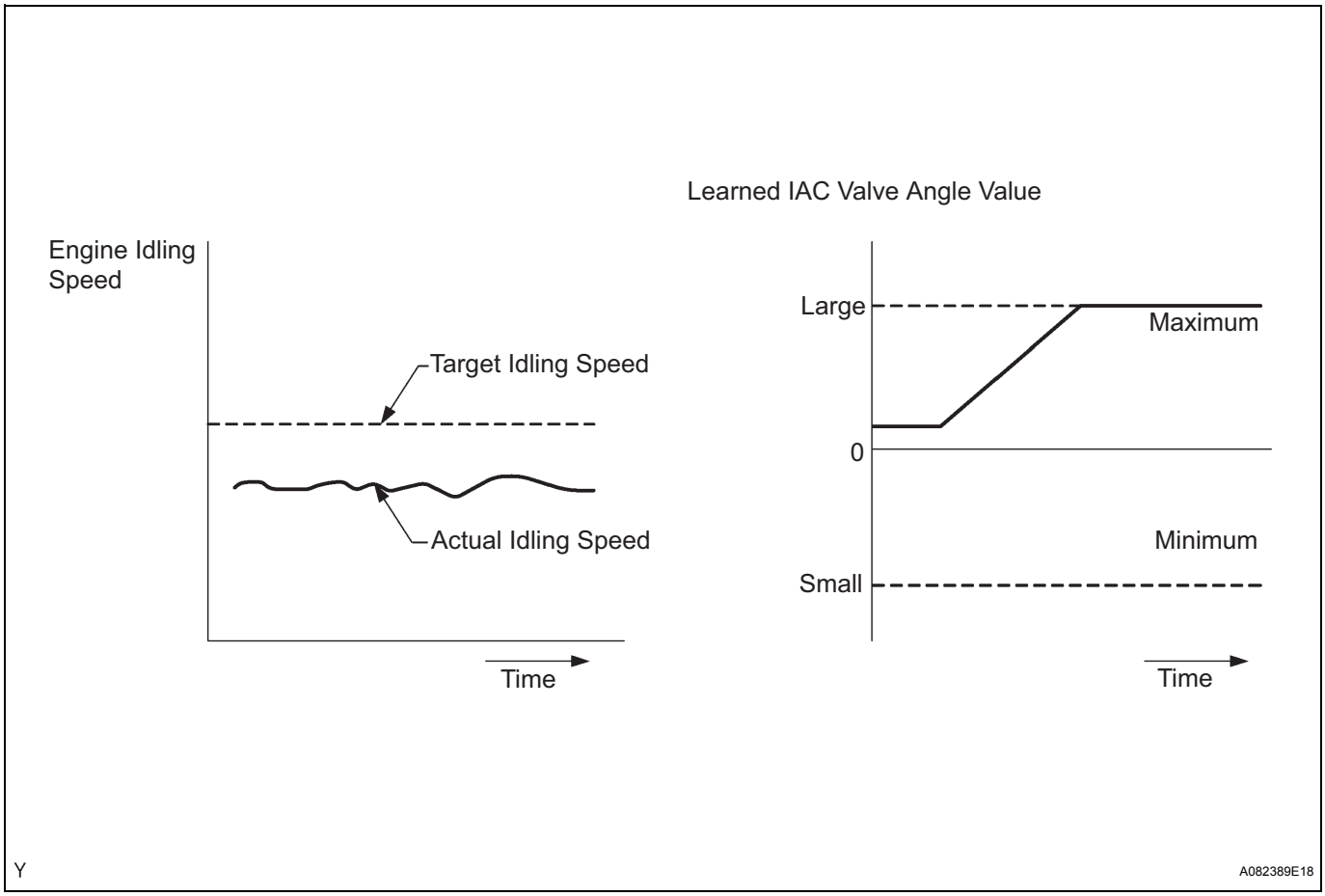
The Idle Air Control (IAC) valve, a rotary solenoid type, is located under the throttle body. Intake air bypassing the throttle valve flows into the IAC valve through a passage.
The valve regulates the volume of intake air that bypasses the throttle valve and allows the engine idling speed to be controlled.
The IAC valve is used by the ECM to perform idle-up and its feedback signal is used as one factor in target engine idling speed regulation.

ES



DTC No.	DTC Detection Condition	Trouble Area
P0505	Engine idling speed continues to vary greatly from target idling speed (2 trip detection logic)	• Open or short in IAC valve circuit • IAC valve stuck or closed • A/C switch circuit • Air induction system • Ventilation valve and hose • ECM
P0511	Open or short IAC valve circuit (1 trip detection logic)	• Open or short in IAC valve circuit • IAC valve stuck or closed • ECM

MONITOR DESCRIPTION



The IAC valve controls the volume of air that bypasses the throttle valve.
Idling speed is determined by the volume of air that passes through the Intake Air Control (IAC) valve. When the volume is large, the idling speed increases. Conversely, when it is small, the idling speed decreases. The ECM sends a duty signal to the IAC valve and drives the IAC valve motor to regulate this air volume.
If any of the following conditions apply, the ECM determines that the IAC system is malfunctioning, and illuminates the MIL and sets a DTC. The actual engine idling speed does not reach the target idling speed, the IAC learned valve angle remains at the maximum or minimum, or the duty ratio signal to the IAC valve is stuck.
Example:
The ECM sets DTC P0505 if either of the following conditions applies:
- The difference between the actual and target engine idling speeds exceeds 200* rpm while the engine idles, and this occurs 5 times.
- The IAC learned valve angle remains at the maximum or minimum for 5 seconds.

The ECM sets DTC P0511 (open/short circuit) if the following condition applies:
- The duty ratio signal to the IAC valve is stuck at 0 or 100%.

*: The threshold varies according to engine load.

MONITOR STRATEGY

Related DTCs	P0505: Idle Air Control (IAC) valve P0511: Idle Air Control (IAC) valve
Required Sensors/Components (Main)	Crankshaft position (CKP) sensor
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor and Vehicle Speed Sensor (VSS)
Frequency of Operation	P0505 Functional check: once per driving cycle P0505 Range check, P0511: continuous

Duration	10 minutes: IAC functional check 10 seconds: IAC range check
MIL Operation	P0505 Functional check: 2 driving cycles P0505 Range check, P0511: Immediate
Sequence Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	None

P0505 IAC functional check:

Engine	Running

P0505 IAC range check:

IAC duty ratio	10 to 90%
Battery voltage	10 V or more

P0511:

IAC duty ratio	10 to 90%
Battery voltage	10 V or more
Time after first miss of voltage change	10 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0505 IAC functional check:

When either condition below is met:	1 or 2
1. Frequency that both of following conditions (a) and (b) set	5 times or more
(a) Engine rpm - Target engine rpm	Less than -100 rpm, or more than 150 rpm
(b) Vehicle condition	Stop after vehicle was driven by 10 km/h (6.25 mph) or more
2. Frequency that both of following conditions (c) and (d) set	Once
(c) Engine rpm - Target engine rpm	Less than -100 rpm, or more than 150 rpm
(d) IAC flow rate learning value	0.55 L/sec. or less, or 2.75 L/sec. or more

P0505 IAC range check:

Number of missed output voltage change	2,000 times or more

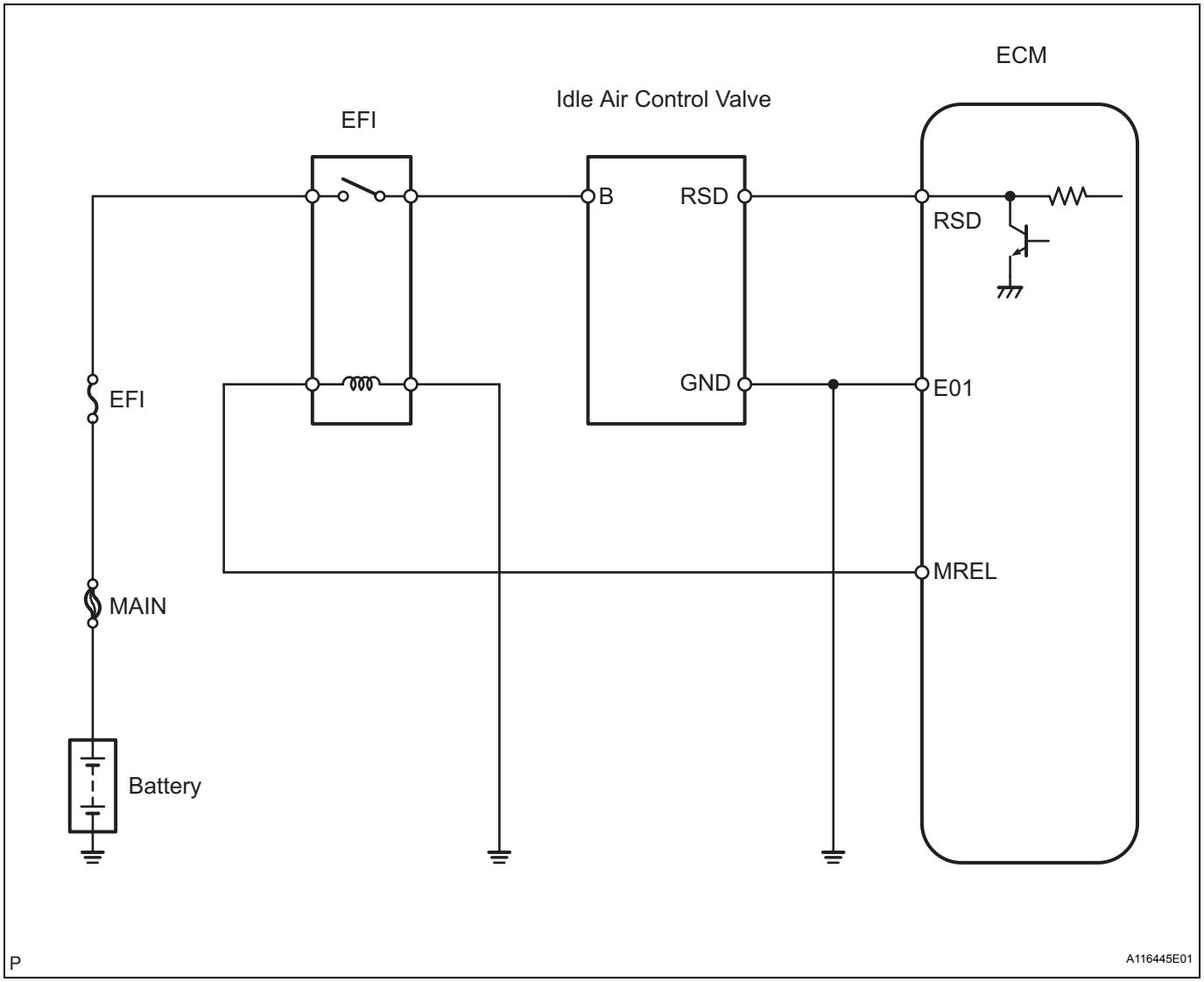
P0511:

Number of missed output voltage change	1,000 times or more

COMPONENT OPERATING RANGE

Time with no missed voltage change	0.5 seconds or more

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- When the throttle position is slightly opened (the accelerator pedal is slightly depressed) because a floor carpet is overlapped on the accelerator pedal, or if not fully releasing the accelerator pedal, etc., DTC P505 will possibly be detected.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0505)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs (see page ES-47).

Result

Display (DTC Output)	Proceed to
P0505	A
P0511	B

B → Go to step 7

A

2 CHECK VENTILATION HOSE CONNECTIONS

ES

OK:
Ventilation hose is connected correctly and is not damaged.

NG → REPAIR OR REPLACE VENTILATION HOSE

OK

3 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

4 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (CHECK IAC VALVE OPERATION)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Start the engine and warm it up to the normal operating temperature.
(d) Switch off all the accessories (if on).
(e) Switch off A/C (if on).
(f) Move the gear selector lever to the N position.
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / IAC STEP POS.
(h) Check that the engine speed varies when the Idle Air Control (IAC) step position is changed using the tester.
OK:
Engine speed fluctuates according to IAC step position variation.

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

5	CHECK A/C SIGNAL CIRCUIT

(a) Check the A/C signal circuit (see page AC-12).

NG → REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

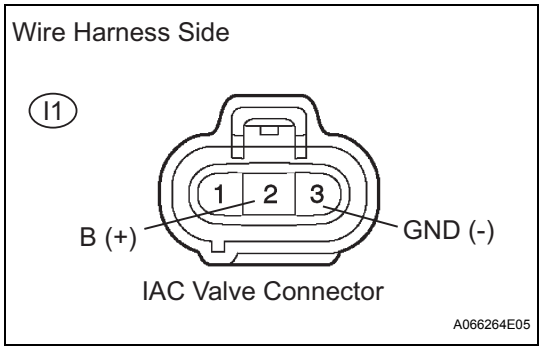
OK

6	CHECK FOR BLOCKAGE IN IAC VALVE AND PASSAGE TO BYPASS THROTTLE VALVE

NG → REPLACE IDLE AIR CONTROL VALVE

OK

7	CHECK HARNESS AND CONNECTOR (BATTERY - IAC VALVE, IAC VALVE - BODY GROUND)



(a) Disconnect the I1 IAC valve connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals of the IAC valve wire harness side connector.

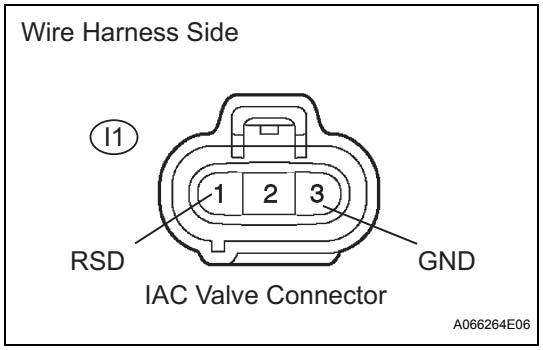
Standard voltage

Tester Connection	Specified Condition
B (I1-2) - GND (I1-3)	9 to 14 V

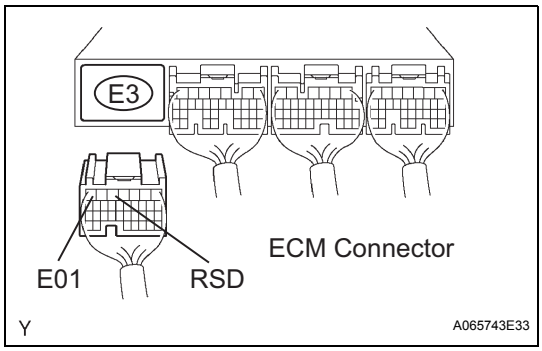
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

8	CHECK HARNESS AND CONNECTOR (IAC VALVE - ECM)



(a) Disconnect the I1 IAC valve connector.



(b) Disconnect the E3 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
RSD (I1-1) - RSD (E3-5)	Below 1 Ω
GND (I1-3) - E01 (E3-7)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
RSD (I1-1) or RSD (E3-5) - Body ground	10 kΩ or higher

ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

9	INSPECT IDLE AIR CONTROL VALVE

(a) Inspect the IAC valve (see page ES-351).

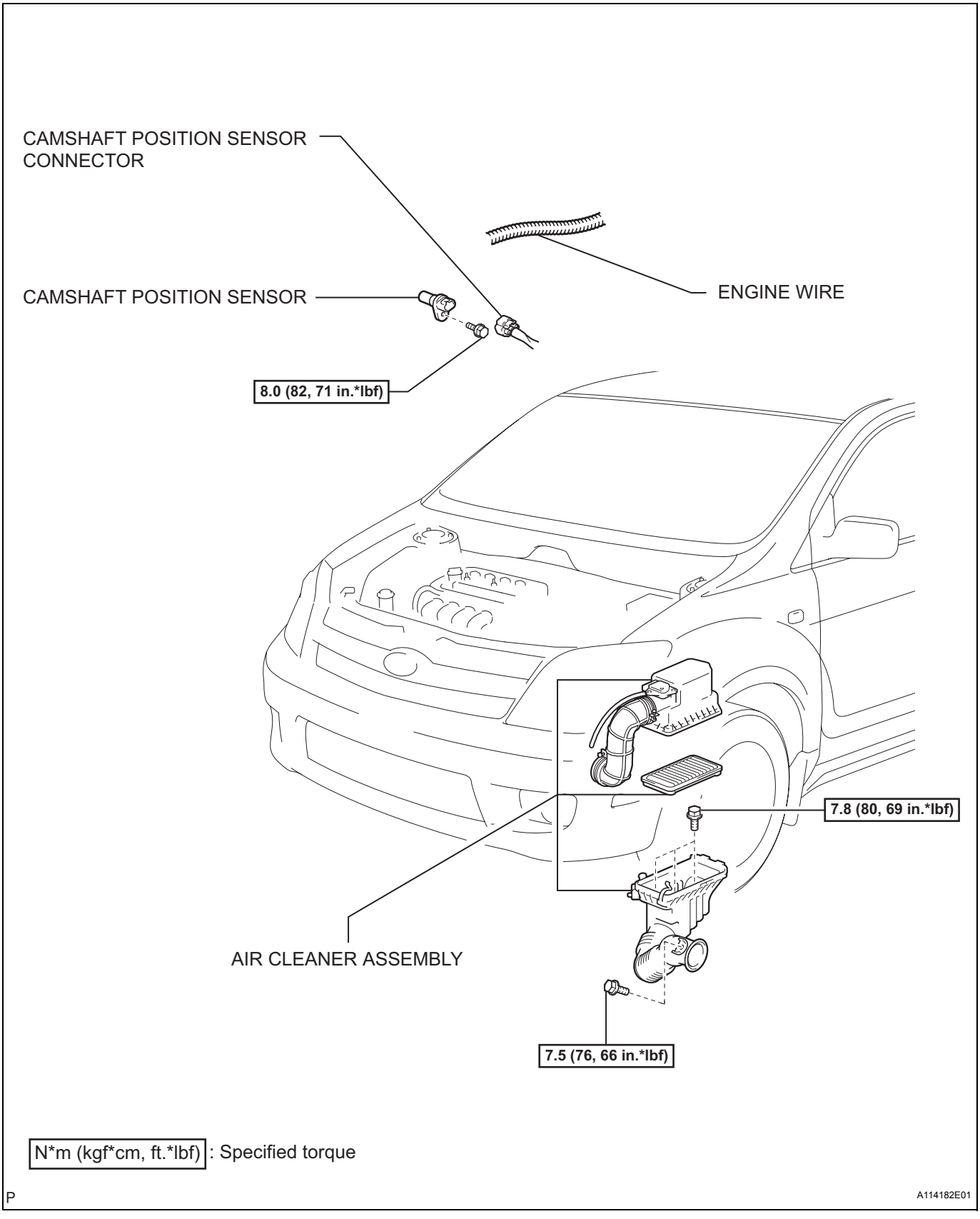
NG → **REPLACE IDLE AIR CONTROL VALVE**

OK

REPLACE ECM

CAMSHAFT POSITION SENSOR

COMPONENTS



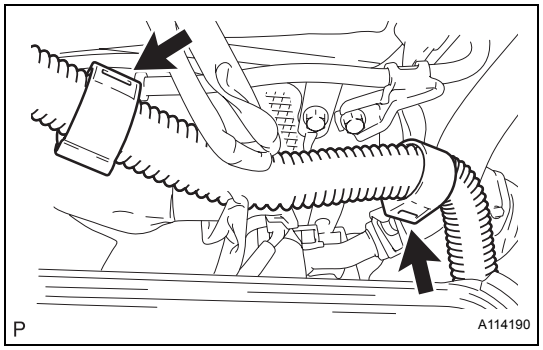
N*m (kgf*cm, ft.*lbf) : Specified torque

P

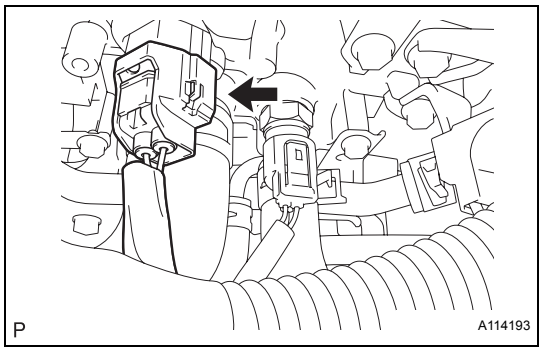
A114182E01

REMOVAL

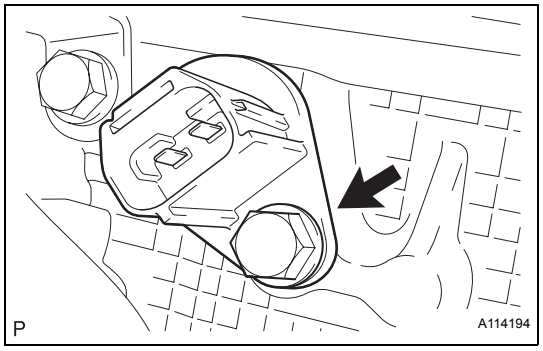
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE AIR CLEANER ASSEMBLY (See page ES-346)**
3. **DISCONNECT ENGINE WIRE**
   (a) Disconnect the 2 clamps of the engine wire.



4. **REMOVE CAMSHAFT POSITION SENSOR**
   (a) Disconnect the sensor connector.

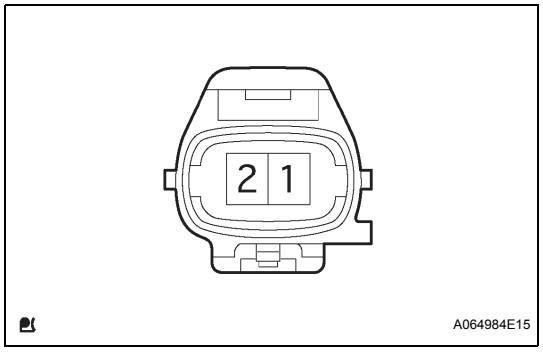


   (b) Remove the bolt and sensor.



INSPECTION

1. **INSPECT CAMSHAFT POSITION SENSOR**
   (a) Measure the resistance of the sensor.
   Standard resistance



Tester Connection	Condition	Specified Condition
1 - 2	Cold	1.630 to 2.740 Ω
1 - 2	Hot	2.065 to 3.225 Ω

If the result is not as specified, replace the camshaft position sensor.

DTC	P0550	Power Steering Pressure Sensor Circuit Malfunction

DTC	P0552	Power Steering Pressure Sensor Circuit Low Input

DTC	P0553	Power Steering Pressure Sensor Circuit High Input

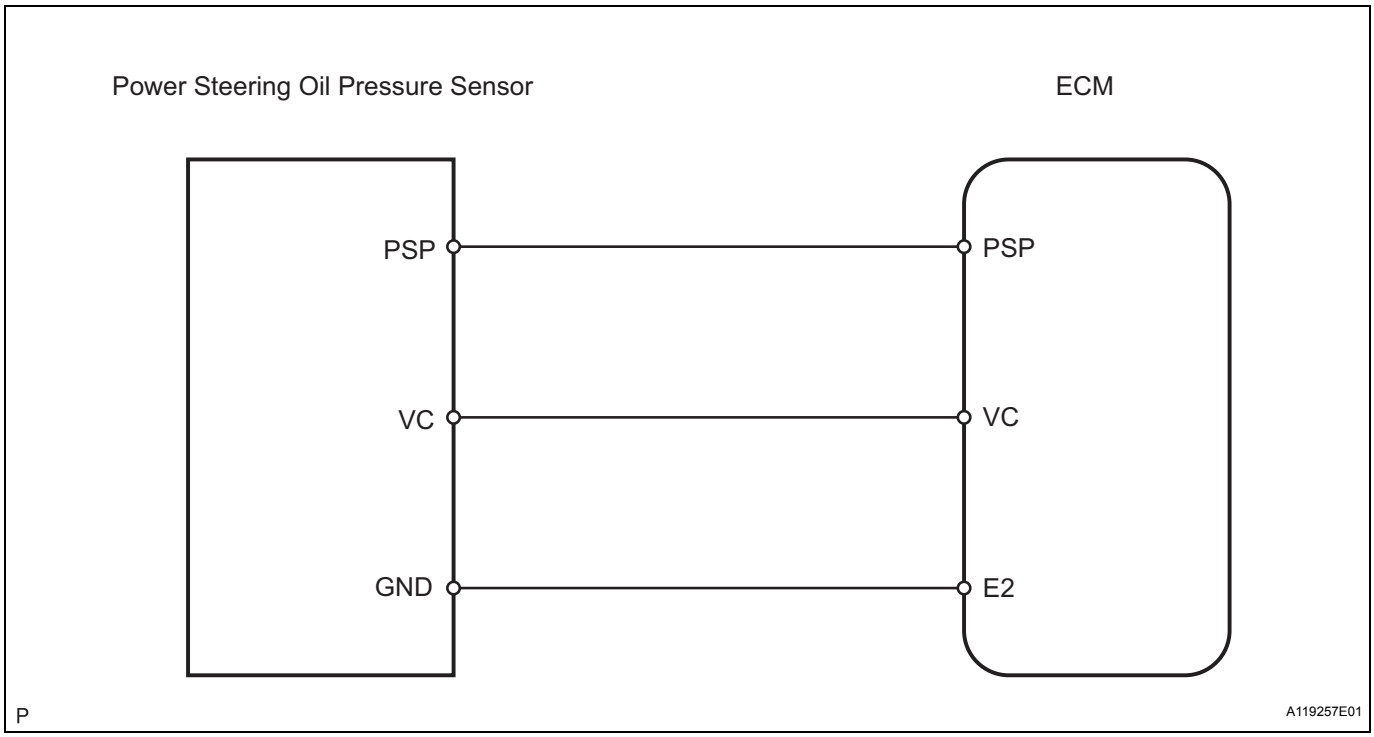
DESCRIPTION

ES

The power steering oil pressure sensor is turned ON when a power steering wheel load occurs by turning the steering wheel. The ECM regulates the engine idling RPM according to the voltage output of the sensor.

DTC No.	DTC Detection Condition	Trouble Area
P0550	Open or short in power steering oil pressure sensor circuit detected for more than 3 seconds after ignition switch turned ON. (1 trip detection logic)	• Open or short in power steering oil pressure sensor circuit • Power steering oil pressure sensor • ECM
P0552	Open in power steering oil pressure sensor circuit detected for more than 3 seconds after ignition switch turned ON.	• Open in power steering oil pressure sensor circuit • Power steering oil pressure sensor • ECM
P0553	Short in power steering oil pressure sensor circuit detected for more than 3 seconds after ignition switch turned ON.	• Short in power steering oil pressure sensor circuit • Power steering oil pressure sensor • ECM

WIRING DIAGRAM



MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to regulates the engine idling speed. When the sensor output voltage deviates from the normal operating range, the ECM determines that there is a malfunction in the power steering oil pressure sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0550: Power steering pressure sensor range check (Chattering) P0552: Power steering pressure sensor range check (Low Resistance) P0553: Power steering pressure sensor range check (High Resistance)
Required sensors/components (Main)	Power steering pressure sensor
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence of operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Time after starter signal ON to OFF	2 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0550:

Power steering pressure sensor voltage	Less than 0.28 V, or more than 4.9 V

P0552:

Power steering pressure sensor voltage	Less than 0.28 V

P0553:

Power steering pressure sensor voltage	More than 4.9 V

INSPECTION PROCEDURE

HINT:

- If other DTCs relating to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK POWER STEERING OIL PRESSURE SENSOR

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / PS SIGNAL.
(e) Read the value displayed on the tester.

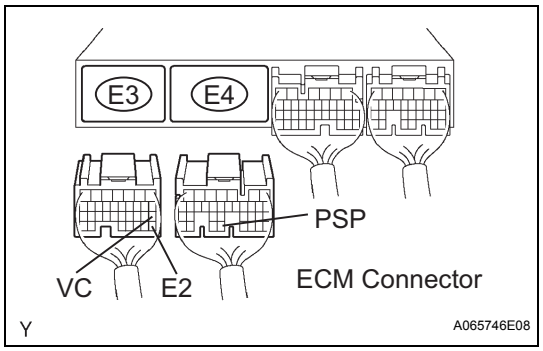
OK

Condition	Power steering oil pressure sensor
Steering wheel locked	ON
Engine is idle	OFF

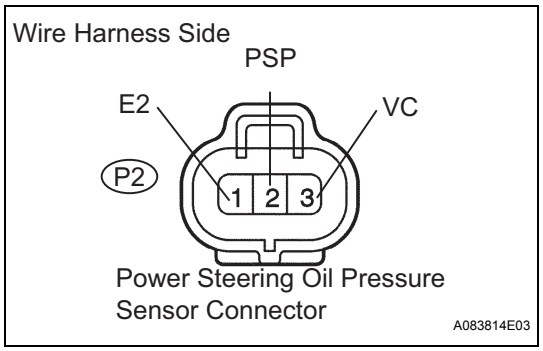
OK → CHECK FOR INTERMITTENT PROBLEMS

NG

2	CHECK HARNESS AND CONNECTOR (ECM - POWER STEERING OIL PRESSURE SENSOR)



(a) Disconnect the E3 and E4 ECM connectors.



(b) Disconnect the P2 power steering oil pressure sensor connector.

(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
PSP (P2-2) - PSP (E4-32)	Below 1 Ω
VC (P2-3) - VC (E3-18)	
E2 (P2-1) - E2 (E3-28)	

Standard resistance (Check for short)

Tester Connection	Specified Condition
PSP (P2-2) or PSP (E4-32) - Body ground	10 kΩ or higher
E2 (P2-1) or E2 (E3-28) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE POWER STEERING OIL PRESSURE SENSOR

ES

DTC	P0560	System Voltage

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is in the OFF position. This power allows the ECM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, the memory is cleared and the ECM determines that there is a malfunction in the power supply circuit. When the engine is next started, the ECM illuminates the MIL and sets the DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in ECM back up power source circuit (1 trip detection logic)	• Open in back up power source circuit • EFI fuse • ECM

ES

HINT:
If DTC P0560 is set, the ECM does not store other DTCs.

MONITOR STRATEGY

Related DTCs	P0560: ECM system voltage
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate (MIL will be illuminated after next engine start)
Sequence of Operation	None

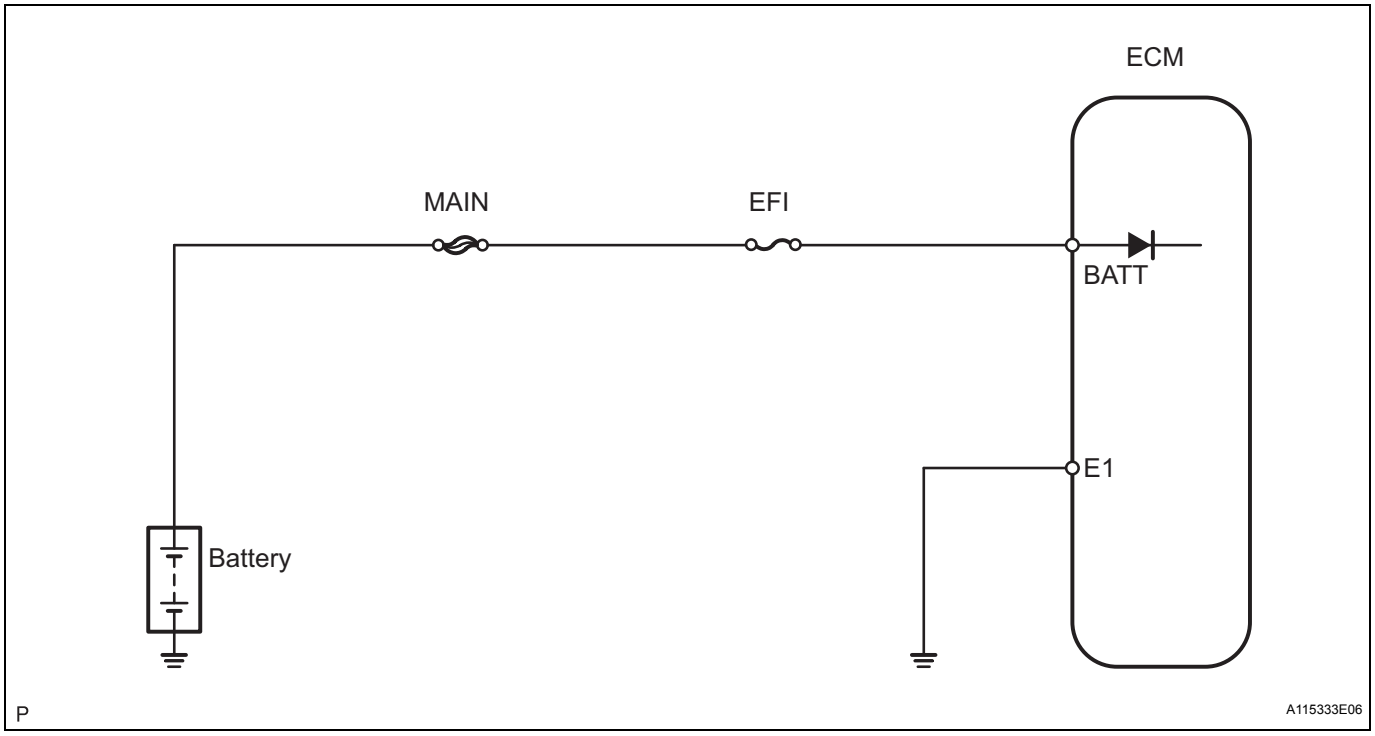
TYPICAL ENABLING CONDITIONS

Monitor runs whenever these DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

ECM power source	Less than 3.5 V

WIRING DIAGRAM

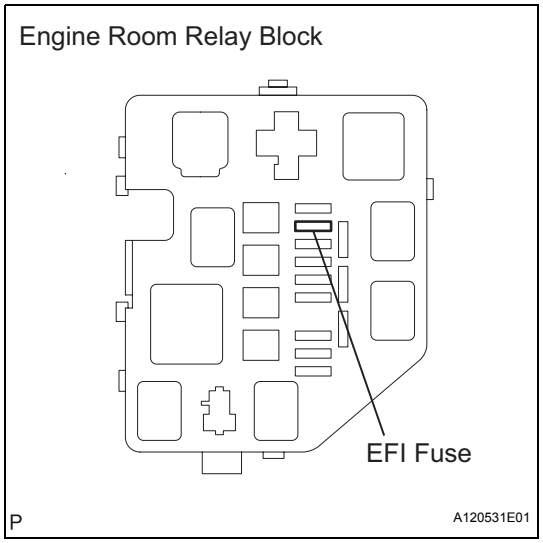


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK FUSE (EFI)

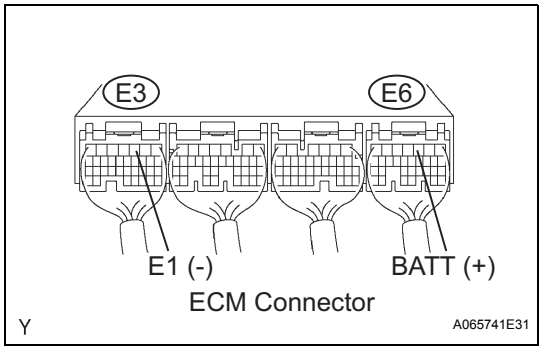


(a) Remove the EFI fuse from the engine room relay block.
(b) Measure the resistance of the EFI fuse.
Standard resistance:
Below 1 Ω

NG → **CHECK FOR SHORT IN ALL HARNESSES AND COMPONENTS CONNECTED TO FUSE**

OK

2	INSPECT ECM (BATT VOLTAGE)



(a) Measure the voltage of the E3 and E6 ECM connectors.
Standard voltage

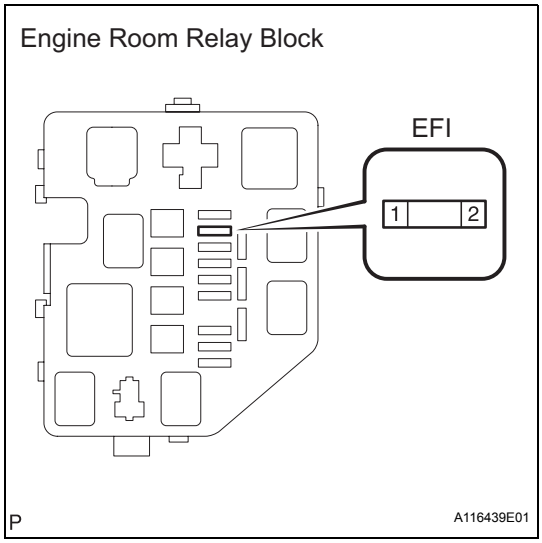
Tester Connection	Specified Condition
BATT (E6-3) - E1 (E3-3)	9 to 14 V

NG → **Go to step 3**

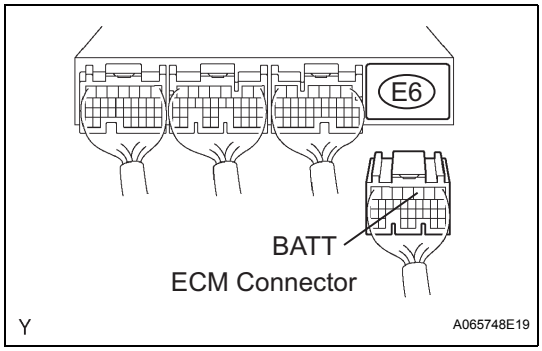
OK

REPLACE ECM

3	CHECK HARNESS AND CONNECTOR (ECM - EFI FUSE, EFI FUSE - BATTERY)



(a) Check the harness and connector between the EFI fuse and ECM.
(1) Remove the EFI fuse from the engine room relay block.



(2) Disconnect the E6 ECM connector.
(3) Measure the resistance of the wire harness side connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
Engine room relay block (EFI relay terminal 2) - BATT (E6-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Engine room relay block (EFI relay terminal 2) or BATT (E6-3) - Body ground	10 kΩ or higher

(b) Check the harness and connector between the EFI fuse and battery.
(1) Remove the EFI fuse from the engine room relay block.
(2) Disconnect the positive (+) battery terminal.
(3) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
Battery positive terminal - Engine room relay block (EFI relay terminal 1)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Battery positive terminal or Engine room relay block (EFI relay terminal 1) - Body ground	10 kΩ or higher

ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT BATTERY

(a) Check that the battery is not depleted.

NG → **REPLACE BATTERY**

OK

CHECK AND REPLACE ENGINE ROOM RELAY BLOCK ASSEMBLY

DTC	P0606	ECM / PCM Processor

MONITOR DESCRIPTION

The ECM continuously monitors its own internal circuits. This self-checking ensures that the ECM is functioning properly.
The 2 CPUs, main and sub, inside the ECM perform continuous mutual monitoring. If the outputs from the 2 CPUs differ or deviate from the standard levels, the ECM determines that the internal circuits are malfunctioning. The ECM then illuminates the MIL and set the DTCs.

DTC No.	DTC Detection Condition	Trouble Area
P0606	ECM internal error (1 trip detection logic)	ECM

ES

MONITOR STRATEGY

Related DTCs	P0606: ECM CPU malfunction
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	Within 1 second
MIL Operation	Immediate
Sequence of Operation	None

MONITOR STRATEGY

Monitor runs whenever following DTCs not present	

TYPICAL MALFUNCTION THRESHOLDS

RAM	RAM check failure

INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION P0606)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0606	**A**
P0606 and other DTCs	**B**

B → GO TO RELEVANT DTC CHART

A

REPLACE ECM

DTC	P0617	Starter Relay Circuit High

MONITOR DESCRIPTION

While the engine being cranked, the positive battery voltage is applied to terminal STA of the ECM. If the ECM detects the Starter Control (STA) signal while the vehicle is being driven, it determines that there is a malfunction in the STA circuit. The ECM then illuminates the MIL and sets the DTC. This monitor runs when the vehicle is driven at 20 km/h (12.4 mph) for over 20 seconds.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When conditions (a), (b) and (c) met when battery (+B) voltage 10.5 V or more applied for 20 seconds (1 trip detection logic): (a) Vehicle speed greater than 12.4 mph (20 km/h) (b) Engine revolution greater than 1,000 rpm (c) STA signal ON	• Park/Neutral Position (PNP) switch switch (A/T)* • Clutch start switch (M/T)* • ST relay circuit • ECM

*: A/T denotes Automatic Transaxle models and M/T denotes Manual Transaxle models.

MONITOR STRATEGY

Related DTCs	P0617: Starter signal
Required Sensors/Components (Main)	ST relay, Park/Neutral position switch and Ignition switch
Required Sensors/Components (Related)	Vehicle Speed Sensor (VSS), Crankshaft Position (CKP) sensor
Frequency of Operation	Continuous
Duration	20 seconds
MIL Operation	Immediate
Sequence of Operation	None

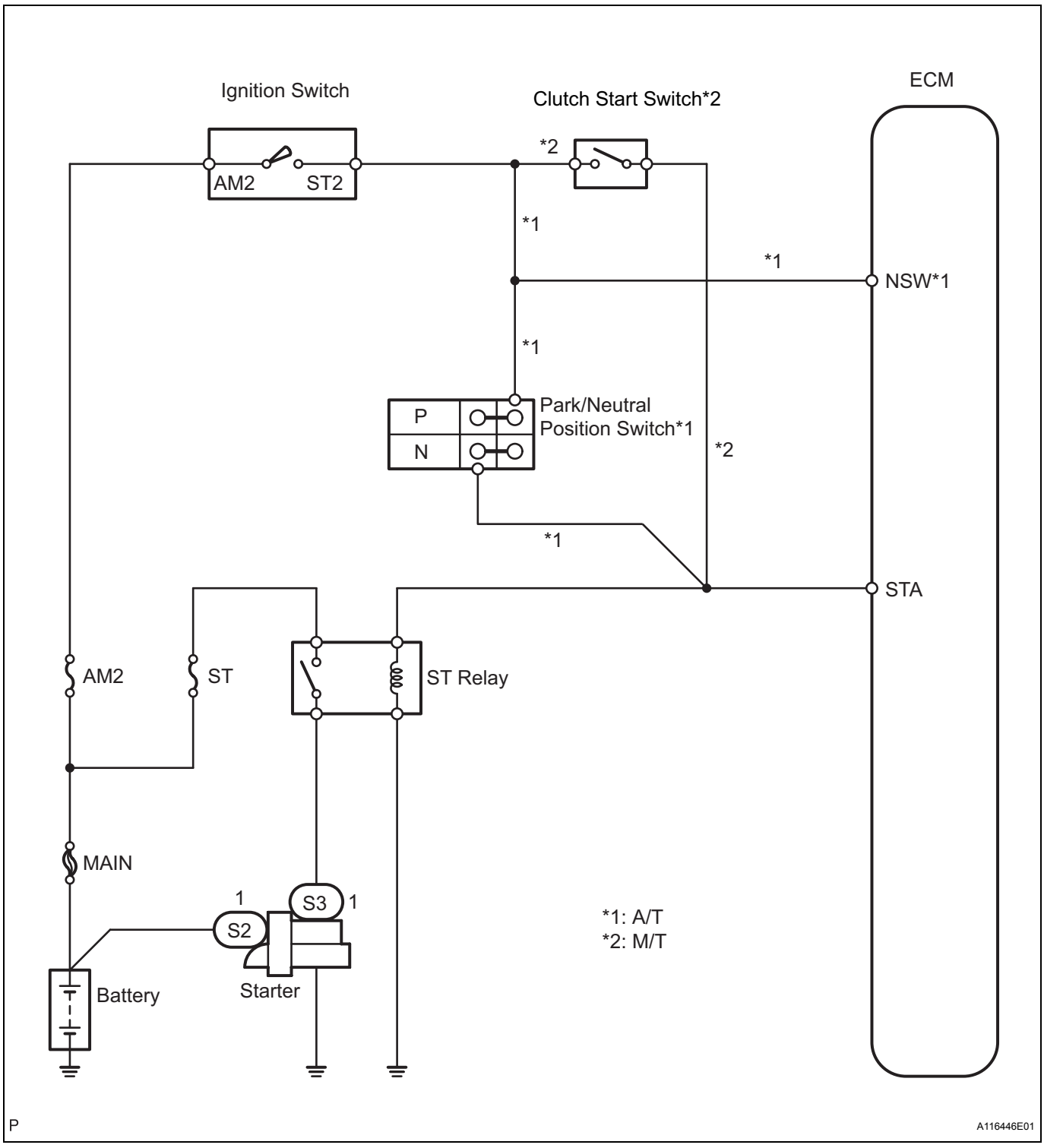
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Battery voltage	10.5 V or more
Vehicle speed	20 km/h (12.4 mph) or more
Engine speed	1,000 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

Starter signal	ON

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- The following troubleshooting flowchart is based on the premise that the engine is cranked normally. If the engine will not crank, proceed to the problem symptoms table on page ES-27.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STARTER SIG.
(d) Check the value displayed on the tester when the ignition switch is turned to the ON and START positions.
OK

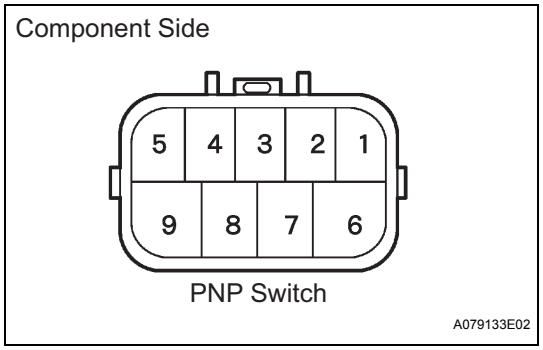
Ignition Switch Position	STARTER SIG
ON	OFF
START	ON

ES

OK → CHECK FOR INTERMITTENT PROBLEMS

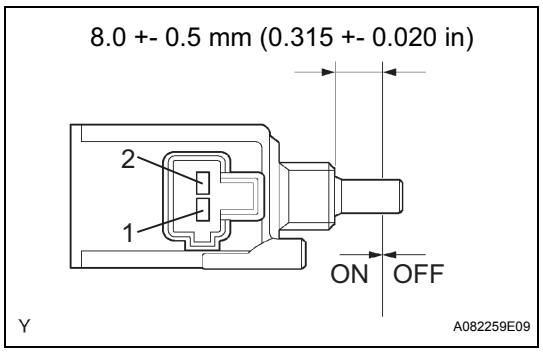
NG

2	INSPECT PARK/NEUTRAL POSITION SWITCH OR CLUTCH START SWITCH



(a) Inspect the Park/Neutral Position (PNP) switch (for A/T models).
(1) Disconnect the P1 PNP switch connector.
(2) Measure the resistance when the transmission gear selector lever is moved to each position.
Standard resistance

Gear Selector Lever Position	Tester Connection	Specified Condition
P	1 - 3, 6 - 9	Below 1 Ω
N	3 - 5, 6 - 9	Below 1 Ω



(b) Inspect the clutch start switch (for M/T models).
(1) Disconnect the C9 clutch start switch connector.
(2) Measure the resistance when the clutch start switch is ON and OFF.
Standard resistance

Ignition Switch Position	Tester Connection	Specified Condition
ON (pushed)	1 - 2	Below 1 Ω
OFF (free)	1 - 2	10 kΩ or higher

NG → REPLACE PARK/NEUTRAL POSITION SWITCH OR CLUTCH START SWITCH (GO TO NEXT STEP AFTER REPLACEMENT)

OK

3	READ VALUE OF INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STARTER SIG.
(d) Check the value displayed on the tester when the ignition switch is turned to the ON and START positions.

OK

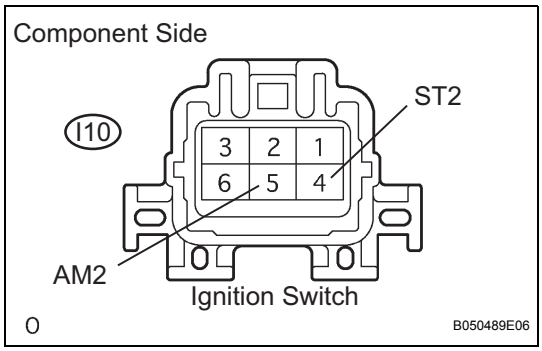
Ignition Switch Position	STARTER SIG
ON	OFF
START	ON

OK → **SYSTEM OK**

NG

ES

4 INSPECT IGNITION SWITCH ASSEMBLY



(a) Disconnect the I10 ignition switch connector.
(b) Measure the resistance of the ignition switch.

Switch Position	Tester Connection	Specified Condition
LOCK	All Terminals	10 kΩ or higher
START	ST2 (4) - AM2 (5)	Below 1 Ω

NG → **REPLACE IGNITION SWITCH ASSEMBLY (GO TO NEXT STEP AFTER REPLACEMENT)**

NG

5 READ VALUE OF INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STARTER SIG.
(d) Check the value displayed on the tester when the ignition switch is turned to the ON and START positions.

OK

Ignition Switch Positions	STARTER SIG
ON	OFF
START	ON

OK → **SYSTEM OK**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

DTC	P0630	VIN not Programmed or Mismatch - ECM / PCM

DESCRIPTION

DTC P0630 is set if the Vehicle Identification Number (VIN) is not stored in the ECM or the input VIN is not accurate. Input the VIN with the intelligent tester (see page ES-14).

DTC No.	DTC Detection Condition	Trouble Area
P0630	• VIN not stored in ECM • Input VIN in ECM not accurate	ECM

MONITOR STRATEGY

Related DTCs	P0630: VIN not programmed
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	None
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

VIN code	Not programmed

COMPONENT OPERATING RANGE

VIN code	Programmed

INSPECTION PROCEDURE

1	READ CURRENT DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DAC INFO / CURRENT CODES.
(d) Read DTCs.

Result

Display (DTC Output)	Proceed to
P0630	**A**
P0630 and other DTCs	**B**

If any DTCs other than P0630 are output, troubleshoot those DTCs first.

NOTICE:
If P0630 is set, the VIN must be input to the ECM using the intelligent tester. However, all DTCs are cleared automatically by the tester when inputting the VIN. If DTCs other than P0630 are set, check them first.

B	GO TO DTC CHART

A

2	INPUT VIN WITH INTELLIGENT TESTER

(a) Input the VIN with the intelligent tester (see page ES-14).

ES

NEXT

END

DTC	P2401	Evaporative Emission Leak Detection Pump Stuck OFF

DTC	P2402	Evaporative Emission Leak Detection Pump Stuck ON

DTC SUMMARY

DTC No.	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2401	Leak detection pump stuck OFF	P043E, P043F, P2401, P2402 and P2419 are present when one of the following conditions is met during key-off EVAP monitor: • EVAP pressure just after reference pressure measurement greater than -1 kPa-g (755 mmHg-a) • Reference pressure less than -4.85 kPa-g (726 mmHg-a) • Reference pressure greater than -1 kPa-g (755 mmHg-a) • Reference pressure is not saturated • Reference pressure difference between first and second is 0.7 kPa-g (5 mmHg-g) or more HINT: These values are typical	• Canister pump module (reference orifice, leak detection pump, vent valve) • Connector/wire harness (canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	Ignition switch OFF	2 trip

ES

DTC No.	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2402	Leak detection pump stuck ON	P043E, P043F, P2401, P2402 and P2419 are present when one of the following conditions is met during key-off EVAP monitor: • EVAP pressure just after reference pressure measurement greater than -1 kPa-g (755 mmHg-a) • Reference pressure less than -4.85 kPa-g (726 mmHg-a) • Reference pressure greater than -1 kPa-g (755 mmHg-a) • Reference pressure is not saturated • Reference pressure difference between first and second is 0.7 kPa-g (5 mmHg-g) or more HINT: These values are typical	• Canister pump module (reference orifice, leak detection pump, vent valve) • Connector/wire harness (canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	Ignition switch OFF	2 trip

DESCRIPTION

The circuit description can be found in the Evaporative Emission (EVAP) system (see page ES-272).

INSPECTION PROCEDURE

Refer to the EVAP system (see page ES-272).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:

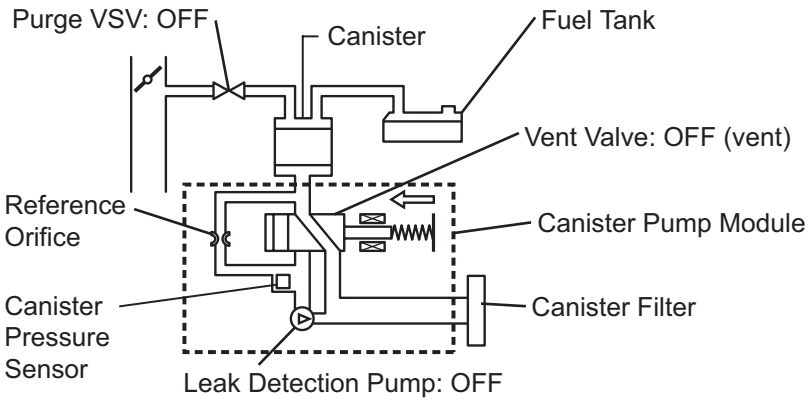
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned OFF, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned OFF, the monitor check starts 2.5 hours later.

Sequence	Operation	Description	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch OFF.	-

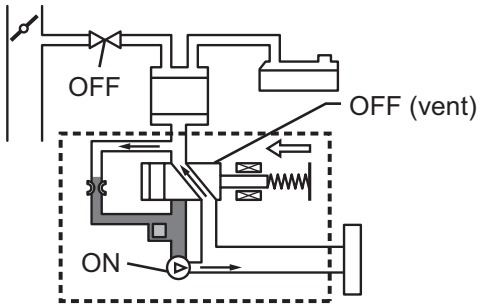
Sequence	Operation	Description	Duration
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak criterion measurement	In order to determine 0.02 inch leak criterion, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 900 seconds, ECM cancels EVAP system monitor.	900 seconds*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak criterion measurement	After second 0.02 inch leak criterion measurement, leak check performed by comparing first and second 0.02 inch leak criterion. If stabilized system pressure higher than second 0.02 inch leak criterion, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

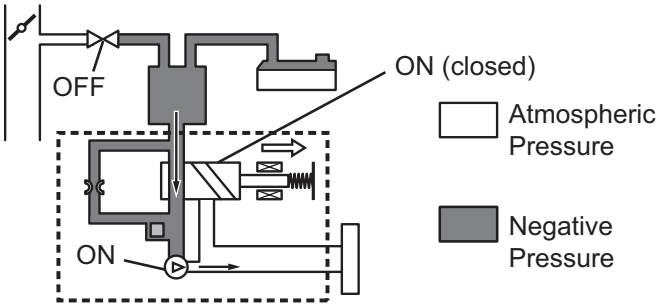
Operation A: Atmospheric Pressure Measurement



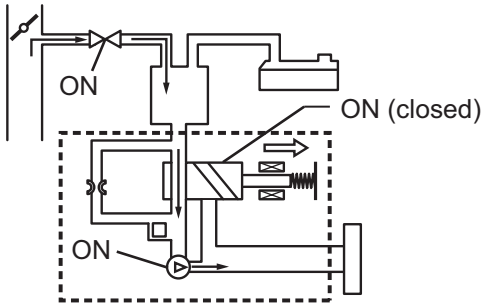
Operation B, E: 0.02 Inch Leak Criterion Measurement



Operation C: EVAP System Pressure Measurement

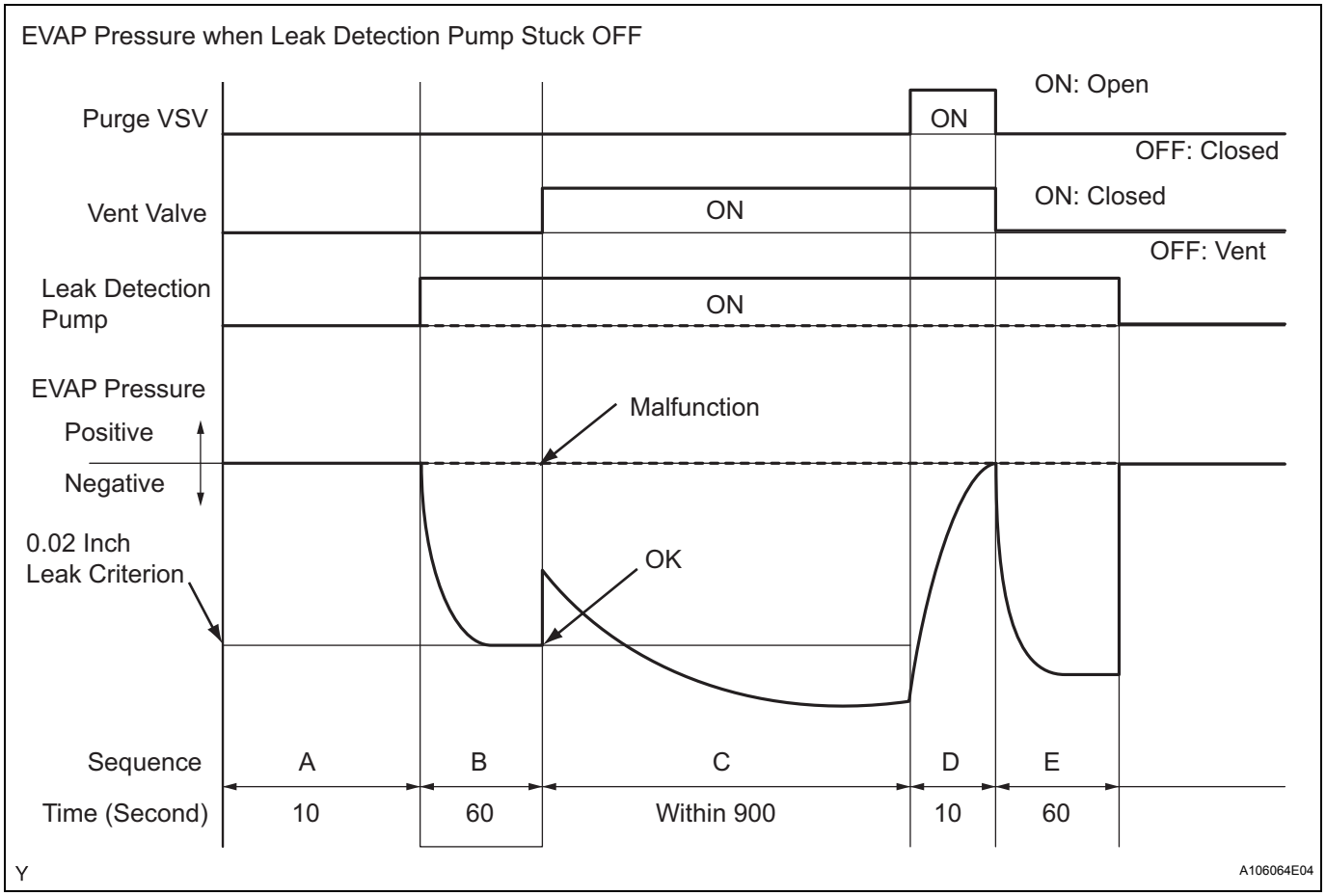


Operation D: Purge VSV Monitor

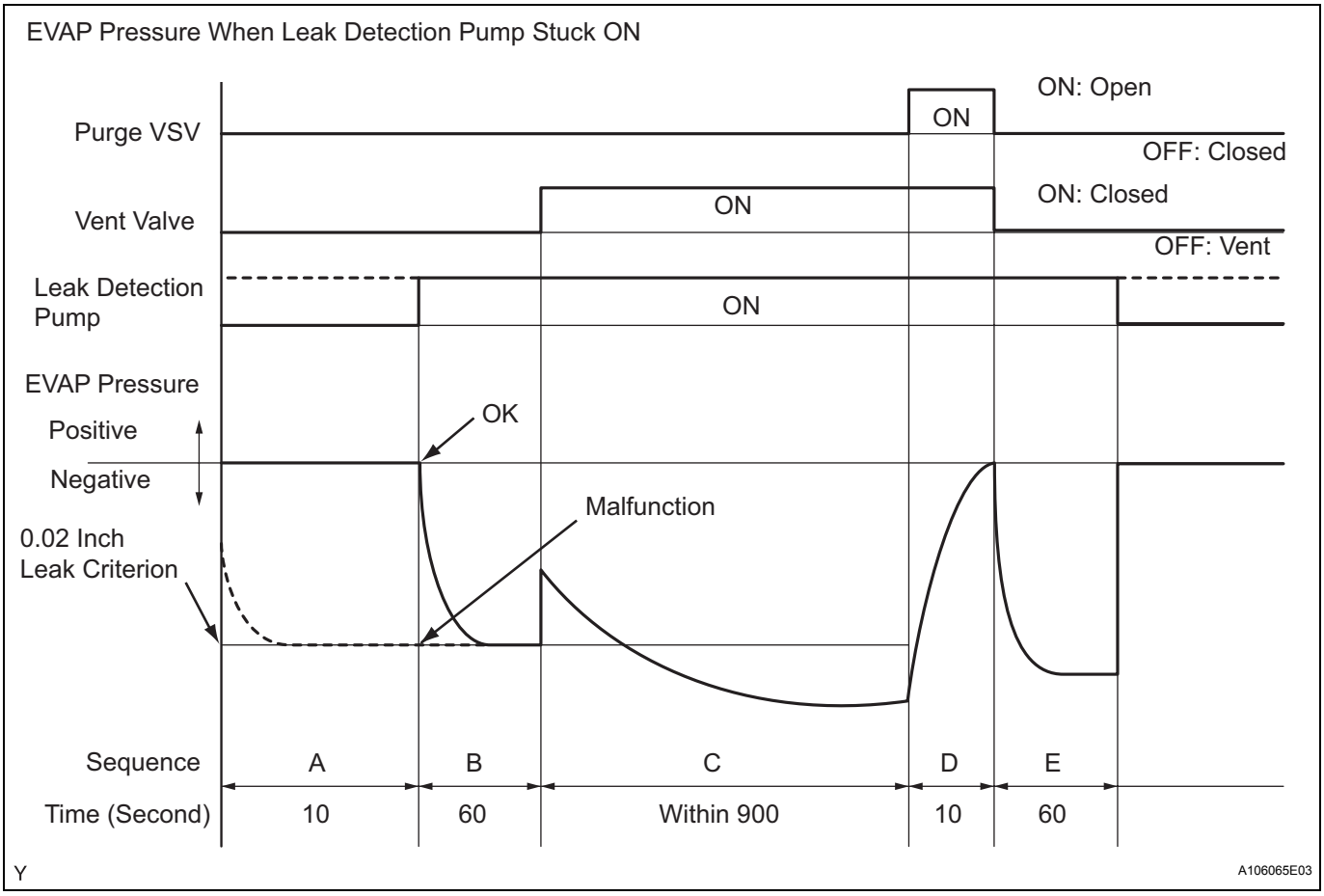


A122912E01

1. P2401: Leak detection pump stuck OFF
   In operation B, the leak detection pump creates negative pressure (vacuum) through the reference orifice. The EVAP system pressure is then measured by the ECM using the canister pressure sensor to determine the 0.02 inch leak criterion. If the pressure is higher than -1.06 kPa (-7.95 mmHg)* or lower than -4.85kPa (-36.38 mmHg)*, the ECM interprets this as the leak detection pump being stuck OFF (not operating). The ECM then illuminates the MIL and sets the DTC (2 trip detection logic).
   *: The threshold varies according to the atmospheric pressure measured in operation A. The values described above are based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



2. P2402: Leak detection pump stuck ON
   In operation B, the leak detection pump creates negative pressure (vacuum) through the reference orifice. The EVAP system pressure is then measured by the ECM using the canister pressure sensor to determine the 0.02 inch leak criterion. If the pressure is higher than -1.06 kPa (-7.95 mmHg)* or lower than -4.85 kPa (-36.38 mmHg)*, the ECM interprets this as the leak detection pump being stuck ON (operating all the time). The ECM illuminates the MIL and sets the DTC (2 trip detection logic).
   *: The threshold varies according to the atmospheric pressure measured in operation A. The values described above are based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



HINT:
The detection logic of DTCs P2401 and P2402 is the same because in both cases the 0.02 inch leak criterion measured in operation B is compared to the atmospheric pressure registered in operation A. The ECM calculates the difference between these pressures by deducting [the 0.02 inch leak criterion] from [the stored atmospheric pressure], and uses this to monitor the EVAP system pressure change.

MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 2 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Enabling conditions of EVAP key-OFF monitor	
P043E (Reference orifice - low flow) P043F (Reference orifice - high flow) P0441 (Purge VSV - stuck open) P0441 (Purge VSV - stuck closed) P0451 (Canister pressure sensor - noise) P0455 (EVAP gross leak) P0456 (EVAP 0.02 inch leak) P2401 (Leak detection pump - stuck OFF) P2402 (Leak detection pump - stuck ON) P2419 (Vent valve - stuck ON) P2420 (Vent valve - stuck OFF)	
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)

Battery voltage	10.5 V or higher
Vehicle speed	4 km/h (2.5 mph) or less
Ignition switch	OFF
Time after key off	5 or 7 or 9.5 hours
Canister pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions 1 and 2 are met before key off	-
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met	-
Atmospheric pressure change	Within 0.3 kPa (2.25 mmHg) in 1 second

2. First reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement start	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction

Next sequence is run if the following condition is met	-
EVAP pressure	Saturated within 900 seconds

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after purge VSV is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement	-1 kPa (-7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated
Reference pressure difference between first and second	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if the following condition is met	-
EVAP pressure when vacuum introduction is complete	Lower than second reference pressure

8. Atmospheric pressure measurement

EVAP monitor is complete if the following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa (2.25 mmHg)

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

One of following conditions met	-
FTP when just after reference pressure measurement began	-1 kPa (755 mmHg) or higher
Reference pressure	Less than -4.85 kPa (726 mmHg)
Reference pressure	-1.05 kPa (754 mmHg) or higher
Reference pressure	Not saturated
Reference pressure difference between first and second	0.7 kPa (5.25 mmHg) or more

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

DTC	P2419	Evaporative Emission Pressure Switching Valve Stuck ON

DTC	P2420	Evaporative Emission Pressure Switching Valve Stuck OFF

DTC SUMMARY

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timing	Detection Logic
P2419	Vent valve stuck closed	P043E, P043F, P2401, P2402 and P2419 are present when one of the following conditions is met during key-off EVAP monitor: • EVAP pressure just after reference pressure measurement greater than -1 kPa-g (755 mmHg-a) • Reference pressure less than -4.85 kPa-g (726 mmHg-a) • Reference pressure greater than -1 kPa-g (755 mmHg-a) • Reference pressure is not saturated • Reference pressure difference between first and second is 0.7 kPa-g (5 mmHg-g) or more HINT: These values are typical	• Canister pump module (reference orifice, leak detection pump, vent valve) • Connector/wire harness (canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	Ignition switch OFF	2 trip
P2420	Vent valve stuck open (vent)	The following condition is met during key-off EVAP monitor: • EVAP pressure change when vent valve is closed (ON) less than 0.3 kPa-g (2.25 mmHg-g)	• Canister pump module (reference orifice, leak detection pump, vent valve) • Connector/wire harness (canister pump module - ECM) • ECM	Ignition switch OFF	2 trip

DESCRIPTION

The circuit description can be found in the Evaporative Emission (EVAP) system (see page ES-272).

INSPECTION PROCEDURE

Refer to the EVAP system (see page ES-272).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

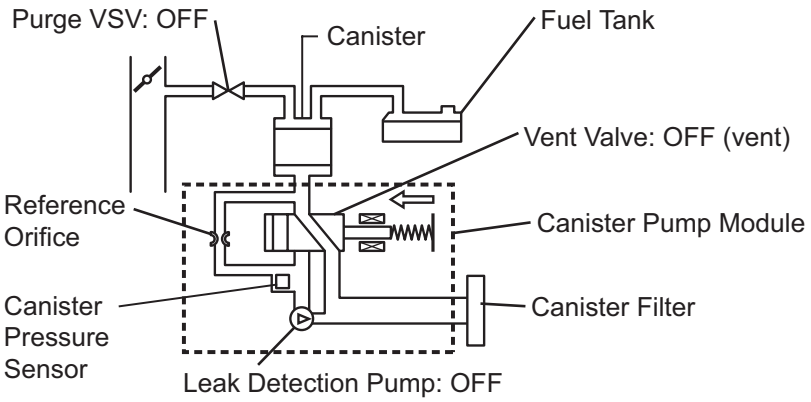
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned OFF, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned OFF, the monitor check starts 2.5 hours later.

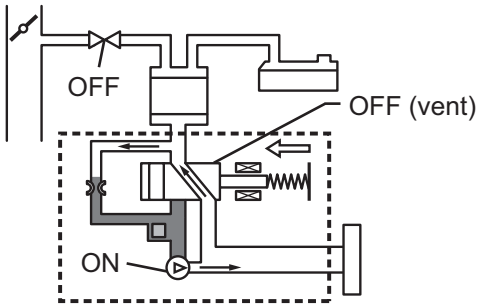
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak criterion measurement	In order to determine 0.02 inch leak criterion, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 900 seconds, ECM cancels EVAP system monitor.	900 seconds*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak criterion measurement	After second 0.02 inch leak criterion measurement, leak check performed by comparing first and second 0.02 inch leak criterion. If stabilized system pressure higher than second 0.02 inch leak criterion, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

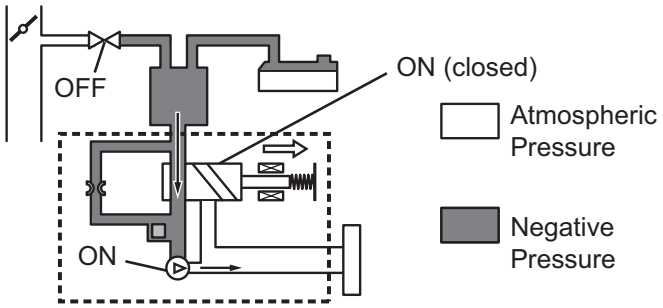
Operation A: Atmospheric Pressure Measurement



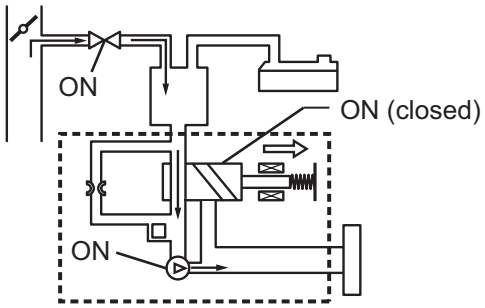
Operation B, E: 0.02 Inch Leak Criterion Measurement



Operation C: EVAP System Pressure Measurement



Operation D: Purge VSV Monitor

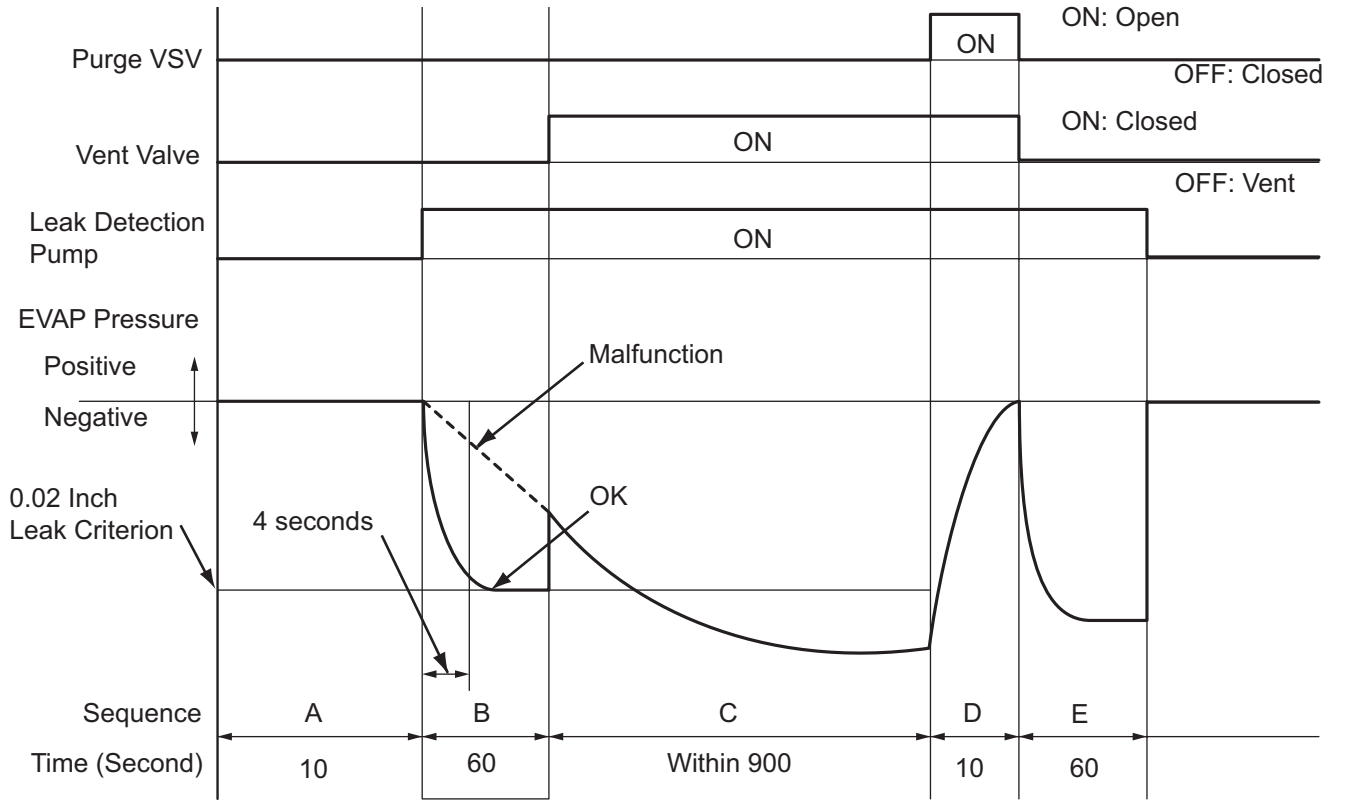


A122912E01

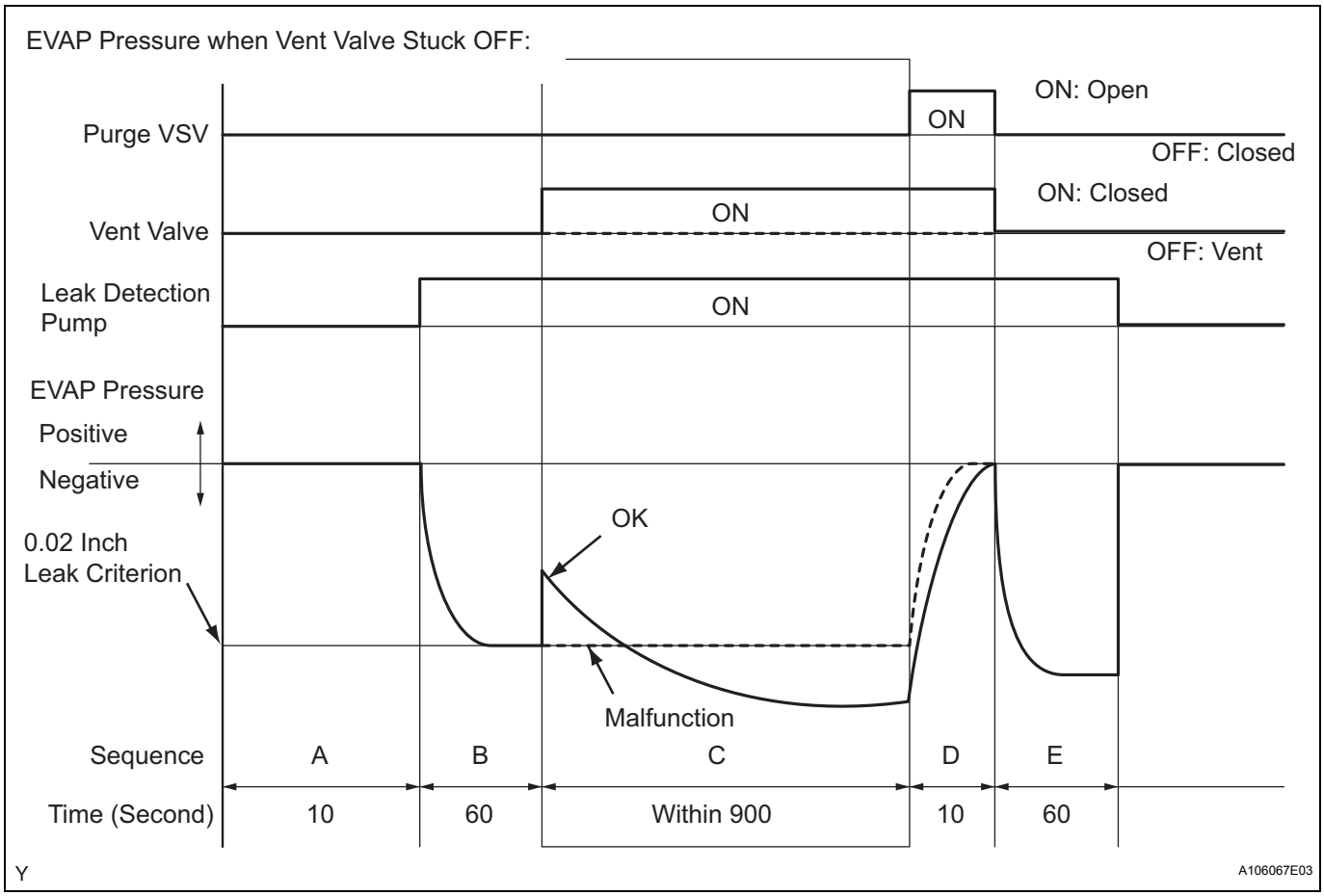
ES

1. P2419: Vent valve stuck closed
   In operation B, the leak detection pump creates negative pressure (vacuum) through the reference orifice. The EVAP system pressure is then measured by the ECM using the canister pressure sensor to determine the 0.02 inch leak criterion. If the pressure exceeds -1.06 kPa (-7.95 mmHg)* 4 seconds after the leak detection pump is turned ON, the ECM interprets this as the vent valve being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).
   *: The threshold varies according to the atmospheric pressure measured in operation A. The values described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.

EVAP Pressure when Vent Valve Stuck OFF:



2. P2420: Vent valve stuck open (vent)
In operation C, the vent valve turns ON (closes) and the EVAP system pressure is then measured by the ECM using the canister pressure sensor to conduct an EVAP leak check. If pressure does not drop when the vent valve is open, the ECM interprets this as the vent valve being stuck open. The ECM illuminates the MIL and sets the DTC.



MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	2 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Enabling conditions of EVAP key-OFF monitor	
P043E (Reference orifice - low flow) P043F (Reference orifice - high flow) P0441 (Purge VSV - stuck open) P0441 (Purge VSV - stuck closed) P0451 (Canister pressure sensor - noise) P0455 (EVAP gross leak) P0456 (EVAP 0.02 inch leak) P2401 (Leak detection pump - stuck OFF) P2402 (Leak detection pump - stuck ON) P2419 (Vent valve - stuck ON) P2420 (Vent valve - stuck OFF)	
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)

Battery voltage	10.5 V or higher
Vehicle speed	4 km/h (2.5 mph) or less
Ignition switch	OFF
Time after key off	5, 7 or 9.5 hours
Canister pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions 1 and 2 are met before key off	-
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

ES

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met	-
Atmospheric pressure change	Within 0.3 kPa (2.25 mmHg) in 1 second

2. First reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement start	1 kPa (7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction

Next sequence is run if the following condition is met	-
EVAP pressure	Saturated within 900 seconds

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if the following conditions are met	-
EVAP pressure just after reference pressure measurement	1 kPa (7.5 mmHg) or lower
Reference pressure	-4.85 to -1.05 kPa (726 to 754 mmHg)
Reference pressure	Saturated
Reference pressure difference between first and second	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if the following condition is met	-
EVAP pressure when vacuum introduction is complete	Lower than second reference pressure

8. Atmospheric pressure measurement

EVAP monitor is complete if the following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa (2.25 mmHg)

TYPICAL MALFUNCTION THRESHOLDS

1. P2419: Vent valve stuck closed

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

One of following conditions met	-
FTP when just after reference pressure measurement began	-1 kPa (755 mmHg) or higher
Reference pressure	Less than -4.85 kPa (726 mmHg)
Reference pressure	-1.05 kPa (754 mmHg) or higher
Reference pressure	Not saturated within 60 seconds
Reference pressure difference between first and second	0.7 kPa (5.25 mmHg) or more

2. P2420: Vent valve stuck open (vent)

EVAP pressure change after EVAP canister vent valve is ON	Less than 0.3 kPa (2.25 mmHg)

ES

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-303).

DTC	P2610	ECM / PCM Internal Engine Off Timer Performance

DTC SUMMARY

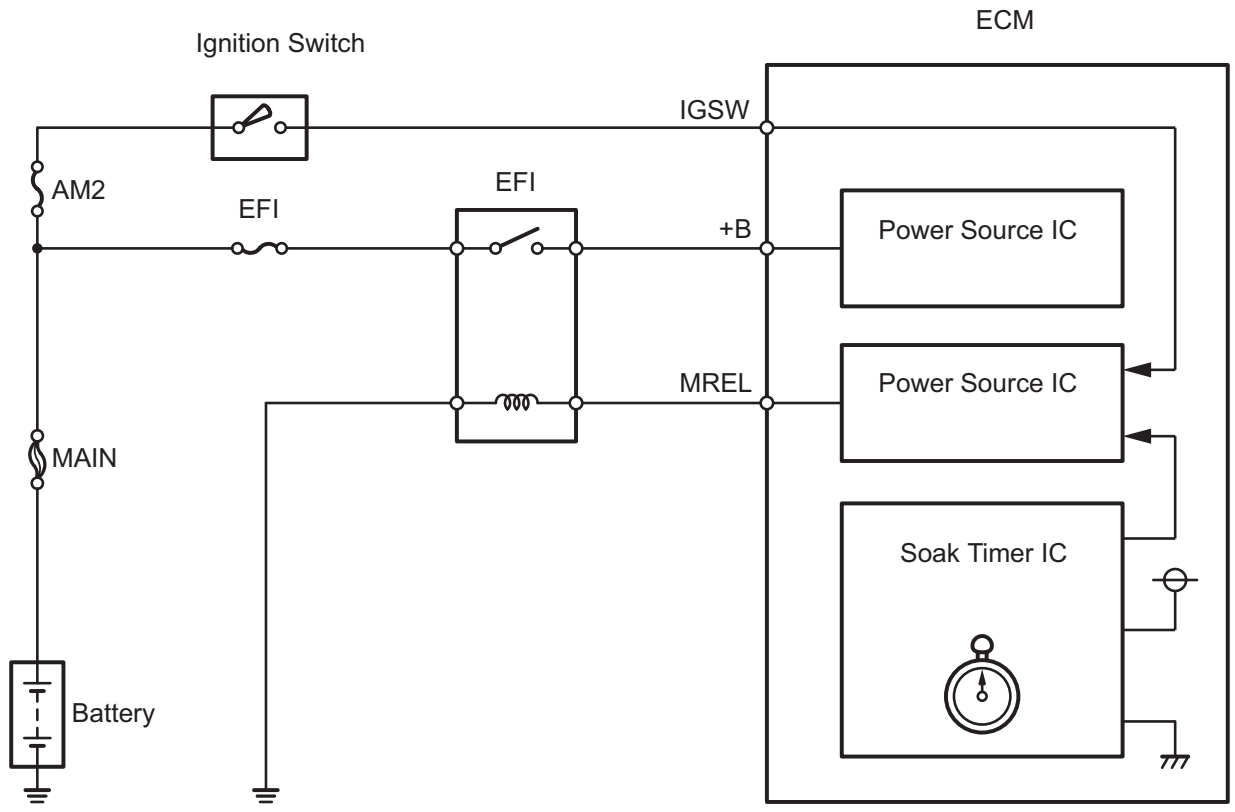
DTC No.	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2610	Soak timer (built into ECM)	ECM internal malfunction	ECM	Engine running	2 trip

DESCRIPTION

ES

The soak timer is built into the ECM. To ensure that the Evaporative Emission (EVAP) monitor values will be accurate, the soak timer counts 5 hours (+-15 minutes) from when the ignition switch is turned OFF. This allows the fuel to cool down, which stabilizes the Fuel Tank Pressure (FTP). When approximately 5 hours have passed, the ECM turns ON.

Soak Timer Circuit:



MONITOR DESCRIPTION

5 hours after the ignition switch is turned OFF, the soak timer activates the ECM to begin the EVAP system monitor. While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If the soak timer and CPU clock are not synchronized, the ECM interprets this as a malfunction, illuminates the MIL and sets the DTC (2 trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	ECM
Frequency of Operation	Once per driving cycle

Duration	10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTC not present	None
Ignition switch	ON
Engine	Running
Battery voltage	8 V or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Soak timer measurement when ECM CPU clock counts 10 minutes	Less than 7 minutes or more than 13 minutes

INSPECTION PROCEDURE

HINT:

- DTC P2610 is set if an internal ECM problem is detected. Diagnostic procedures are not required. ECM replacement is required.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**REPLACE ECM**

(a) Replace the ECM (see page ES-362).

NEXT

2	**CHECK WHETHER DTC OUTPUT RECURS**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester ON.
(c) Clear DTCs (see page ES-36).
(d) Start the engine and wait for 10 minutes or more.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(f) If no pending DTC is displayed, the repair has been successfully completed.

NEXT

END

EVAP System

RELATED DTCS

DTC No.	Monitoring Items	See procedure
P043E	Reference orifice clogged (built into canister pump module)	ES-199
P043F	Reference orifice high-flow (built into canister pump module)	
P0441	• Purge VSV stuck closed • Purge VSV stuck open • Purge flow	ES-207
P0450	Canister pressure sensor (built into canister pump module) voltage abnormal fluctuation	ES-215
P0451	• Canister pressure sensor noise • Canister pressure sensor signal becomes fixed/flat	
P0452	Canister pressure sensor (built into canister pump module) voltage low	
P0453	Canister pressure sensor (built into canister pump module) voltage high	
P0455	EVAP gross leak	ES-225
P0456	EVAP small leak	
P2401	Leak detection pump stuck OFF (built into canister pump module)	ES-255
P2402	Leak detection pump stuck ON (built into canister pump module)	
P2419	Vent valve stuck closed (built into canister pump module)	ES-263
P2420	Vent valve stuck open (vent) (built into canister pump module)	
P2610	Soak timer (built into ECM)	ES-270

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor stuck				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

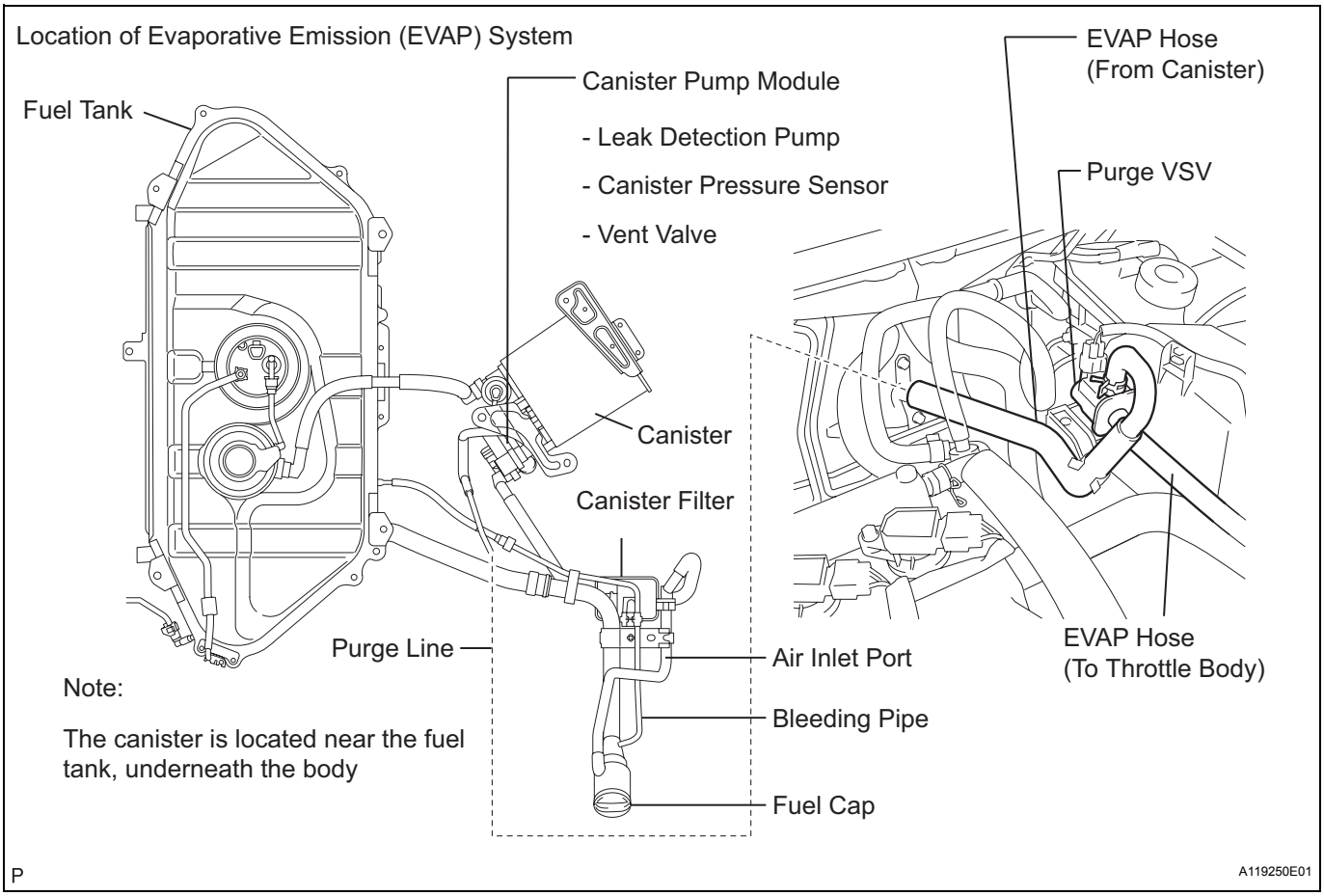
Y

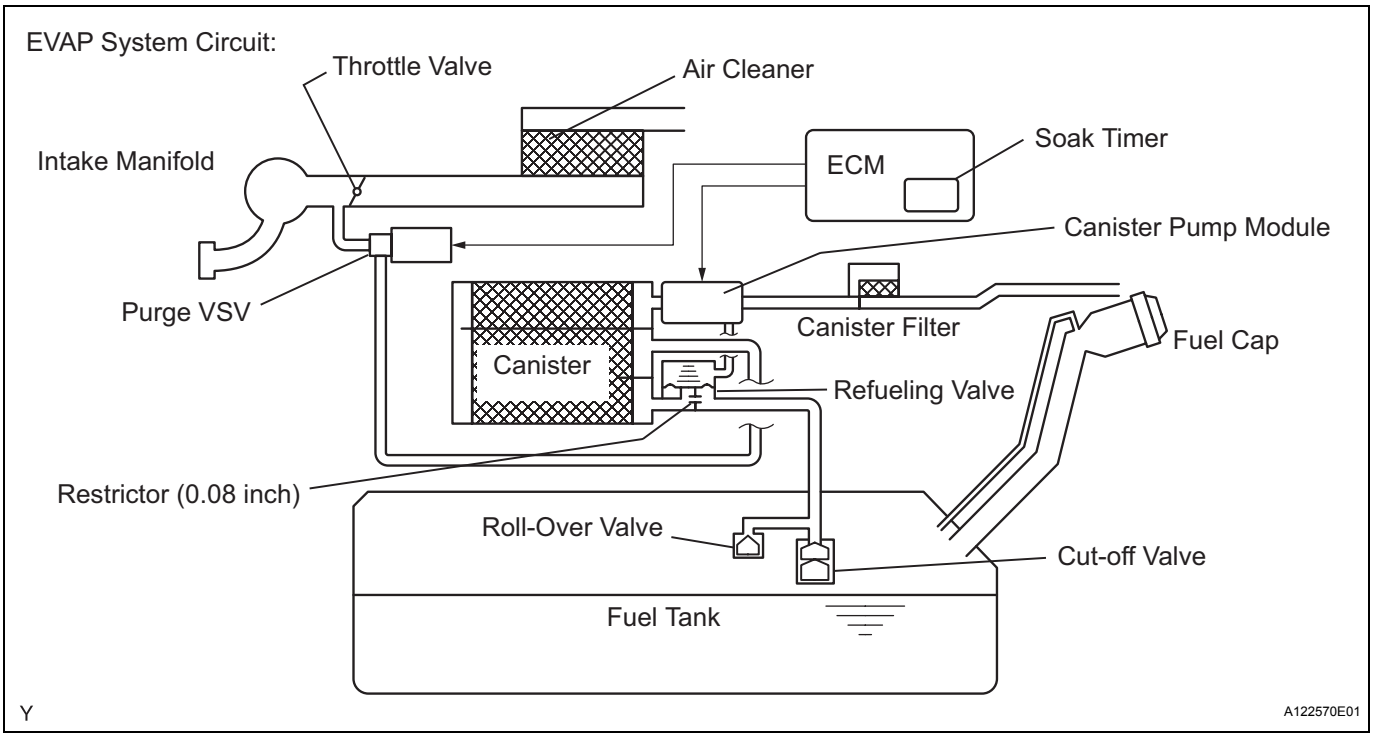
A106731E06

NOTICE:
If the 0.02 inch reference pressure difference between the first and second checks is greater than the specification, the DTCs corresponding to the reference pressure (P043E, P043F, P0441, P0455, P0456, P2401 and P2420) will all be stored.

ES

DESCRIPTION





NOTICE:
In this vehicle's EVAP system, turning ON the vent valve does not seal off the EVAP system. To check for leaks in the EVAP system, disconnect the air inlet vent hose and apply pressure from the atmosphere side of the canister.

While the engine is running, if a predetermined condition (closed loop, etc.) is met, the purge VSV is opened by the ECM and stored fuel vapors in the canister are purged to the intake manifold. The ECM changes the duty cycle ratio of the purge VSV to control purge flow volume.
The purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that the purge flow is maintained when the negative pressure (vacuum) is applied to the canister.
The following 2 monitors run to confirm appropriate EVAP system operation.

1. Key-off monitor

This monitor checks for Evaporative Emission (EVAP) system leaks and canister pump module malfunctions. The monitor starts 5 hours* after the ignition switch is turned OFF. More than 5 hours are required to allow the fuel to cool down to stabilize the Fuel Tank Pressure (FTP), thus making the EVAP system monitor more accurate.
The leak detection pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system and malfunctions in both the canister pump module and purge VSV, based on the EVAP pressure.
HINT:
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned OFF, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned OFF, the monitor check starts 2.5 hours later.

2. Purge flow monitor

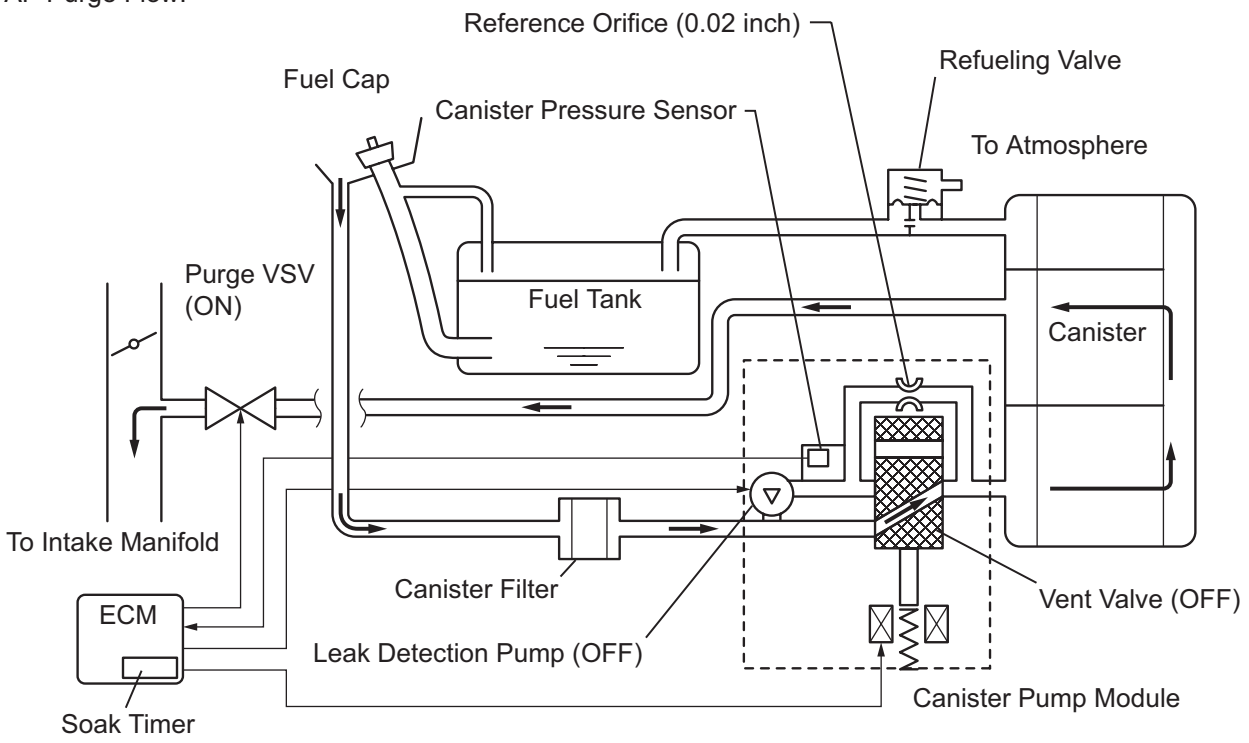
The purge flow monitor consists of the 2 monitors. The 1st monitor is conducted every time and the 2nd monitor is conducted if necessary.

- The 1st monitor
  While the engine is running and the purge Vacuum Switching Valve (VSV) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve turned OFF (open) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:
In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

ES

EVAP Purge Flow:



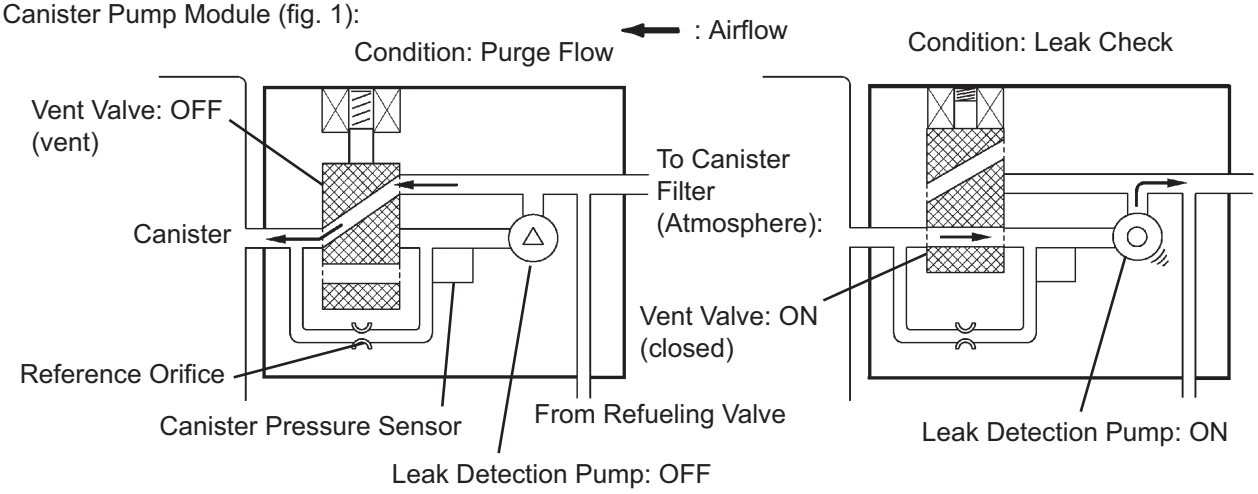
Y

A122571E01

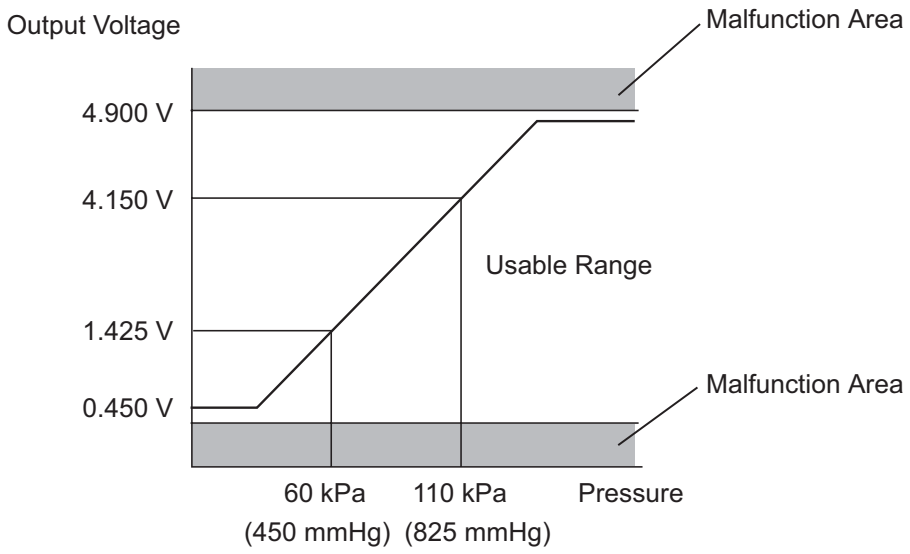
Components	Operations
Canister	Contains activated charcoal to absorb EVAP generated in fuel tank.
Cut-off valve	Located in fuel tank. Valve floats and closes when fuel tank 100% full.
Purge Vacuum Switching Valve (VSV)	Opens or closes line between canister and intake manifold. ECM uses purge VSV to control EVAP purge flow. In order to discharge EVAP absorbed by canister to intake manifold, ECM opens purge VSV. EVAP discharge volume to intake manifold controlled by purge VSV duty cycle ratio (current-carrying time) (open: ON; closed: OFF).
Refueling valve	Controls EVAP pressure from fuel tank to canister. Valve consists of diaphragm, spring and restrictor (diameter: 0.08 inch). When fuel vapor and pressure inside fuel tank increase, valve opens. While EVAP purged, valve closes and restrictor prevents large amount of vacuum from affecting pressure in fuel tank. Valve opens while refueling.
Roll-over valve	Located in fuel tank. Valve closes by its own weight when vehicle overturns to prevent fuel from spilling out.
Soak timer	Built into ECM. To ensure accurate EVAP monitor, measures 5 hours (+-15 min) after ignition switch OFF. This allows fuel to cool down, stabilizing Fuel Tank Pressure (FTP). When approximately 5 hours elapsed, ECM activates.
Canister pump module	Consists of (a) to (d) below. Canister pump module cannot be disassembled.
(a) Vent valve	Vents and closes EVAP system. When ECM turns valve ON, EVAP system closed. When ECM turns valve OFF, EVAP system vented. Negative pressure (vacuum) created in EVAP system to check for EVAP leaks by closing purge VSV, turning vent valve ON (closed) and operating leak detection pump (refer to fig. 1).
(b) Canister pressure sensor	Indicates pressure as voltage. ECM supplies regulated 5 V to canister pressure sensor, and uses feedback from sensor to monitor EVAP system pressure (refer to fig. 2).
(c) Leak detection pump	Creates negative pressure (vacuum) in EVAP system for leak check.

Components	Operations
(d) Reference orifice	Has opening with 0.02 inch diameter. Vacuum produced through orifice by closing purge VSV, turning vent valve OFF and operating leak detection pump to monitor 0.02 inch leak criterion. 0.02 inch leak criterion indicates small leak of EVAP.

Canister Pump Module (fig. 1):



Canister Pressure Sensor Specification (fig. 2):



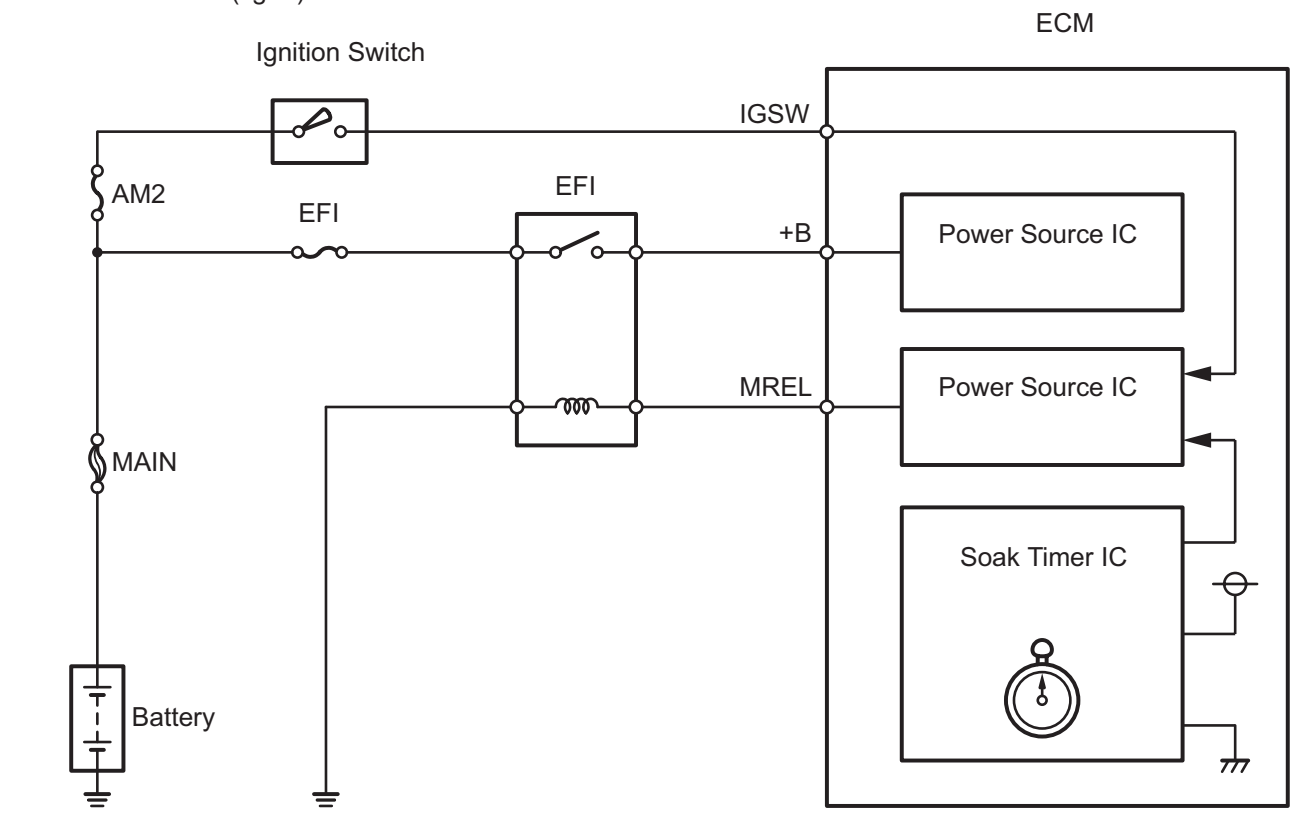
HINT:

Standard atmospheric pressure is 101.3 kPa (759.8mmHg)

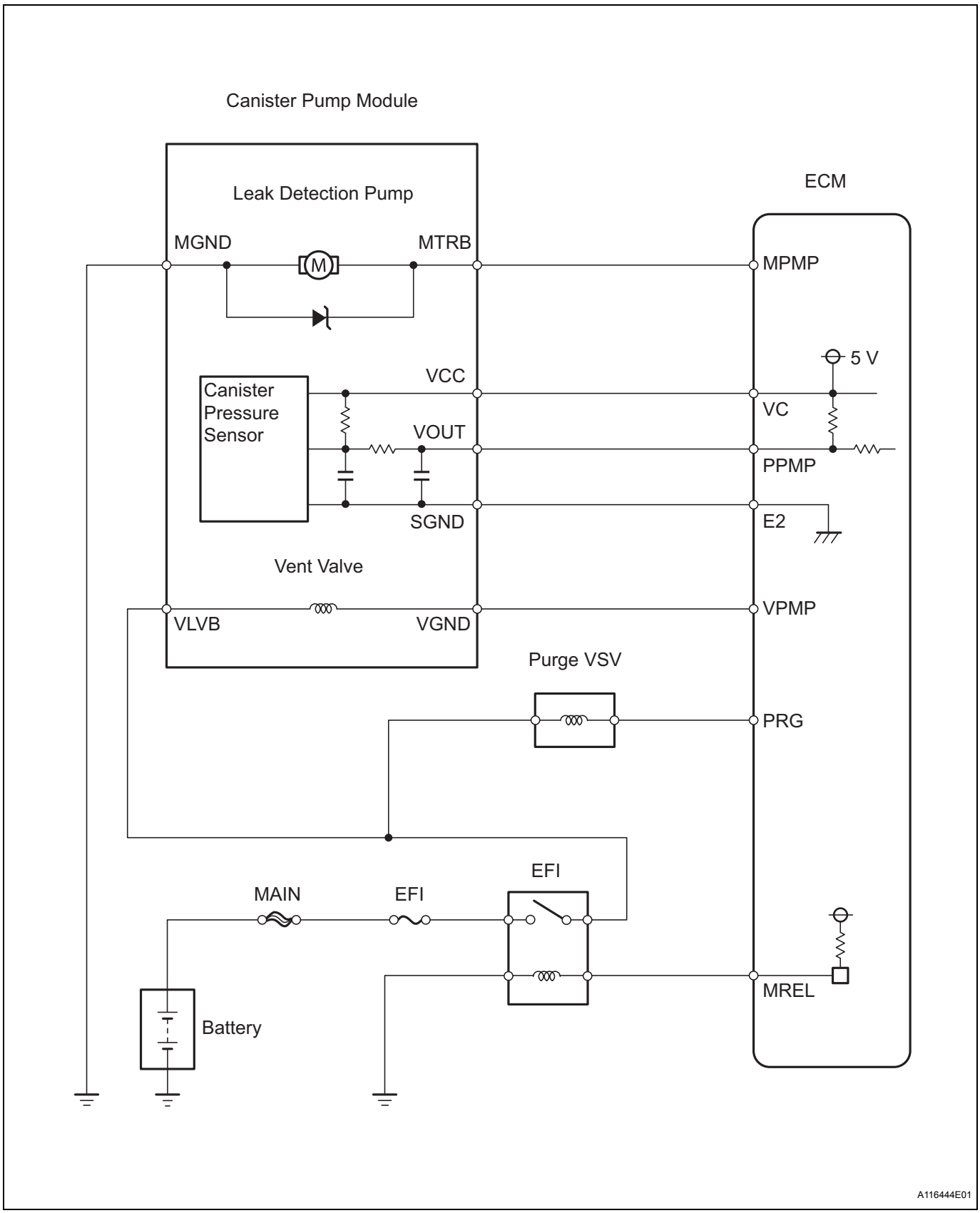
A115543E02

ES

Soak Timer Circuit (fig. 3):



WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.

HINT:
- Using the intelligent tester monitor results enable the EVAP system to be confirmed.
- Read freeze frame data using the intelligent tester. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CONFIRM DTC**

(a) Turn the ignition switch OFF and wait for 10 seconds.
(b) Turn the ignition switch ON.
(c) Turn the ignition switch OFF and wait for 10 seconds.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the ignition switch ON.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Confirm DTCs and freeze frame data.
If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.
NOTICE:
If the 0.02 inch reference pressure difference between the first and second checks is greater than the specification, the DTCs corresponding to the reference pressure (P043E, P043F, P0441, P0455, P0456, P2401 and P2420) will all be stored.

ES

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor stuck				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

Y

A106731E06

ES

NEXT

2	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of five steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the leak check of the fuel tank not possible.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

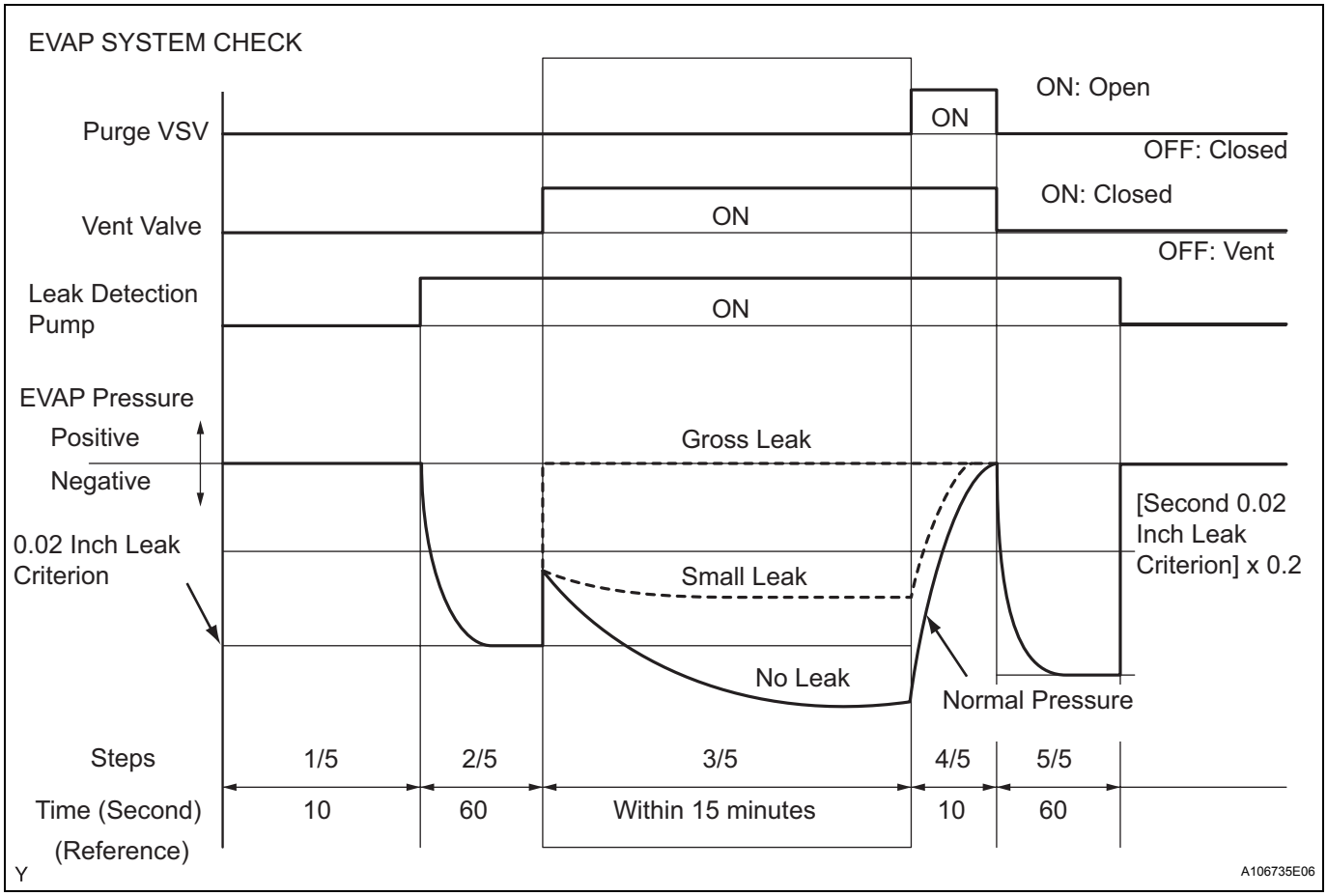
(a) Clear the DTCs (see page ES-36).

(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.
(c) After the EVAP SYSTEM CHECK is completed, check for pending DTCs by entering the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTC is displayed, perform the CONFIRMATION DRIVING PATTERN (see " Diagnostic Help" menu). After this confirmation, check for pending DTCs. If no DTC is displayed, the EVAP system is normal.

ES

NEXT

3	PERFORM EVAP SYSTEM CHECK (MANUAL OPERATION)



NOTICE:

- **In the EVAP SYSTEM CHECK (MANUAL OPERATION), the series of 5 EVAP SYSTEM CHECK steps are performed manually by the intelligent tester.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the leak check of the fuel tank not possible.**
- **Do not run the engine in this step.**

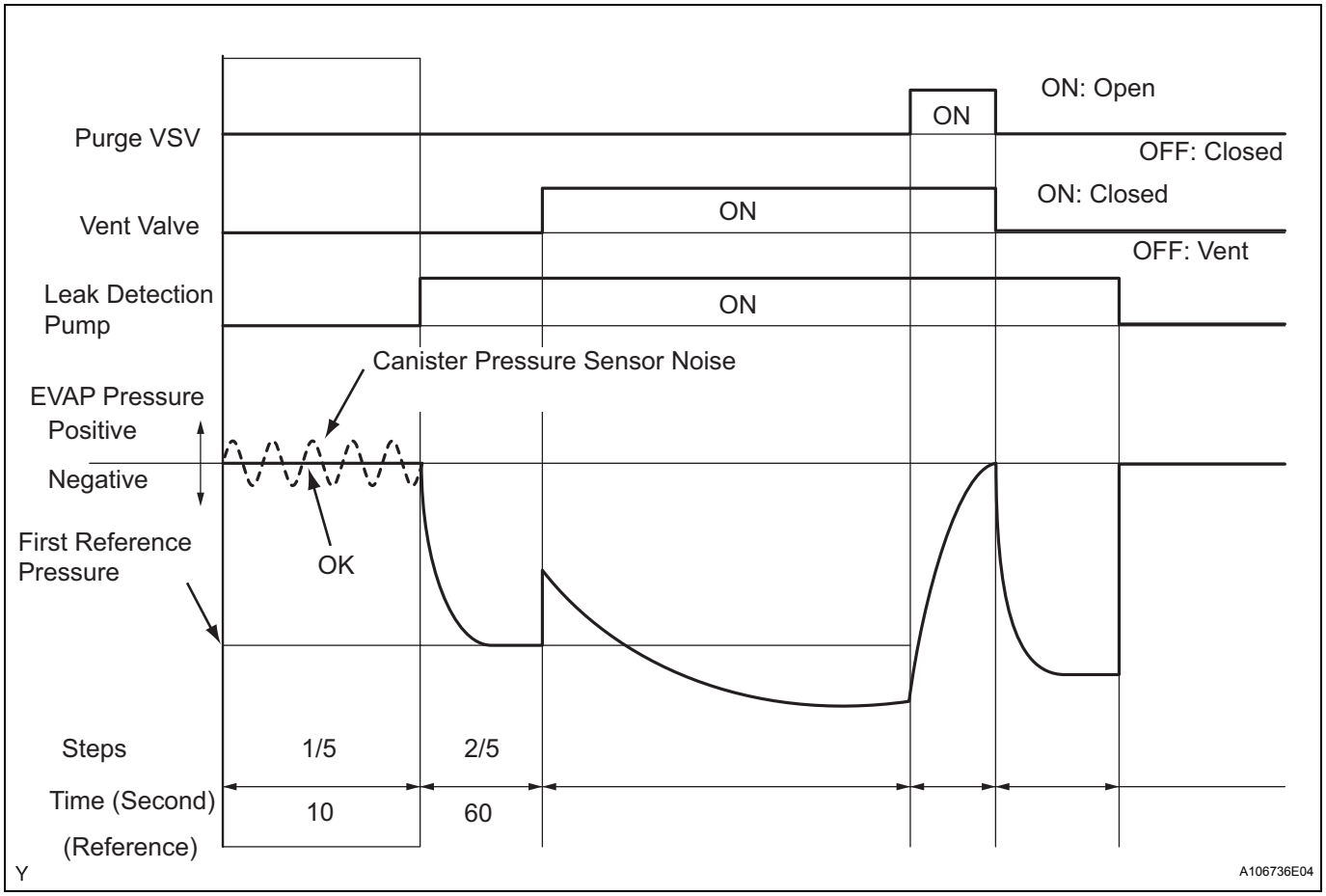
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear the DTCs (see page ES-36).

(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / MANUAL OPERATION.

NEXT

4	PERFORM EVAP SYSTEM CHECK (STEP 1/5)



(a) Check the EVAP pressure in step 1/5.

Result

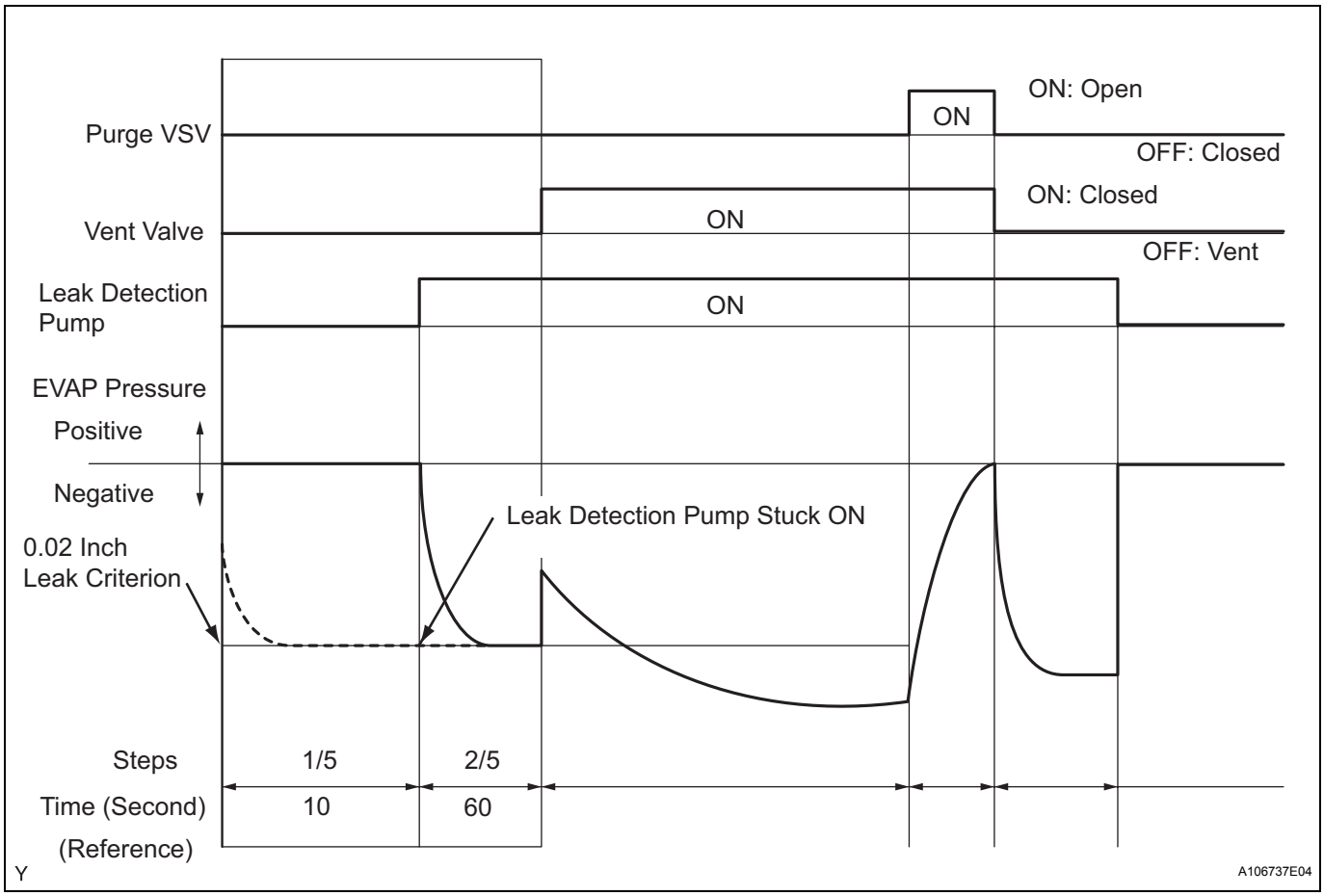
DTC No.*	Test Results	Suspected Trouble Areas	Proceed to
-	Virtually no variation in EVAP pressure	Not yet determined	A
P0451	EVAP pressure fluctuates by +- 0.3 kPa (2.25 mmHg) or more	Canister pressure sensor noising	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

B	Go to step 30

A

5	PERFORM EVAP SYSTEM CHECK (STEP 1/5 TO 2/5)



(a) Check the EVAP pressure in step 1/5 and 2/5.

Result

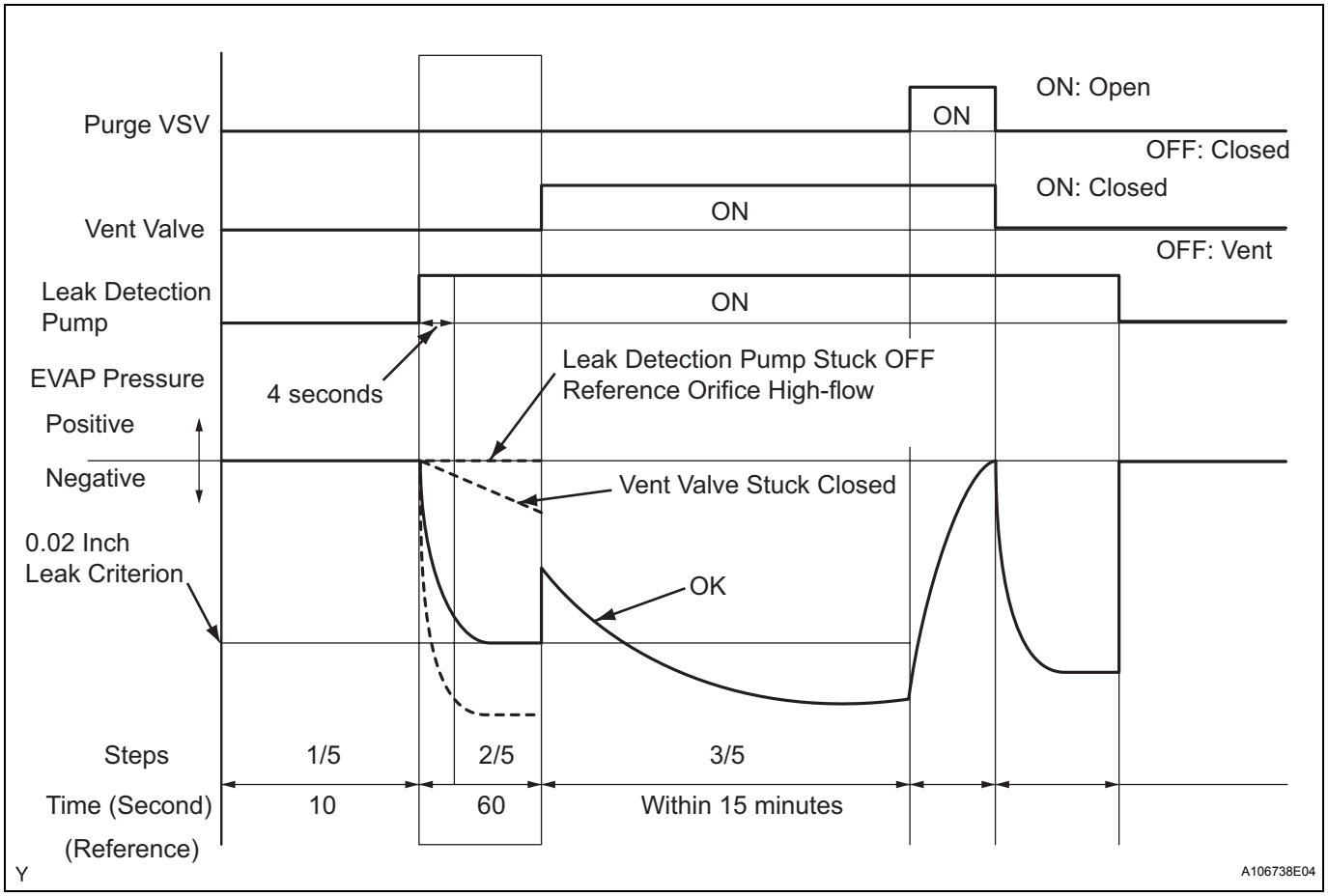
DTC No.*	Test Results	Suspected Trouble Areas	Proceed to
-	Virtually no variation in EVAP pressure during step 1/5. Then decreases to 0.02 inch leak criterion	Not yet determined	A
P2402	Small difference between EVAP pressures during steps 1/5 and 2/5	Leak detection pump stuck ON	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.
HINT:
The first 0.02 inch leak criterion is the value determined in step 2/5.

B → Go to step 23

A

6	PERFORM EVAP SYSTEM CHECK (STEP 2/5)



HINT:
Make a note of the pressures checked in the steps below.
(a) Check the EVAP pressure 4 seconds after the leak detection pump is activated*.
*: The leak detection pump begins to operate as step 1/5 proceeds to step 2/5.
(b) Check the EVAP pressure again when it has stabilized. This pressure is the 0.02 inch leak criterion.

Result

DTC No.*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure in step (b) between -4.85 kPa and -1.06 kPa (-36.38 mmHg and -7.95 mmHg)	Not yet determined	A
P043F and P2401	EVAP pressure in step (b) -1.06 kPa (-7.95 mmHg) or more	• Reference orifice high-flow • Leak detection pump stuck OFF	B
P043E	EVAP pressure in step (b) below -4.85 kPa (-36.38 mmHg)	Reference orifice clogged	C
P2419	EVAP pressure in step (a) more than -1.06 kPa (-7.95 mmHg)	Vent valve stuck closed	D

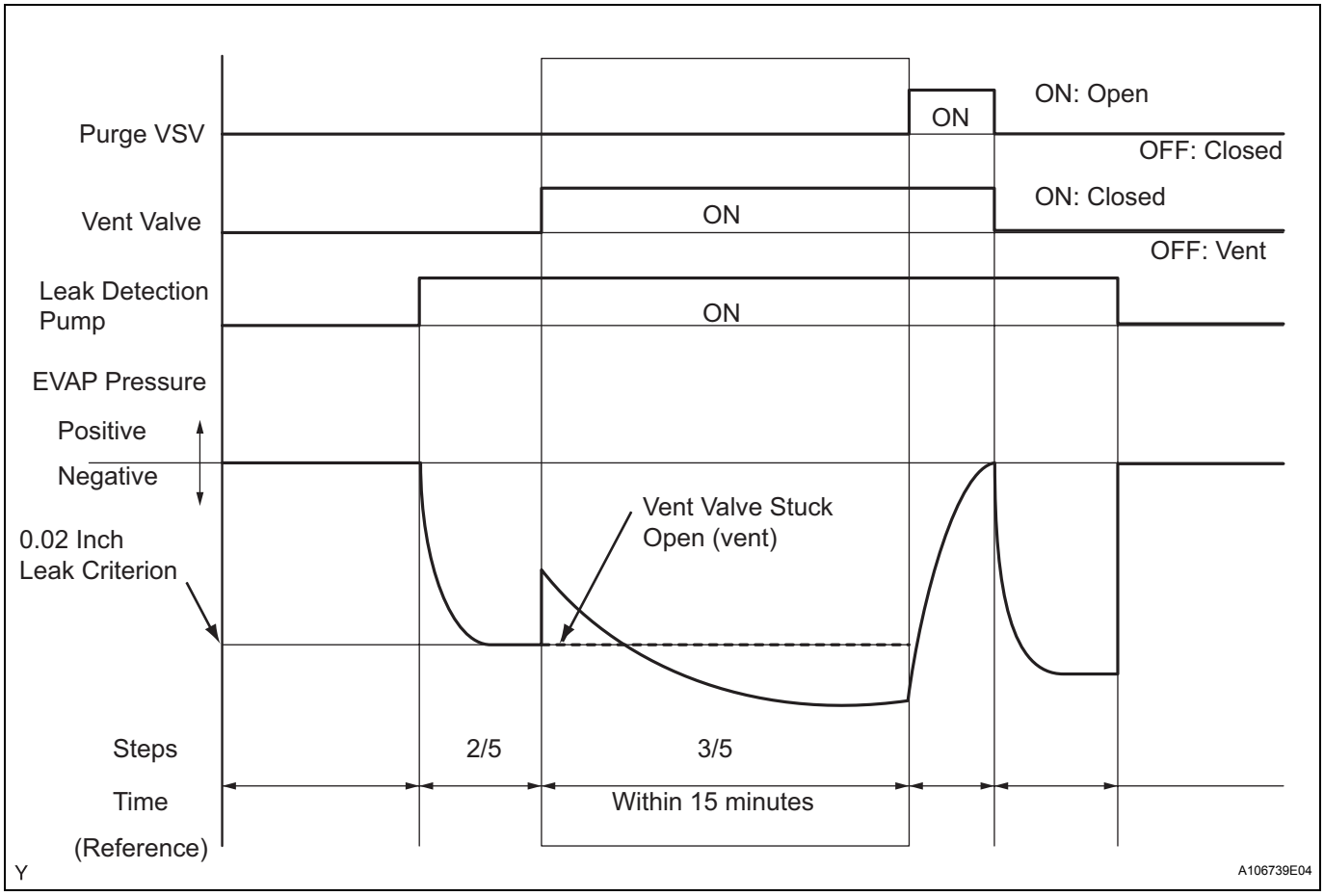
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

B	Go to step 11
C	Go to step 30
D	Go to step 19

A

7	PERFORM EVAP SYSTEM CHECK (STEP 2/5 TO 3/5)

ES



(a) Check the EVAP pressure in step 3/5.

Result

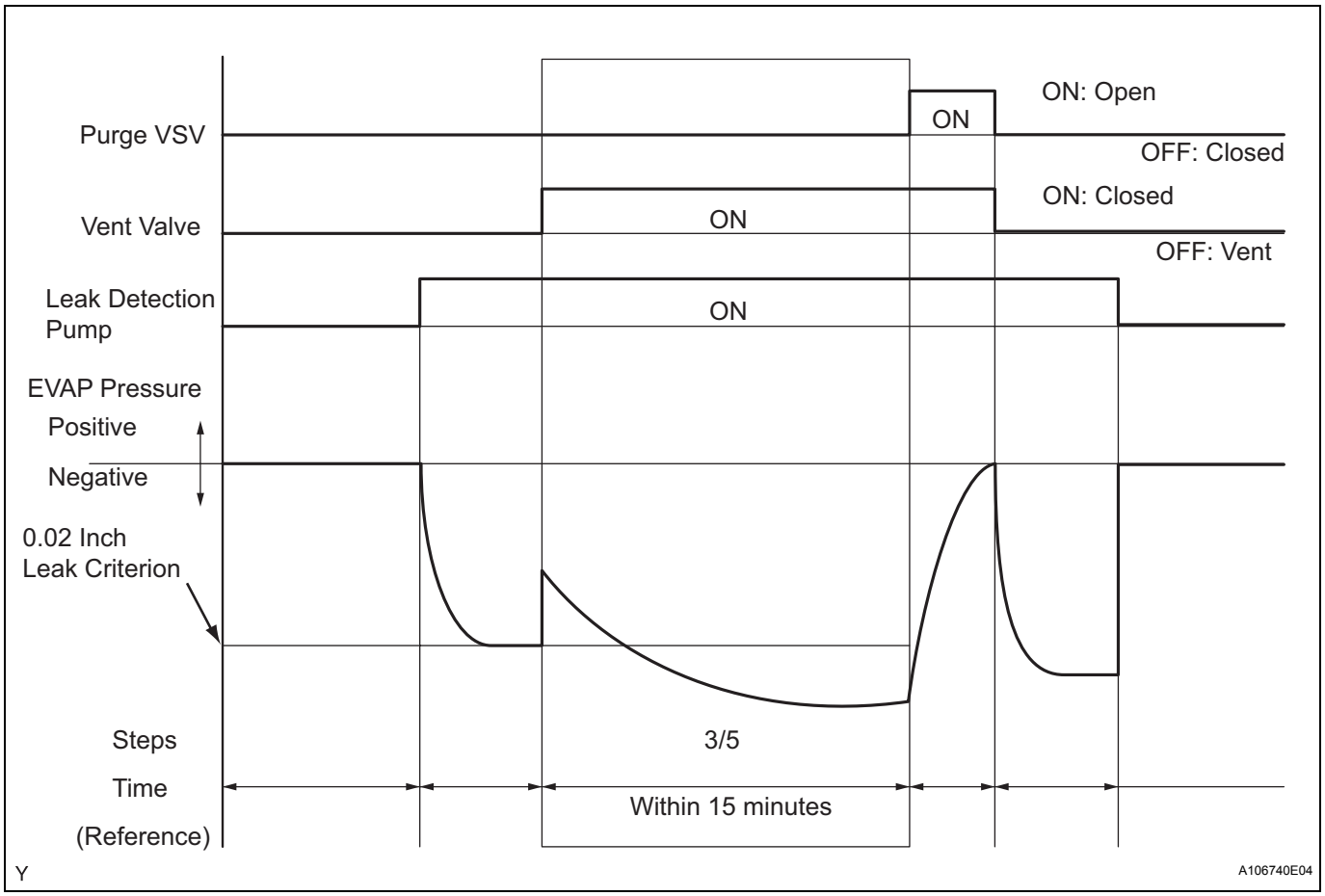
DTC No.*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 2/5 to step 3/5	Not yet determined	A
P2420	No variation in EVAP pressure despite proceeding from step 2/5 to step 3/5	Vent valve stuck open (vent)	B
P0451	No variation in EVAP pressure during steps 1/5 through 3/5	Canister pressure sensor malfunction (stuck)	C

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

B	Go to step 20
C	Go to step 30

A

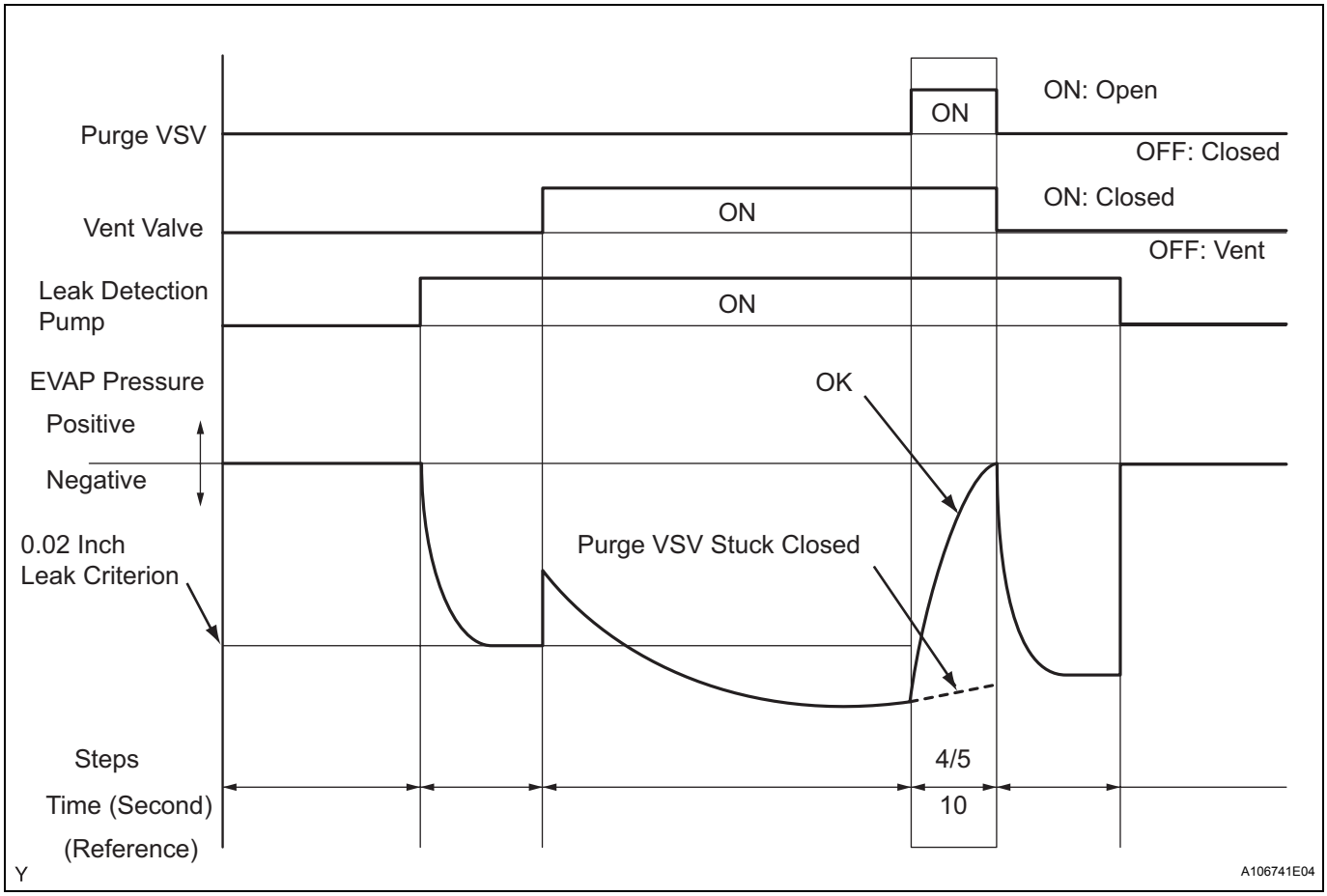
8	PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(a) Wait until the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) for 30 seconds.
(b) Measure the EVAP pressure and record it.
HINT:
A few minutes are required for the EVAP pressure to become saturated. When there is little fuel in the fuel tank, it takes up to 15 minutes.

NEXT

9	PERFORM EVAP SYSTEM CHECK (STEP 4/5)



(a) Check the EVAP pressure in step 4/5.

Result

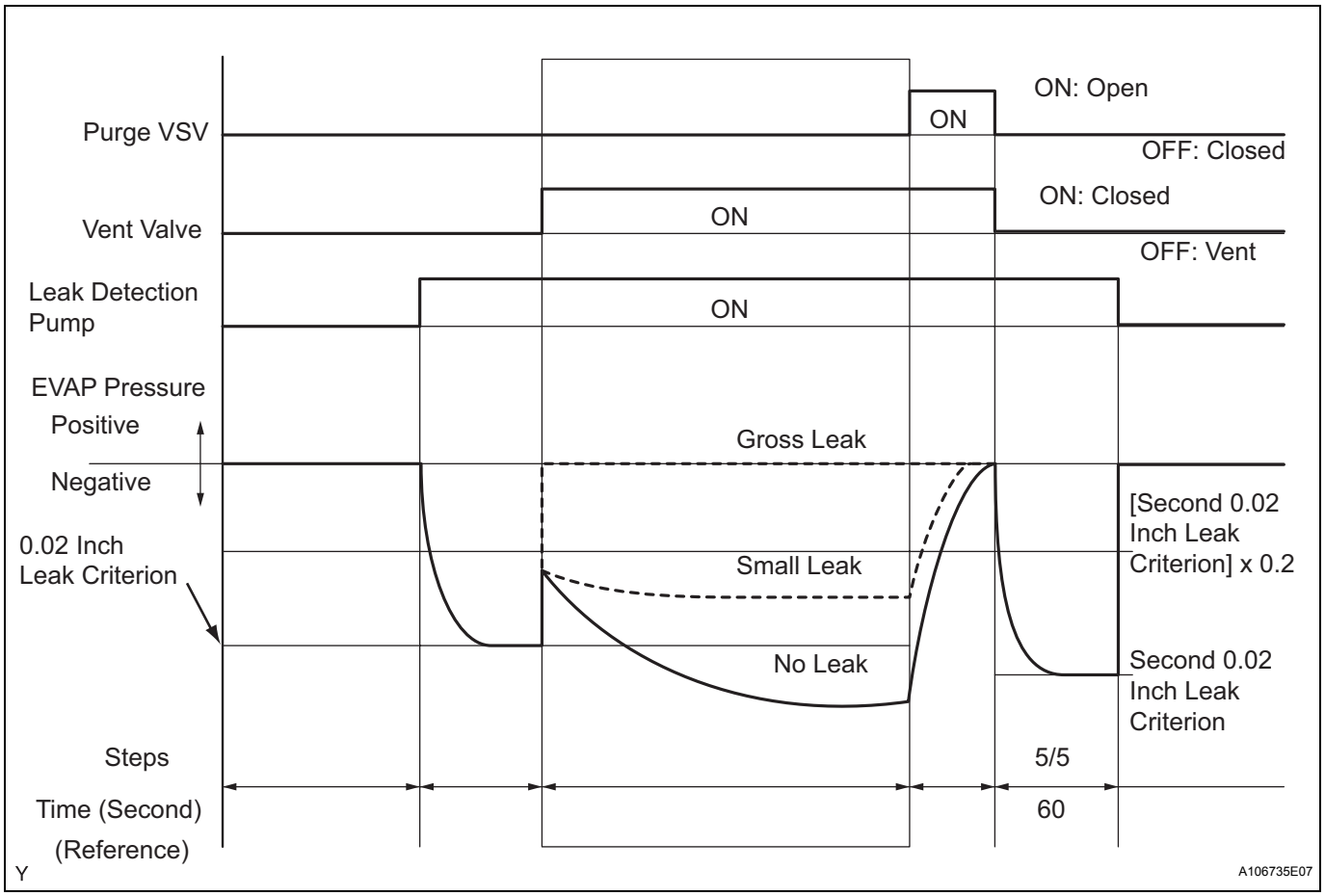
DTC No.*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Not yet determined	A
P0441	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Problems in EVAP hose between purge VSV and intake manifold	B
P0441	Variation in EVAP pressure less than 0.3 kPa (2.25 mmHg) for 10 seconds, after proceeding from step 3/5 to step 4/5	Purge VSV stuck closed	C

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

B	Go to step 15
C	Go to step 12

A

10	PERFORM EVAP SYSTEM CHECK (STEP 5/5)



(a) Check the EVAP pressure in step 5/5.
(b) Compare the EVAP pressure in step 3/5 and the second 0.02 inch leak criterion (step 5/5).

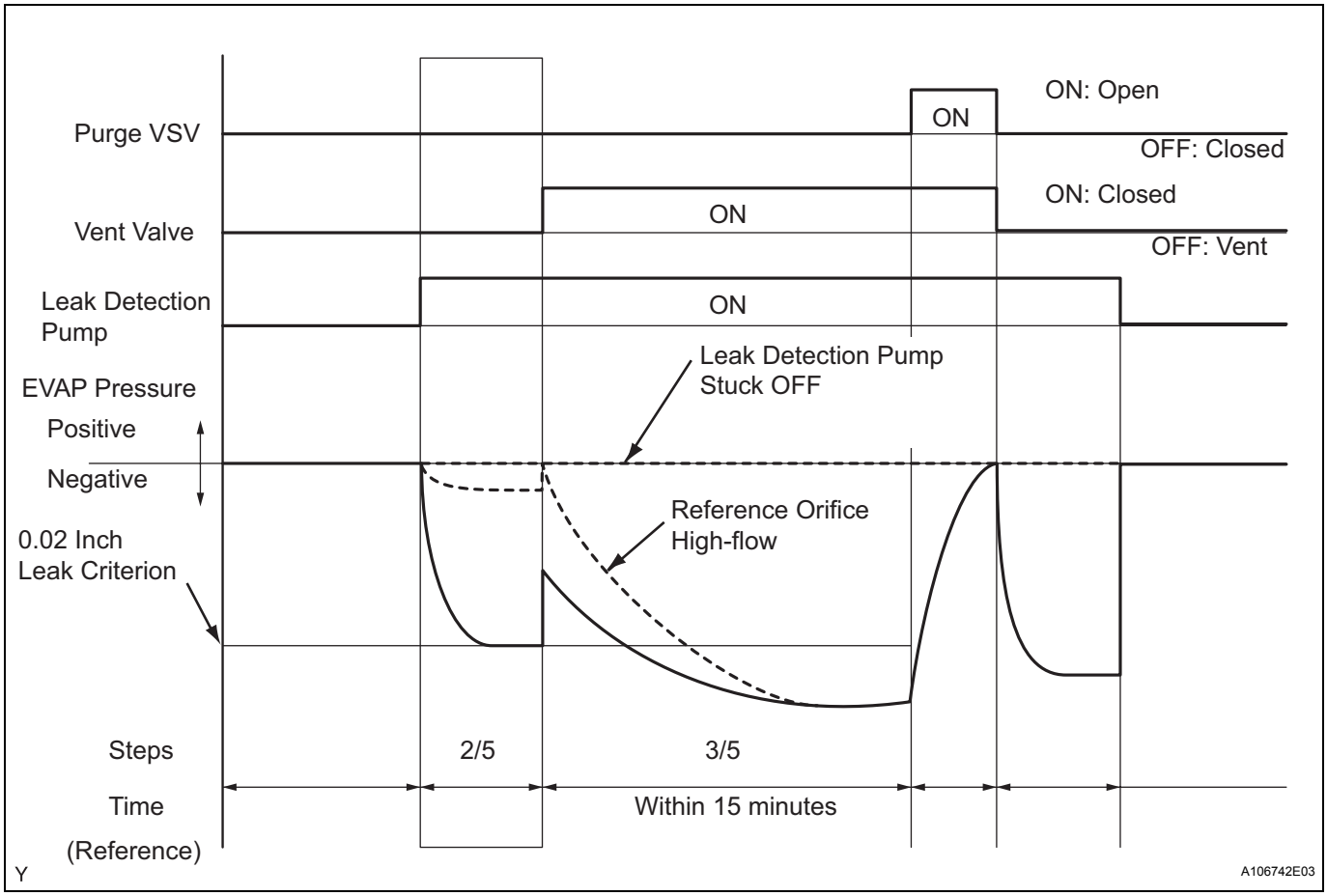
Result

DTC No.*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure (step 3/5) lower than second 0.02 inch leak criterion (step 5/5)	Not yet determined	A
P0441 and P0455	EVAP pressure (step 3/5) higher than [second 0.02 inch leak criterion (step 5/5) x 0.2]	• Purge VSV stuck open • EVAP gross leak	B
P0456	EVAP pressure (step 3/5) higher than second 0.02 inch leak criterion (step 5/5)	EVAP small leak	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

A	Go to step 36
B	Go to step 12

11	PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(a) Check the EVAP pressure in step 3/5.

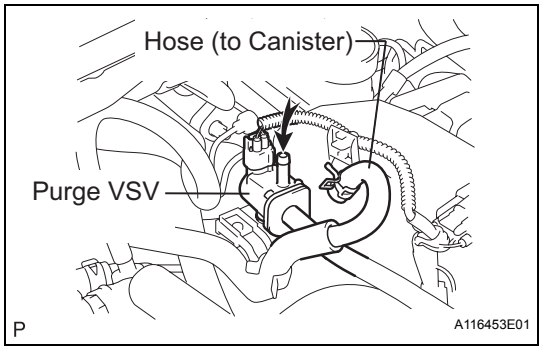
Result

DTC No.*	Test Results	Suspected Trouble Areas	Proceed to
P043F	EVAP pressure less than [0.02 inch leak criterion] measured at 2/5	Reference orifice high-flow	A
P2401	EVAP pressure almost same as [0.02 inch leak criterion] measured at 2/5	Leak detection pump stuck OFF	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.
HINT:
The first 0.02 inch leak criterion is the value determined in step 2/5.

A	Go to step 30
B	Go to step 23

12 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (PURGE VSV)



(a) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / EVAP VSV.
(b) Disconnect the hose (connected to the canister) from the purge VSV.
(c) Turn the ignition switch ON.
(d) Using the tester, turn the purge VSV OFF.
(e) Use your finger to confirm that the purge VSV has no suction.
(f) Using the tester, turn the purge VSV ON.
(g) Use your finger to confirm that the purge VSV has suction.

ES

Result

Test Results	Suspected Trouble Areas	Proceed to
No suction when purge VSV turned OFF, and suction applied when turned ON	Purge VSV normal	A
Suction applied when purge VSV turned OFF	Purge VSV stuck open	B
No suction when purge VSV turned ON	• Purge VSV stuck closed • Problems with EVAP hose between purge VSV and intake manifold	C

B → Go to step 14

C → Go to step 15

A

13 CHECK FUEL TANK CAP

(a) Check that the fuel tank cap is correctly installed and confirm the fuel tank cap meets OEM specification.
  (1) Tighten the fuel tank cap until a few click sounds are heard.
  HINT:
  If an EVAP tester is available, use the tester to check the fuel tank cap.
(b) Remove the fuel tank cap and install it onto the fuel tank cap adaptor.
(c) Connect an EVAP tester pump hose to the adaptor, and pressurize the cap to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.
(d) Seal the adaptor and wait for 2 minutes.
(e) Check the pressure. If the pressure is 2 kPa (15 mmHg) or more, the fuel tank cap is normal.

Result

Test Results	Suspected Trouble Areas	Proceed to
Fuel tank cap correctly installed	-	A
Fuel tank cap loose	• Fuel tank cap improperly installed • Defective fuel tank cap • Fuel tank cap does not meet OEM specifications	B

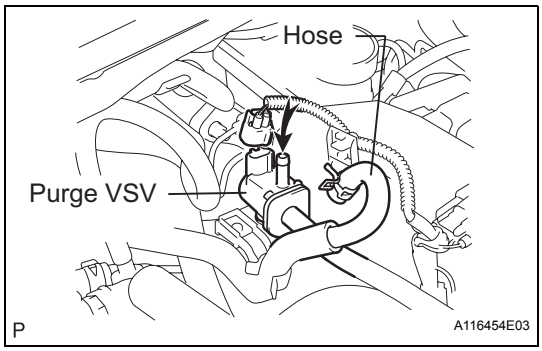
Test Results	Suspected Trouble Areas	Proceed to
No fuel tank cap	-	C

A → Go to step 29

B → Go to step 27

C → Go to step 28

14 INSPECT PURGE VSV



(a) Turn the ignition switch OFF.
(b) Disconnect the P17 purge VSV connector.
(c) Disconnect the hose (connected to the canister) from the purge VSV.
(d) Turn the ignition switch ON.
(e) Start the engine.
(f) Use your finger to confirm that the purge VSV has no suction.

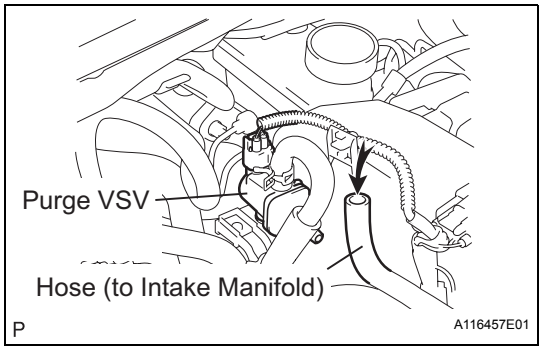
Result

Test Results	Suspected Trouble Areas	Proceed to
No suction	ECM	A
Suction applied	Purge VSV	B

A → Go to step 35

B → Go to step 31

15 CHECK EVAP HOSE (PURGE VSV - INTAKE MANIFOLD)



(a) Disconnect the hose (connected to the intake manifold) from the purge VSV.
(b) Turn the ignition switch ON.
(c) Start the engine.
(d) Use your finger to confirm that the hose has suction.

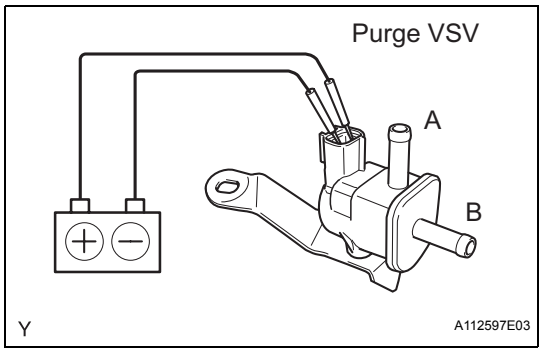
Result

Test Results	Suspected Trouble Areas	Proceed to
Suction applied	EVAP hose between purge VSV and intake manifold normal	A
No suction	• Intake manifold port • EVAP hose between purge VSV and intake manifold	B

B → Go to step 26

A

16 INSPECT DUTY PURGE VSV



(a) Remove the purge VSV connector.
(b) Apply battery voltage to the terminals of the purge VSV.
(c) Using an air gun, confirm that air flows from port A to port B.

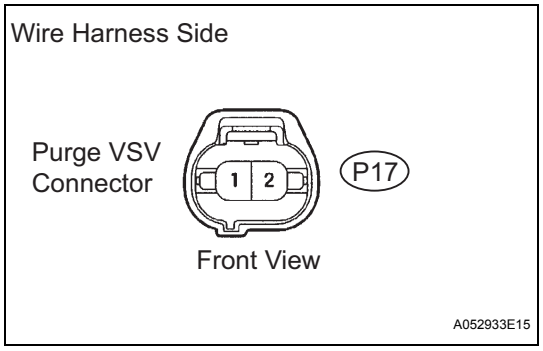
Result

Test Results	Suspected Trouble Areas	Proceed to
Air flows	Purge VSV normal	A
No air flows	Purge VSV	B

B → Go to step 31

A

17 CHECK HARNESS AND CONNECTOR (POWER SOURCE OF PURGE VSV)



(a) Disconnect the P17 purge VSV connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminal 1 of the purge VSV connector and the body ground.

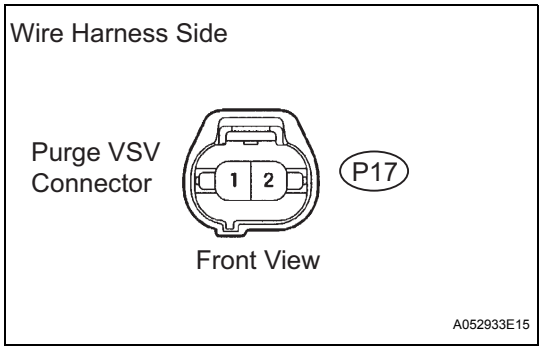
Result

Test Results	Suspected Trouble Areas	Proceed to
11 to 14 V	Normal	A
Other than result above	Wire harness or connectors between purge VSV and ECM	B

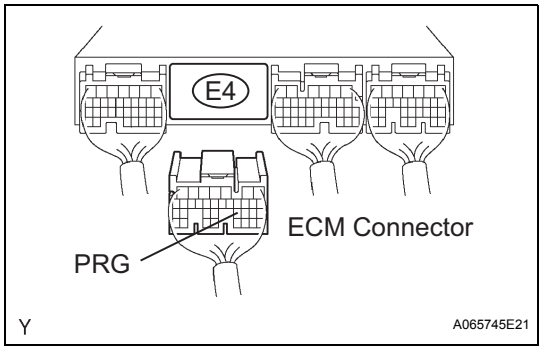
B → Go to step 32

A

18 CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM)



(a) Disconnect the P17 purge VSV connector.



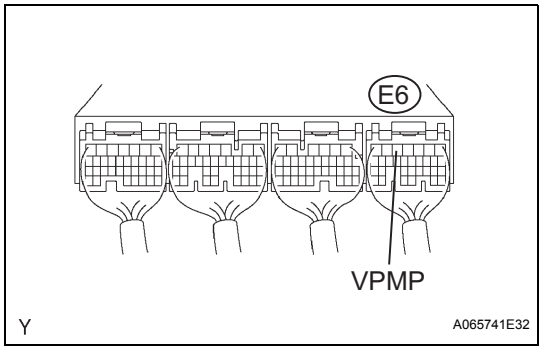
(b) Disconnect the E4 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
P17-1 - PRG (E4-23)	Below 1 Ω
P17-1 or PRG (E4-23) - Body ground	10 kΩ or higher

OK	Go to step 35
NG	Go to step 32

19 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (FOR VENT VALVE)



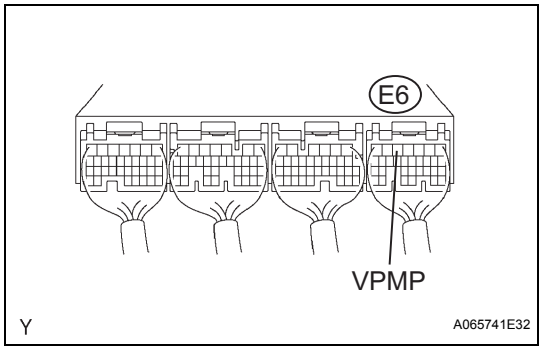
(a) Turn the ignition switch ON.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VENT VALVE (ALONE).
(c) Measure the voltage between terminal VPMP (E6-5) of the ECM connector and the body ground when the vent valve is turned ON (closed) and OFF (vent) using the tester.

Result

Test Results	Suspected Trouble Areas	Proceed to
9 to 14 V when OFF Below 3 V when ON	Vent valve	A
Below 3 V when OFF and ON	ECM	B

A	Go to step 22
B	Go to step 35

20 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (FOR VENT VALVE)



(a) Turn the ignition switch ON.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VENT VALVE (ALONE).
(c) Measure the voltage between terminal VPMP (E6-5) of the ECM connector and the body ground when the vent valve is turned ON (closed) and OFF (vent) using the tester.

ES

Result

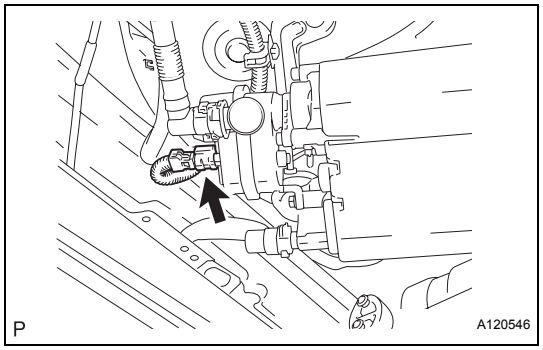
Test Results	Suspected Trouble Areas	Proceed to
Below 3 V when OFF and ON	Power source of vent valve	A
9 to 14 V when OFF Below 3 V when ON	Vent valve	B
9 to 14 V when OFF and ON	ECM	C

B → Go to step 22

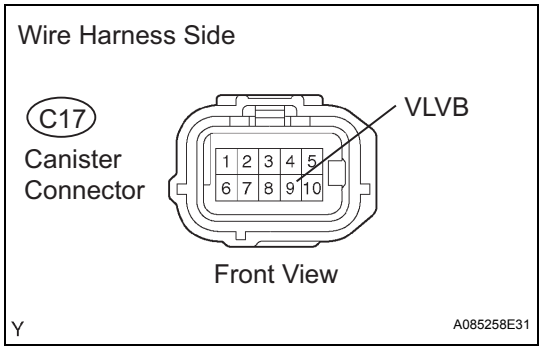
C → Go to step 35

A

21 INSPECT CANISTER PUMP MODULE (POWER SOURCE FOR VENT VALVE)



(a) Turn the ignition switch OFF.
(b) Disconnect the C17 canister connector.
(c) Turn the ignition switch ON.



(d) Measure the voltage between VLVB terminal of the canister connector and the body ground.

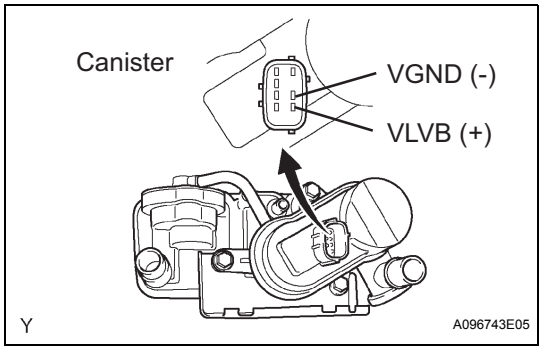
Result

Test Results	Suspected Trouble Areas	Proceed to
9 to 14 V	Normal	A
0 to 3 V	Power source wire harness of vent valve	B

B → Go to step 32

A

22 INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION)



(a) Turn the ignition switch OFF.
(b) Disconnect the C17 canister connector.
(c) Apply battery voltage to VLVB and VGND of the canister pump module.
(d) Touch the canister pump module to confirm the vent valve operation.

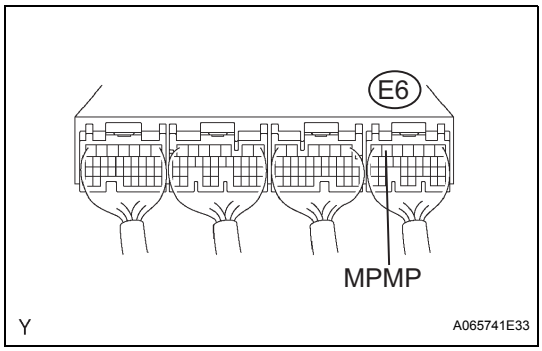
Result

Test Results	Suspected Trouble Areas	Proceed to
Operating	Wire harness between vent valve and ECM	A
Not operating	Vent valve	B

A → Go to step 32

B → Go to step 30

23 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (FOR CANISTER PUMP MODULE [LEAK DETECTION PUMP])



(a) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP (ALONE).
(b) Measure the voltage between the MPMP (E6-6) terminal of the ECM connector and the body ground when the leak detection pump is turned ON and OFF using the tester.

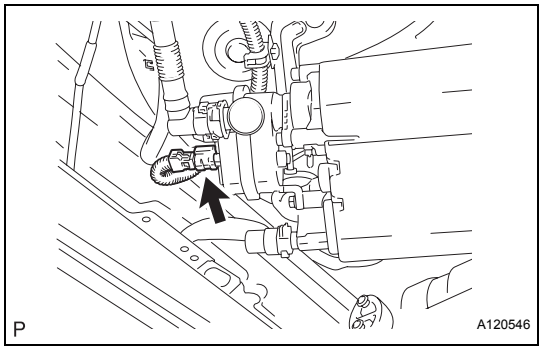
Result

Test Results	Suspected Trouble Areas	Proceed to
0 to 3 V when OFF 9 to 14 V when ON	ECM normal	A
9 to 14 V when OFF 0 V to 3 V when ON	ECM	B

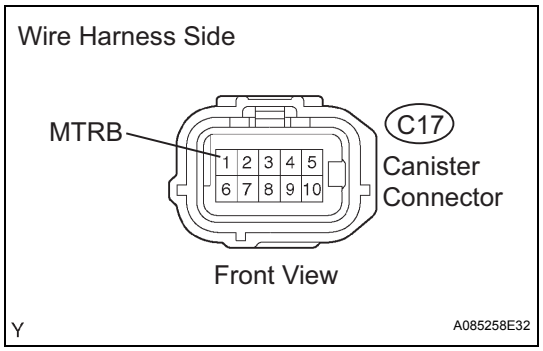
B → Go to step 35

A

24 CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



(a) Turn the ignition switch OFF.
(b) Disconnect the C17 canister connector.
(c) Turn the ignition switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP (ALONE).
(e) Turn the leak detection pump ON.



(f) Measure the voltage between MTRB terminal of the canister connector and the body ground.

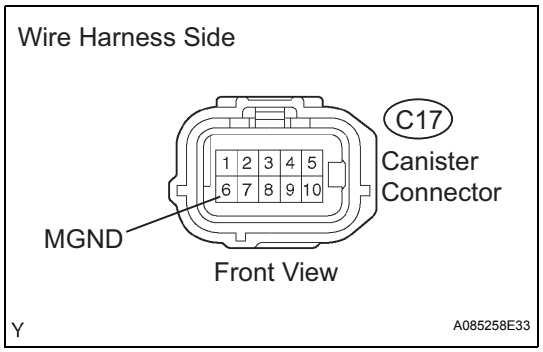
Result

Test Results	Suspected Trouble Areas	Proceed to
9 to 14 V	Normal	A
0 to 3 V	Wire harness between ECM and leak detection pump	B

B → Go to step 32

A

25 CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - GROUND)



(a) Disconnect the C17 canister connector.
(b) Turn the ignition switch OFF.
(c) Measure the resistance of the wire harness side connectors between MGND terminal of the canister connector and the body ground.

Result

Test Results	Suspected Trouble Areas	Proceed to
Below 1 Ω	Leak detection pump	A
10 kΩ or higher	Wire harness between leak detection pump and body ground	B

A → Go to step 30

B → Go to step 32

26 INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

ES

(a) Turn the ignition switch OFF.
(b) Disconnect the EVAP hose from the intake manifold.
(c) Turn the ignition switch ON.
(d) Use your finger to confirm that the port of the intake manifold has suction.

Result

Test Results	Suspected Trouble Areas	Proceed to
Suction applied	EVAP hose between intake manifold and purge VSV	A
No suction	Intake manifold	B

A → Go to step 33

B → Go to step 34

27 CORRECTLY REINSTALL OR REPLACE FUEL TANK CAP

HINT:
- When reinstalling the fuel tank cap, tighten it until a few click sounds are heard.
- When replacing the fuel tank cap, use a fuel tank cap that meets OEM specifications, and tighten it until a few click sounds are heard.

NEXT → Go to step 37

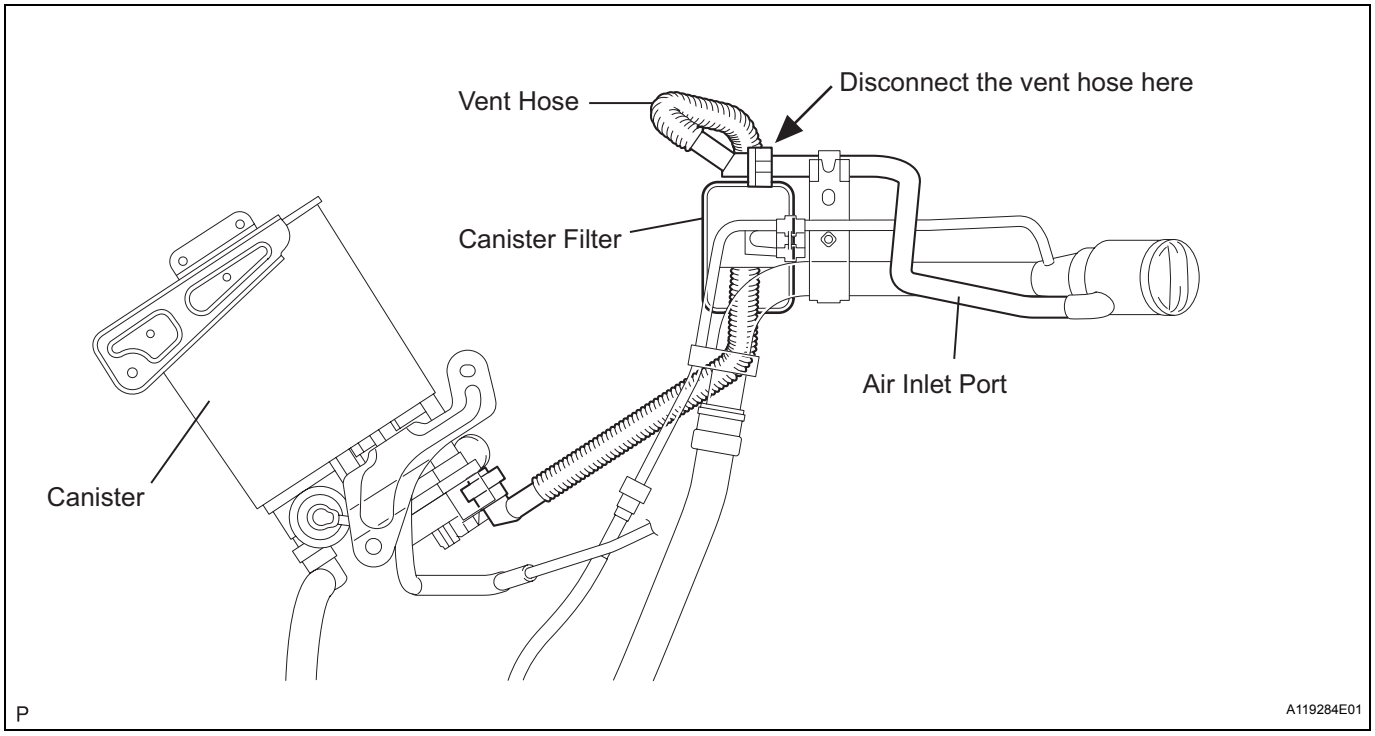
28 REPLACE FUEL TANK CAP

HINT:
When installing the fuel tank cap, tighten it until a few click sounds are heard.

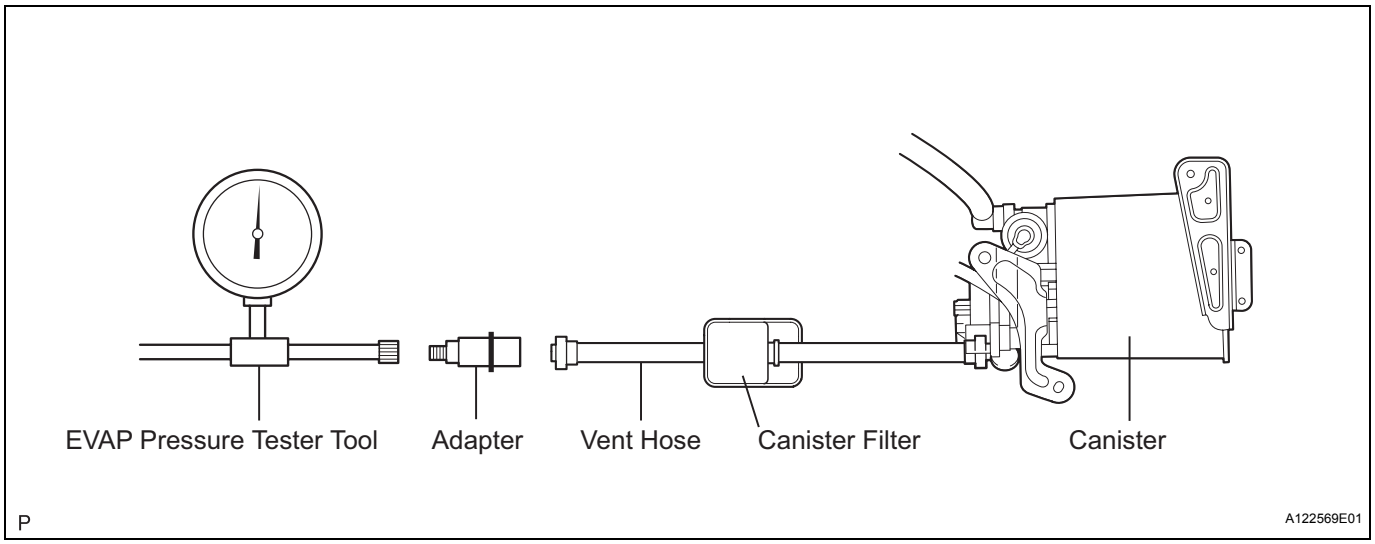
NEXT → Go to step 37

29 LOCATE EVAP LEAK

(a) Disconnect the vent hose.



(b) Connect the EVAP pressure tester tool to the canister with the adapter.



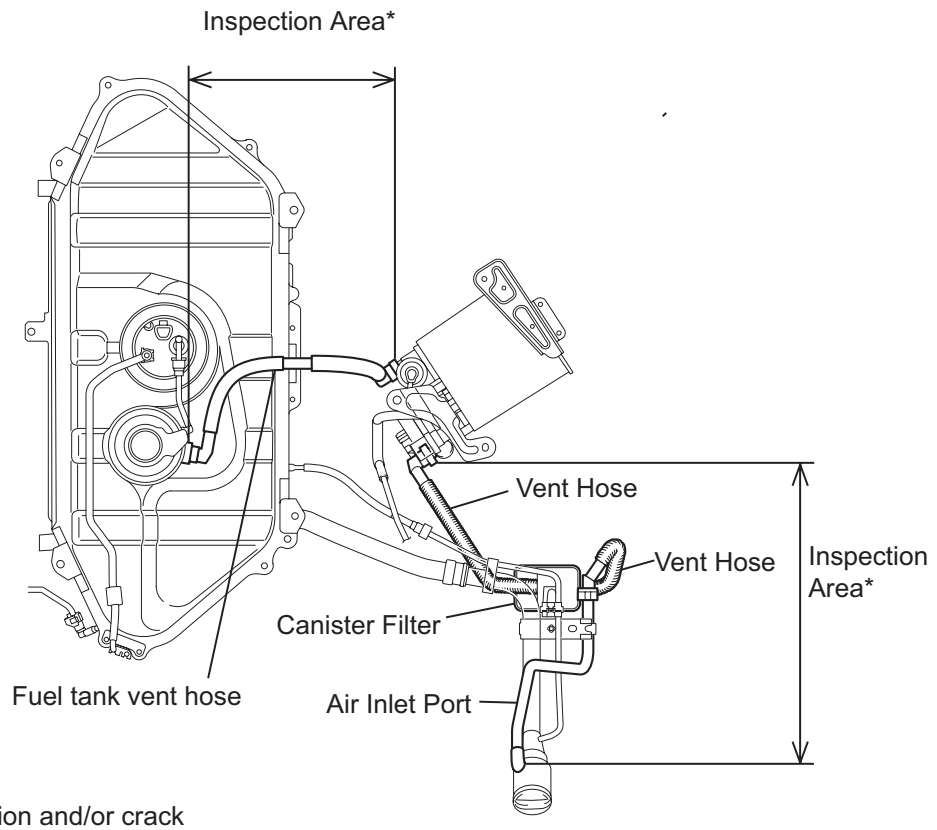
(c) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).
(d) Apply soapy water to the piping and connecting parts of the EVAP system.
(e) Look for areas where bubbles appear. This indicates leak point.
(f) Repair or replace the leak point.
HINT:
Disconnect the hose between the canister and the fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

NEXT	Go to step 37

30	REPLACE CANISTER ASSEMBLY

(a) Replace the canister assembly (see page EC-9).
NOTICE:
When replacing the canister, check the canister pump module interior and related pipes for water, fuel or other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.

ES

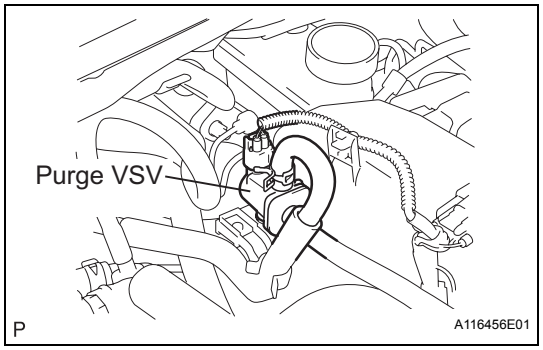


*: Check for disconnection and/or crack

P A122262E02

NEXT Go to step 37

31	REPLACE PURGE VSV



(a) Disconnect the connector and hoses from the purge VSV.
(b) Remove the purge VSV.
(c) Install a new purge VSV.

NEXT → Go to step 37

ES

32	REPAIR OR REPLACE HARNESS AND CONNECTOR

NEXT → Go to step 37

33	REPLACE EVAP HOSE (INTAKE MANIFOLD - PURGE VSV)

NEXT → Go to step 37

34	INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

(a) Check that the EVAP purge port of the intake manifold is not clogged. If necessary, replace the intake manifold.

NEXT → Go to step 37

35	REPLACE ECM

(a) Replace the ECM (see page ES-362).

NEXT → Go to step 37

36	REPAIR OR REPLACE PARTS AND COMPONENTS INDICATED BY OUTPUT DTCS

(a) Repair the malfunctioning areas indicated by the DTCs that had been confirmed when the vehicle was brought in.

NEXT → Go to step 37

37	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of five steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the leak check of the fuel tank not possible.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear the DTCs (see page ES-36).

(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

(c) After the SYSTEM CHECK is completed, check for pending DTCs by entering the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTC is found, the repair has been successfully completed.

NEXT

COMPLETED

CONFIRMATION DRIVING PATTERN

HINT:
After a repair, check Monitor Status by performing the key-off monitor confirmation and purge flow monitor confirmation described below.

1. Key-off monitor confirmation

(a) Preconditions
The monitor will not run unless:
- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway)
- The fuel tank is less than 90% full
- The altitude is less than 8,000 ft (2,400 m)
- The Engine Coolant Temperature (ECT) is between 4.4 to 35°C (40 to 95°F)
- The Intake Air Temperature (IAT) is between 4.4 to 35°C (40 to 95°F)
- The vehicle remains stationary (the vehicle speed is 0 km/h [0 mph])

(b) Monitor Conditions
1. Allow the engine to idle for at least 5 minutes.
2. Turn the ignition switch OFF and wait for 10 hours.
HINT:
Do not turn the ignition switch ON until CHECKING MONITOR STATUS. If the engine is started, the steps described above must be repeated.

(c) Monitor Status
1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch ON.
3. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
4. Check the Monitor Status displayed on the tester.
HINT:
If INCMP is displayed, the monitor is not completed. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

2. Purge flow monitor confirmation (P0441)

HINT:
Perform this monitor confirmation after the key-off monitor confirmation shows COMPL (complete).

(a) Preconditions
The monitor will not run unless:
- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway)
- The ECT is between 4.4 to 35°C (40 to 95°F)
- The IAT is between 4.4 to 35°C (40 to 95°F)

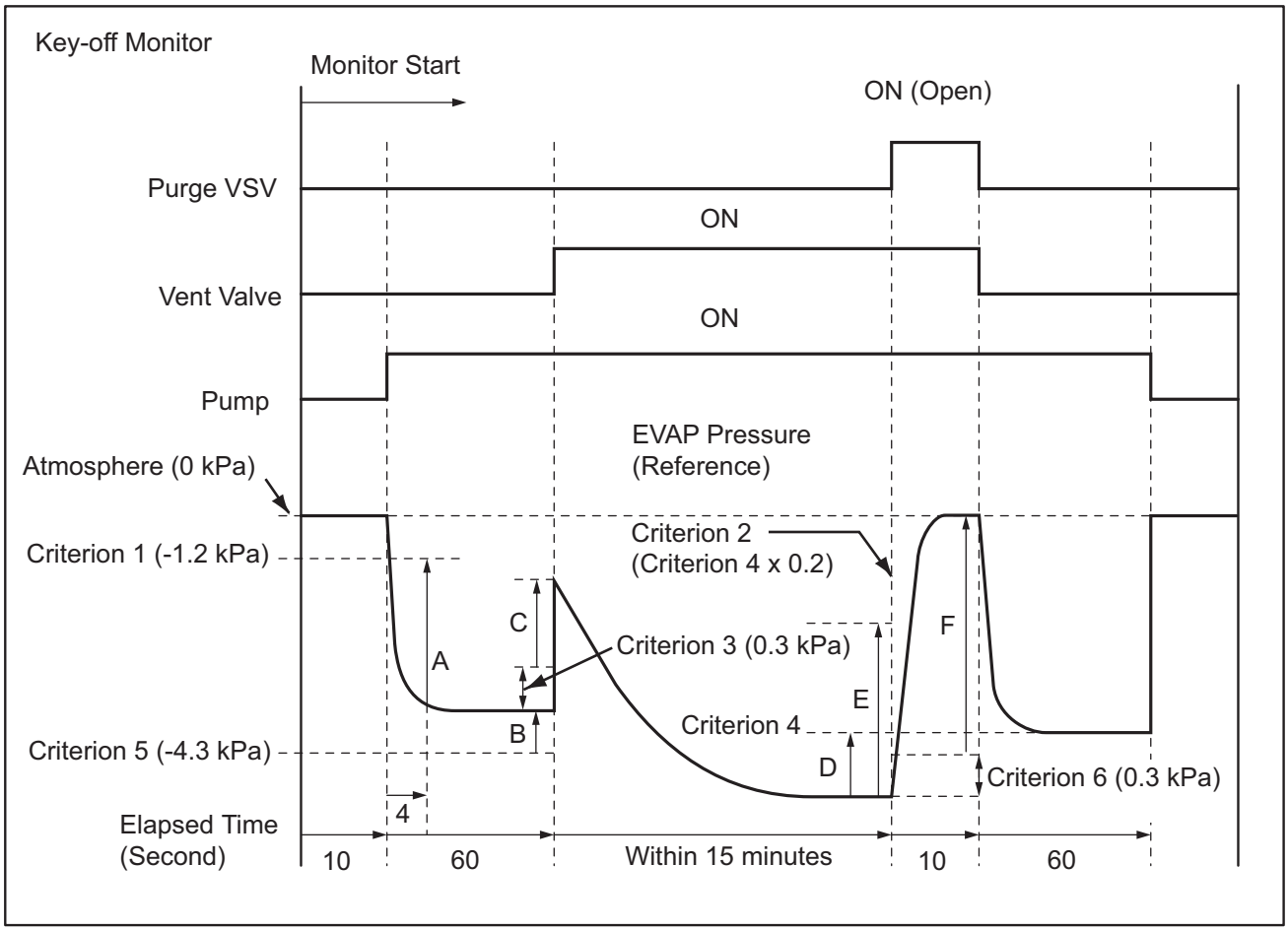
(b) Monitor Conditions
1. Release the pressure from the fuel tank by removing and reinstalling the fuel cap.
2. Warm the engine up until the ECT reaches more than 75°C (167°F).
3. Increase the engine speed to 3,000 rpm once.
4. Allow the engine to idle and turn the A/C ON for 1 minute.

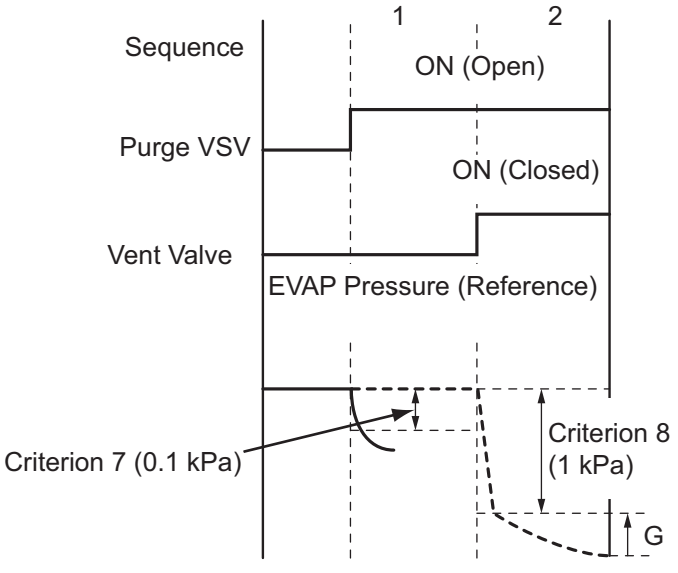
(c) Monitor Status
1. Turn the ignition switch OFF (if ON or the engine is running).
2. Connect the intelligent tester to the DLC3.
3. Turn the ignition switch ON.
4. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
5. Check the Monitor Status displayed on the tester.
HINT:
If INCMP is displayed, the monitor is not completed. Make sure that the preconditions have been met, and perform the "Monitor Conditions" procedures again.

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page ES-18).

ES





——— If pressure change in sequence 1 is greater than criterion 7, purge flow monitor is completed (functioning normally).

- - - - If pressure change in sequence 1 is smaller than criterion 7 and pressure change in sequence 2 is smaller than criterion 8, purge flow is insufficient.

Y

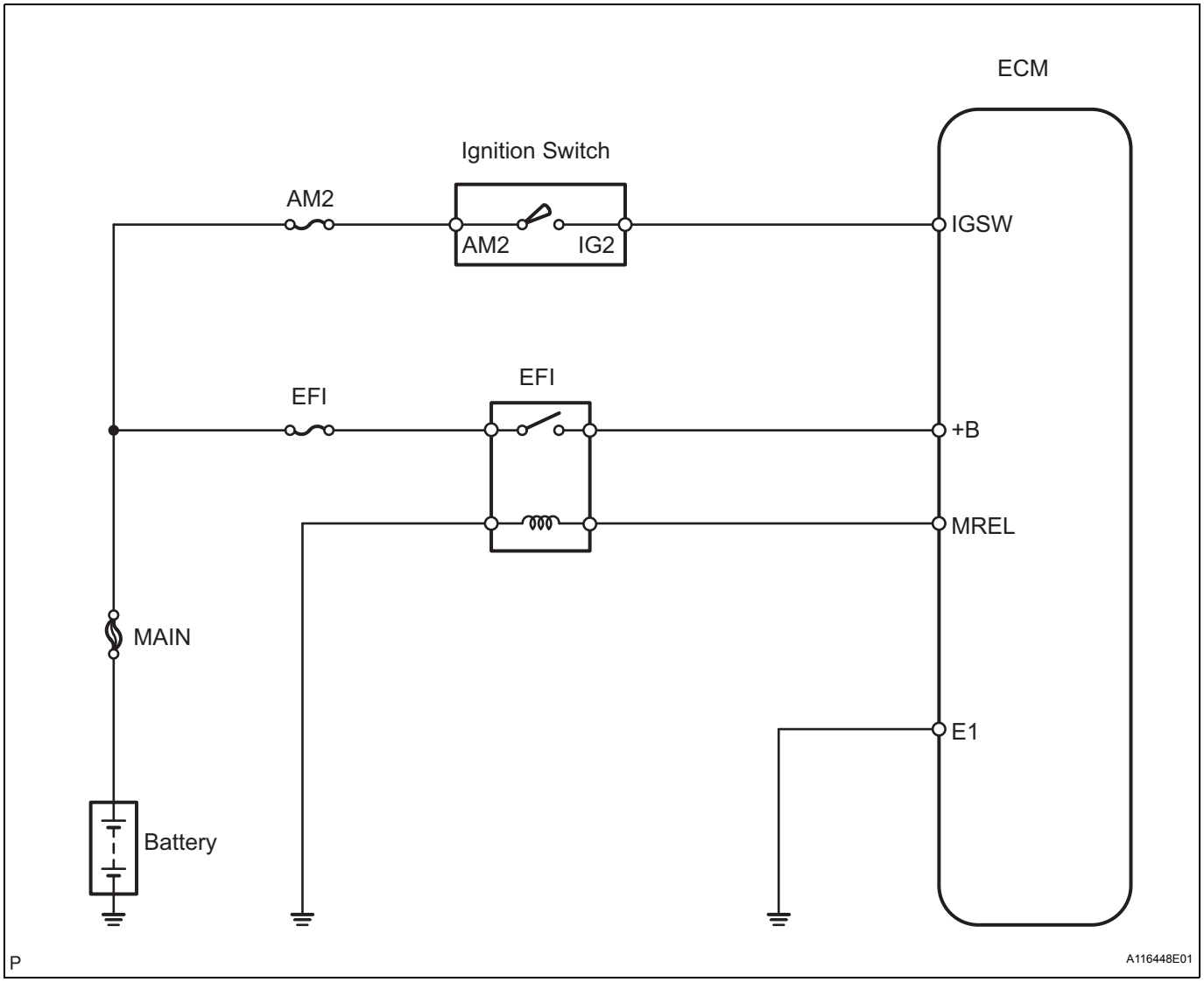
A106747E04

ECM Power Source Circuit

DESCRIPTION

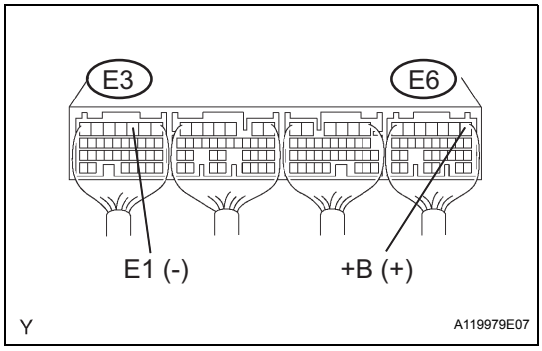
When the ignition switch is turned ON, the positive battery voltage is applied to terminal IGSW of the ECM. The ECM MREL output signal causes a current to flow to the coil, closing the contacts of the EFI relay (Marking: EFI) and supplies power to terminal +B of the ECM.
If the ignition switch is turned OFF, the ECM continues to switch on the EFI relay for a maximum of 2 seconds for the initial setting of the throttle valve.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT ECM (+B VOLTAGE)



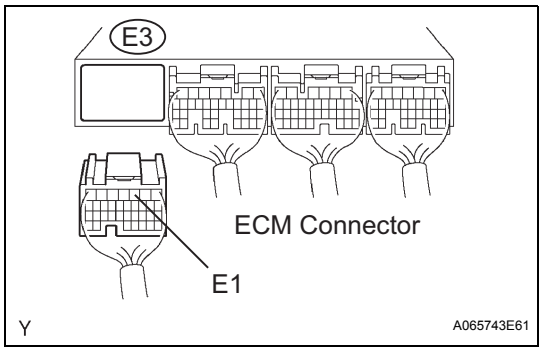
(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals of the ECM connectors.
Standard voltage

Tester Connection	Specified Condition
+B (E6-1) - E1 (E3-3)	9 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 CHECK HARNESS AND CONNECTOR (ECM - BODY GROUND)



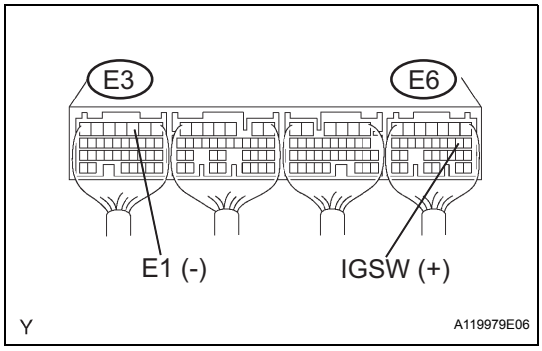
(a) Disconnect the negative (-) battery cable.
(b) Disconnect the E3 ECM connector.
(c) Measure the resistance of the wire harness side connector.
Standard resistance (Check for open)

Tester Connection	Specified Condition
E1 (E3-3) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT ECM (IGSW VOLTAGE)



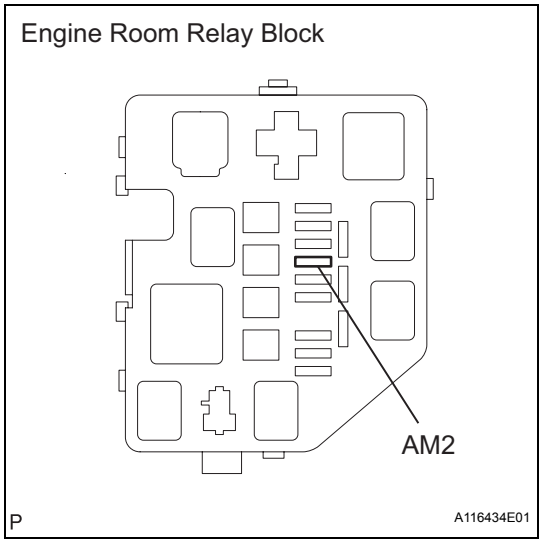
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard voltage

Tester Connection	Specified Condition
IGSW (E6-9) - E1 (E3-3)	9 to 14 V

OK → **Go to step 6**

NG

4 **CHECK FUSE (AM2)**

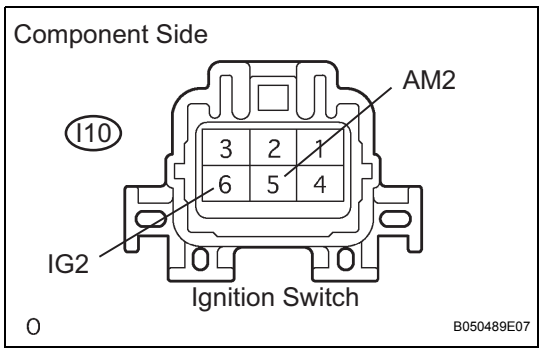


(a) Remove the AM2 fuse from the engine room relay block.
(b) Measure the resistance of the AM2 fuse.
Standard resistance:
Below 1 Ω

NG → **CHECK FOR SHORT IN ALL HARNESSES AND COMPONENTS CONNECTED TO FUSE**

OK

5 **INSPECT IGNITION SWITCH ASSEMBLY**



(a) Disconnect the I10 ignition switch connector.
(b) Measure the resistance of the ignition switch.
Standard resistance

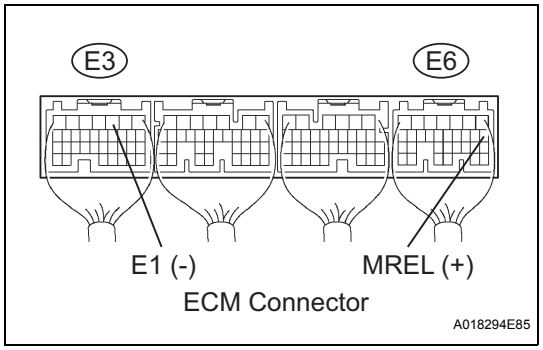
Ignition Switch Position	Tester Connection	Specified Condition
LOCK	All Terminals	10 kΩ or higher
ON	AM2 (5) - IG2 (6)	Below 1 Ω

NG → **REPLACE IGNITION SWITCH ASSEMBLY**

OK

CHECK HARNESS OR CONNECTOR (BATTERY - IGNITION SWITCH, IGNITION SWITCH - ECM)

6 **INSPECT ECM (MREL VOLTAGE)**



(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard voltage

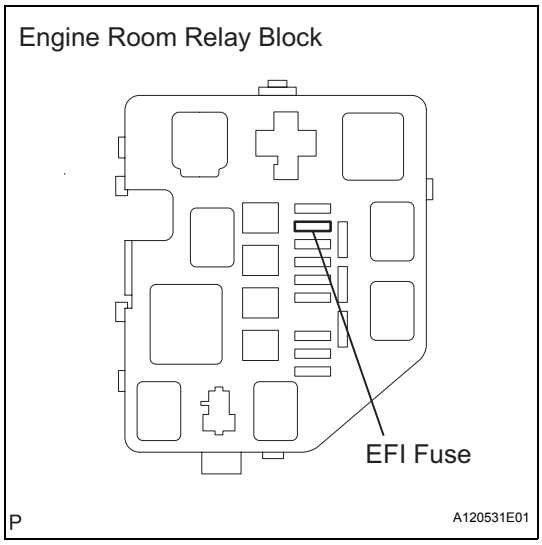
Tester Connection	Specified Condition
MREL (E6-8) - E1 (E3-3)	9 to 14 V

NG → **REPLACE ECM**

ES

OK

7	CHECK FUSE (EFI)

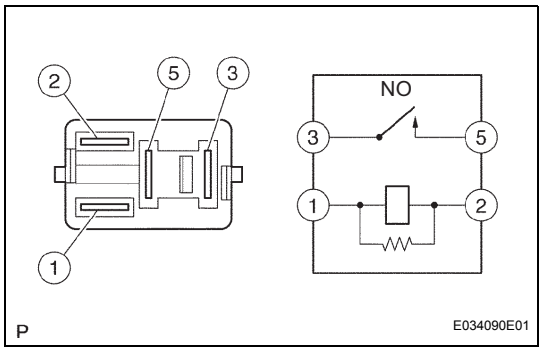


(a) Remove the EFI fuse from the engine room relay block.
(b) Measure the resistance of the EFI fuse.
Standard resistance:
Below 1 Ω

NG → **CHECK FOR SHORT IN ALL HARNESSES AND COMPONENTS CONNECTED TO FUSE**

OK

8	INSPECT EFI RELAY (Marking: EFI)



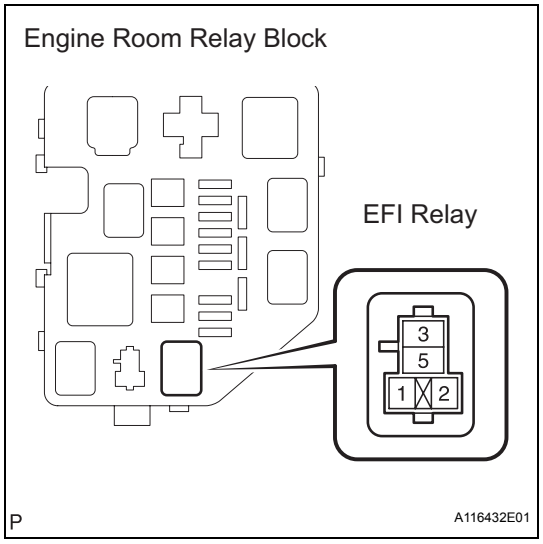
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the EFI fuse.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

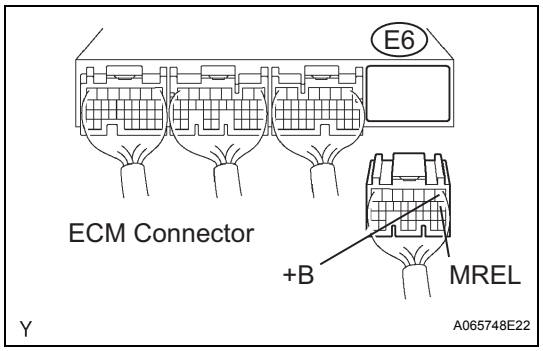
NG → **REPLACE EFI RELAY**

OK

9	CHECK HARNESS AND CONNECTOR (EFI RELAY - ECM, EFI RELAY - BODY GROUND)



(a) Check the harness and connector between the EFI relay and ECM.
(1) Remove the EFI relay from the engine room relay block.



(2) Disconnect the E6 ECM connector.
(3) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
Engine room relay block (EFI relay terminal 2) - MREL (E6-8)	Below 1 Ω
Engine room relay block (EFI relay terminal 3) - +B (E6-1)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
Engine room relay block (EFI relay terminal 2) or MREL (E6-8) - Body ground	10 kΩ or higher
Engine room relay block (EFI relay terminal 3) or +B (E6-1) - Body ground	10 kΩ or higher

(b) Check the harness and connector between the EFI relay and body ground.
(1) Remove the EFI relay from the engine room relay block.
(2) Measure the resistance of the wire harness side connector.

Standard resistance (Check for open)

Tester Connection	Specified condition
Engine room relay block (EFI relay terminal 1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE HARNESS OR CONNECTOR (TERMINAL 5 OF EFI RELAY - BATTERY POSITIVE TERMINAL)

CHECKING MONITOR STATUS

The purpose of the monitor result (mode 06) is to allow access to the results for on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are catalyst, evaporative emission (EVAP) and thermostat.

The monitor result allows the intelligent tester to display the monitor status, test value, minimum test value and maximum test limit. These data are displayed after the vehicle has been driven to run the monitor.

When the test value is not between the minimum test limit and maximum test limit, the ECM (PCM) interprets this as a malfunction. When the component is not malfunctioning, if the difference of the test value and test limit is very small, the component will malfunction in the near future. Perform the following instructions to view the monitor status. Although these instructions refer to the Lexus/Toyota diagnostic tester, it can be checked using a generic OBD II scan tool. Refer to your scan tool operator's manual for specific procedures.

1. PERFORM MONITOR DRIVE PATTERN

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch and intelligent tester ON.

(c) Clear the DTCs (see page ES-36).

(d) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (see page ES-22). Do not turn the ignition switch OFF.

NOTICE:

The test results will be lost if the ignition switch is turned OFF.

2. ACCESS MONITOR RESULT

(a) Select from the intelligent tester menus: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO and MONITOR RESULT. The monitor status appears after the component name.

- INCMP: The component has not been monitored yet.
- PASS: The component is functioning normally.
- FAIL: The component is malfunctioning.

(b) Confirm that the component is either PASS or FAIL.

(c) Select the component and press ENTER. The accuracy test value appears if the monitor status is either PASS or FAIL.

3. CHECK COMPONENT STATUS

(a) Compare the test value with the minimum test limit (MIN) and maximum test limit (MAX).

(b) If the test value is between the minimum test limit and maximum test limit, the component is functioning normally. If not, the component is malfunctioning. The test value is usually significantly higher or lower than the test limits. If the test value is on the borderline of the test limits, the component will malfunction in the near future.
HINT:
The monitor result might on rare occasions be PASS even if the malfunction indicator lamp (MIL) is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

4. MONITOR RESULT INFORMATION

If you use a generic scan tool, multiply the test value by the scaling value listed below.

(a) Front Heated Oxygen Sensor

Bank 1 Sensor 1

Monitor ID	Test ID	Scaling	Unit	Description of Test Value
$01	$03	Multiply by 0.001	V	Criteria of Lean sensor. O2S is Lean when voltage is lower than this value
$01	$04	Multiply by 0.001	V	Criteria of Rich sensor. O2S is Rich when voltage is higher than this value
$01	$05	Multiply by 0.001	Seconds	Rich - Lean switch time
$01	$06	Multiply by 0.001	Seconds	Lean - Rich switch time
$01	$07	Multiply by 0.005	V	Minimum sensor voltage
$01	$08	Multiply by 0.005	V	Maximum sensor voltage
$01	$81	Multiply by 0.001	Seconds	Duration while sensor voltage stuck Lean or Rich

(b) Rear Heated Oxygen Sensor

Bank 1 Sensor 2

MID	TID	Scaling	Unit	Description
$02	$05	Multiply by 0.001	Seconds	Rich - Lean switch time
$02	$06	Multiply by 0.001	Seconds	Lean - Rich switch time
$02	$07	Multiply by 0.001	V	Minimum sensor voltage
$02	$08	Multiply by 0.001	V	Maximum sensor voltage
$02	$8A	Multiply by 1	Time	Frequency of sensor switching
$02	$8B	Multiply by 0.001	Seconds	0.35 to 0.2 V sensor switch time
$02	$8D	Multiply by 0.001	Seconds	Duration that sensor voltage drops to 0.2 V during fuel cut

(c) Catalyst

Bank 1

MID	TID	Scaling	Unit	Description
$21	$A1	Multiply by 0.0003	No dimension	Locus length ratio of O2S sensor 1 and sensor 2
$21	$A2	Multiply by 0.0003	No dimension	Voltage area ratio of O2S sensor 1 and sensor 2

MID	TID	Scaling	Unit	Description
$21	$A3	Multiply by 0.0003	No dimension	Locus length ratio of O2S sensor 1 and sensor 2
$21	$A4	Multiply by 0.0003	No dimension	O2S frequency ratio of sensor 2 and sensor 1
$21	$A5	Multiply by 0.0003	No dimension	Locus length ratio of O2S sensor 1 and sensor 2
$21	$A6	Multiply by 0.0003	No dimension	Voltage area ratio of O2S sensor 1 and sensor 2

(d) EVAP (Key-off Type)

MID	TID	Scaling	Unit	Description
$3D	$C9	Multiply by 0.01	kPa	Test value for small leak (P0456)
$3D	$CA	Multiply by 0.01	kPa	Test value for gross leak (P0455)
$3D	$CB	Multiply by 0.01	kPa	Test value for leak detection pump stuck OFF (P2401)
$3D	$CD	Multiply by 0.01	kPa	Test value for leak detection pump stuck ON (P2402)
$3D	$CE	Multiply by 0.01	kPa	Test value for vent valve stuck OFF (P2420)
$3D	$CF	Multiply by 0.01	kPa	Test value for vent valve stuck ON (P2419)
$3D	$D0	Multiply by 0.01	kPa	Test value for reference orifice low flow (P043E)
$3D	$D1	Multiply by 0.01	kPa	Test value for reference orifice high flow (P043F)
$3D	$D4	Multiply by 0.01	kPa	Test value for purge VSV stuck closed (P0441)
$3D	$D5	Multiply by 0.01	kPa	Test value for purge VSV stuck open (P0441)
$3D	$D7	Multiply by 0.01	kPa	Test value for purge flow insufficient (P0441)

(e) Oxygen Sensor Heater

Bank 1 Sensor 1

MID	TID	Scaling	Unit	Description
$41	$90	Multiply by 0.001	A	Maximum sensor heater current

Bank 1 Sensor 2

MID	TID	Scaling	Unit	Description
$42	$90	Multiply by 0.001	A	Maximum sensor heater current

(f) Misfire - All Cylinders

MID	TID	Scaling	Unit	Description
$A1	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire counts for last 10 driving cycles - Total
$A1	$0C	Multiply by 1	Time	Misfire counts for last driving cycle and current driving cycle - Total

ES

(g) Misfire - Cylinder 1

MID	TID	Scaling	Unit	Description
$A2	$0B	Multiply by 1	Time	EWMA misfire counts for last 10 driving cycles - Total
$A2	$0C	Multiply by 1	Time	Misfire counts for last driving cycle and current driving cycle - Total

(h) Misfire - Cylinder 2

MID	TID	Scaling	Unit	Description
$A3	$0B	Multiply by 1	Time	EWMA misfire counts for last 10 driving cycles - Total
$A3	$0C	Multiply by 1	Time	Misfire counts for last driving cycle and current driving cycle - Total

(i) Misfire - Cylinder 3

MID	TID	Scaling	Unit	Description
$A4	$0B	Multiply by 1	Time	EWMA misfire counts for last 10 driving cycles - Total
$A4	$0C	Multiply by 1	Time	Misfire counts for last driving cycle and current driving cycle - Total

(j) Misfire - Cylinder 4

MID	TID	Scaling	Unit	Description
$A5	$0B	Multiply by 1	Time	EWMA misfire counts for last 10 driving cycles - Total
$A5	$0C	Multiply by 1	Time	Misfire counts for last driving cycle and current driving cycle - Total

(k) Thermostat

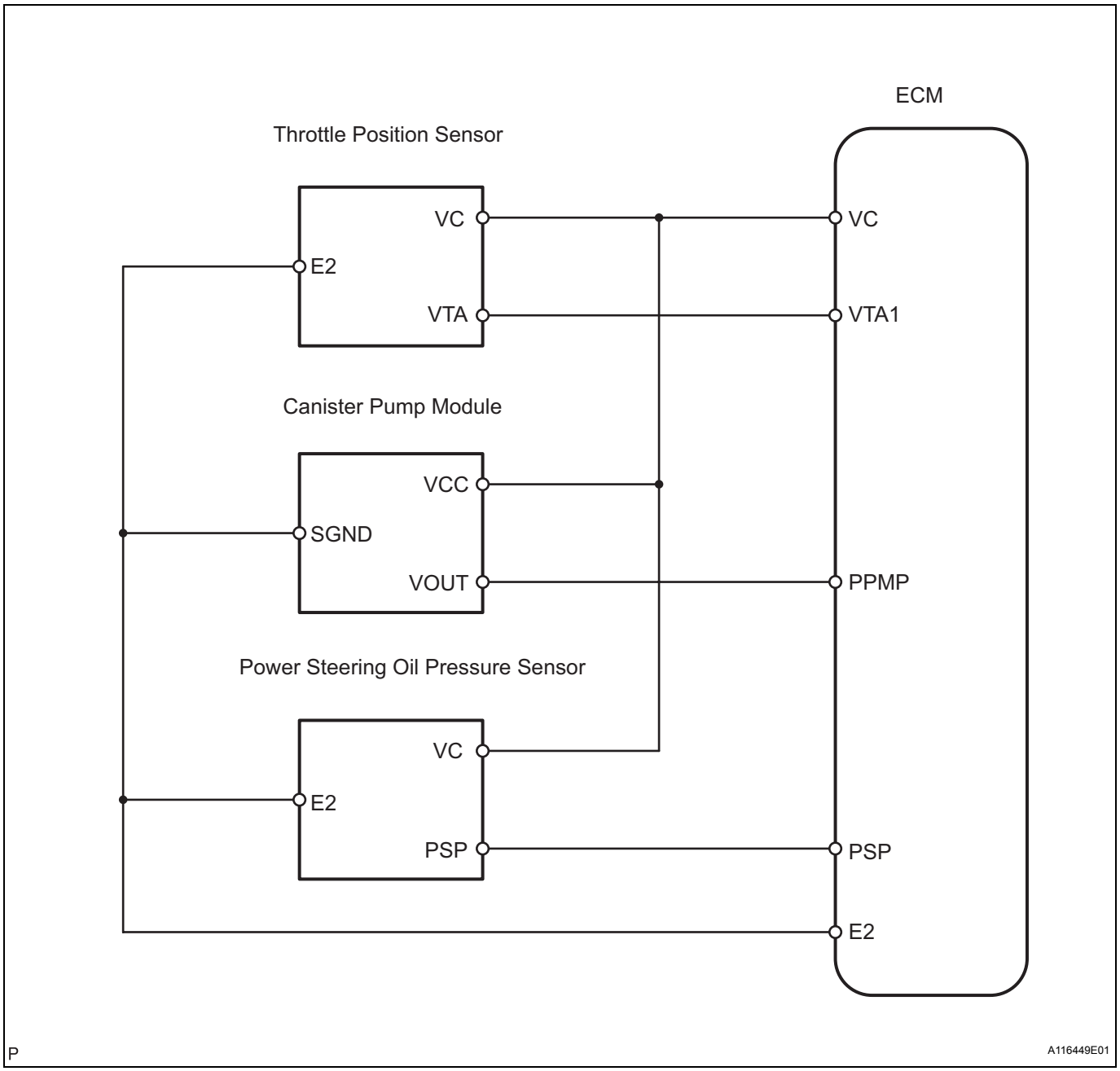
MID	TID	Scaling	Unit	Description
$E1	$E8	Multiply by 0.1	°C	ECT sensor output when estimated ECT reaches malfunction criteria

VC Output Circuit

DESCRIPTION

The VC voltage (5 V) is generated in the ECM. The voltage is used to supply power to the throttle position sensor, canister pump module, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK MIL

(a) Check that the Malfunction Indicator Lamp (MIL) lights up when turning the ignition switch ON.

OK:
MIL lights up

OK → **SYSTEM OK**

NG

2 CHECK CONNECTION BETWEEN INTELLIGENT TESTER AND ECM

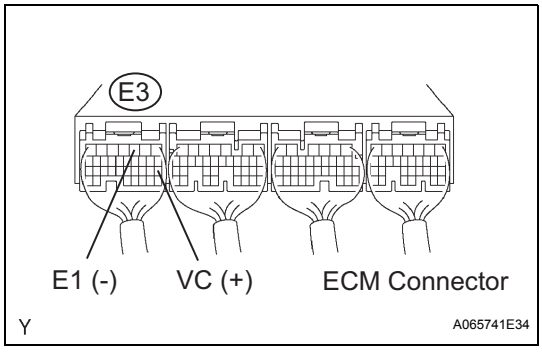
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and intelligent tester ON.
(c) Check the communication between the intelligent tester and ECM.

Result	Proceed to
Communication is possible	A
Communication is not possible	B

A → **GO TO MIL CIRCUIT**

B

3 INSPECT ECM



(a) Turn the ignition switch ON.
(b) Measure the voltage between E3-18 (VC) and E3-3 (E1) of the ECM connectors.
Result:
Voltage is not 5 V

NEXT

4 CHECK MIL (THROTTLE POSITION SENSOR)

(a) Disconnect the T1 throttle position sensor connector.
(b) Turn the ignition switch ON.
(c) Check the MIL.
Result

Result	Proceed to
MIL illuminates	**A**
MIL does not illuminate	**B**

A → **REPLACE THROTTLE POSITION SENSOR**

B

5 CHECK MIL (POWER STEERING OIL PRESSURE SENSOR)

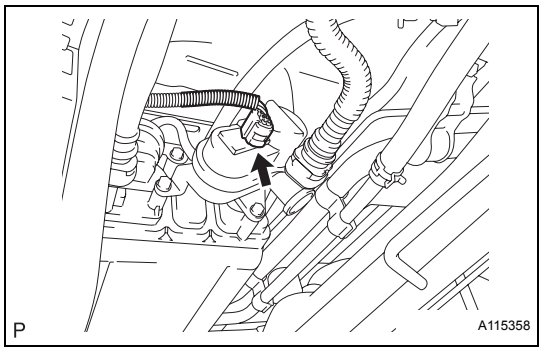
(a) Disconnect the P2 power steering oil pressure sensor connector.
(b) Turn the ignition switch ON.
(c) Check the MIL.
Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

A → **REPLACE POWER STEERING OIL PRESSURE SENSOR**

B

6 CHECK MIL (CANISTER PUMP MODULE)



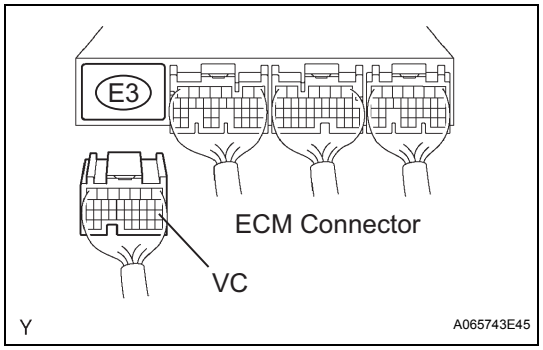
(a) Disconnect the C17 canister pump module connector.
(b) Turn the ignition switch ON.
(c) Check the MIL.
Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

A → **REPLACE CANISTER**

B

7 CHECK HARNESS AND CONNECTOR



(a) Disconnect the T1 throttle position sensor connector.
(b) Disconnect the P2 power steering oil pressure sensor connector.
(c) Disconnect the C17 canister pump module connector.
(d) Disconnect the E3 ECM connector.
(e) Measure the resistance of the wire harness side connector.
Standard resistance (check for short)

Tester Connection	Specified Condition
VC (E3-18) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

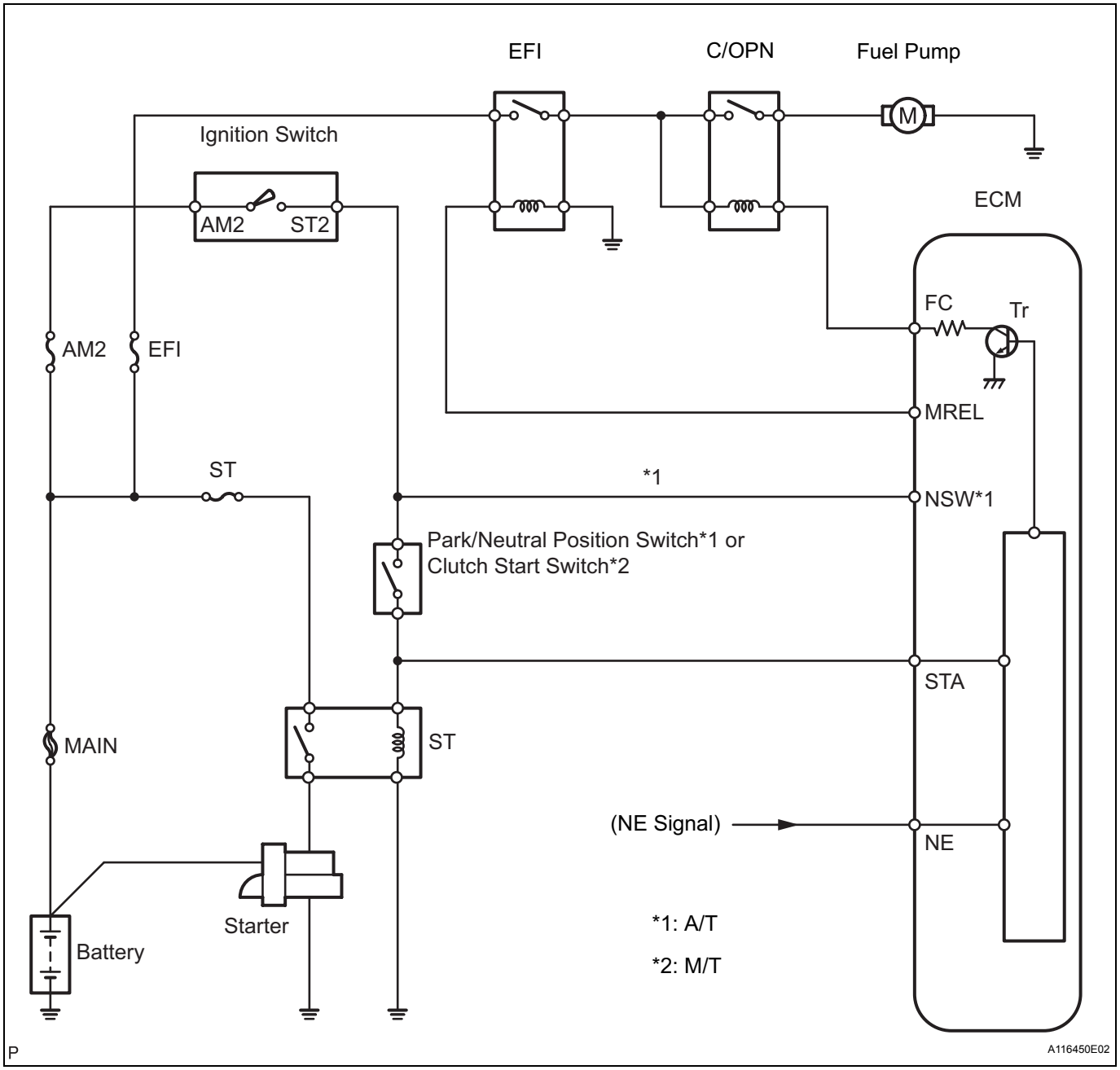
OK

REPLACE ECM

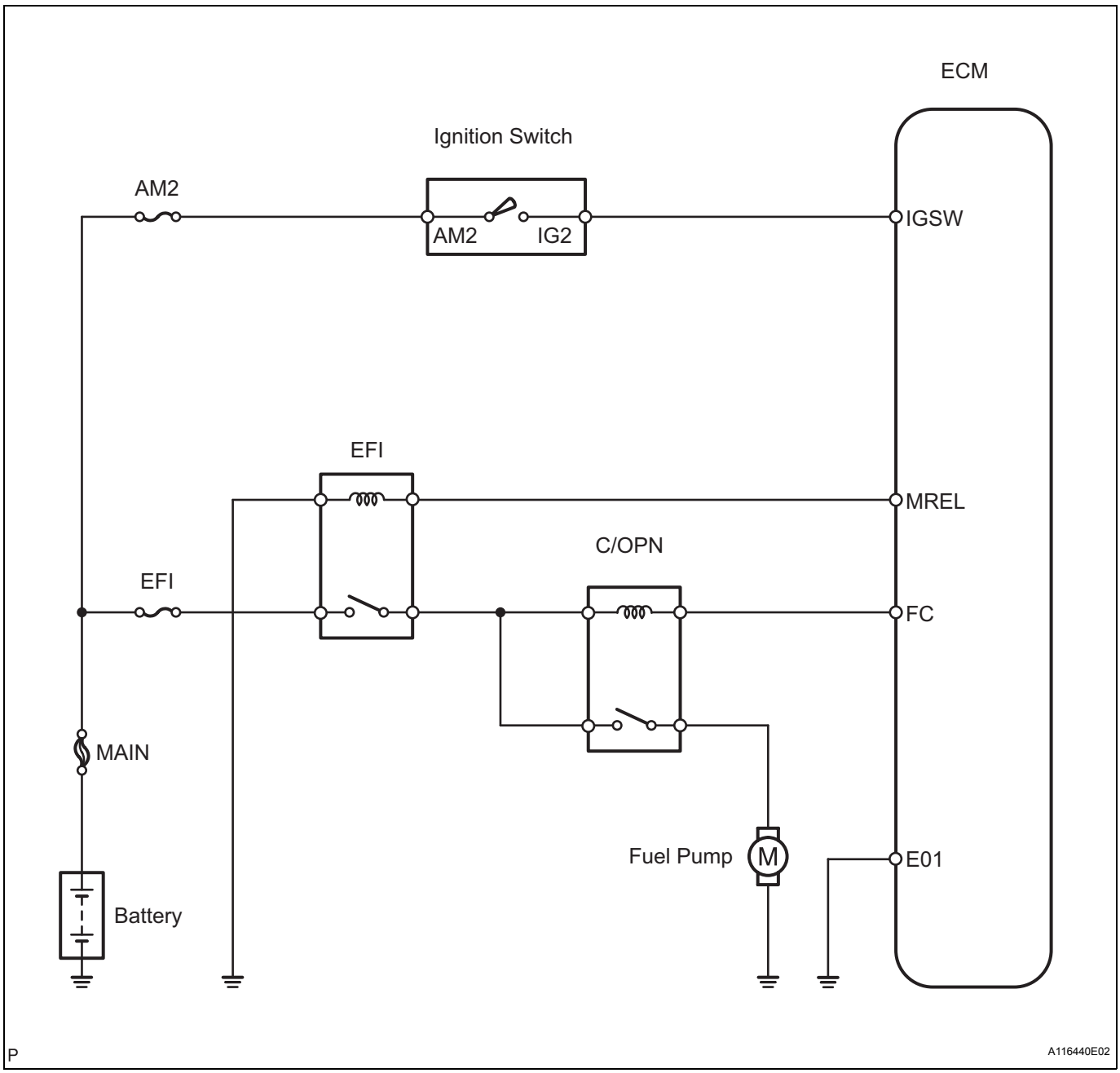
Fuel Pump Control Circuit

DESCRIPTION

When the engine is cranked, a current flows from terminal ST2 of the ignition switch into the starter relay (Marking: ST) coil and a current also flows into terminal STA of the ECM (STA signal).
When the STA and NE signals are received by the ECM, Tr (power transistor) is switched on, allowing a current to flow into the circuit opening relay (Marking: C/OPN) coil, the circuit opening relay switches on, power is supplied to the fuel pump and the fuel pump operates.
While the NE signal is being generated (engine running), the ECM keeps Tr ON, therefore keeping the circuit opening relay ON, so that the fuel pump continues to operate.



WIRING DIAGRAM



INSPECTION PROCEDURE

1	**PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATION OF CIRCUIT OPENING RELAY)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
(d) Check whether operating sounds can be heard while operating the relay using the tester.
OK:
Operating sounds can be heard from relay.

OK → Go to step 7

NG

2 INSPECT ECM POWER SOURCE CIRCUIT

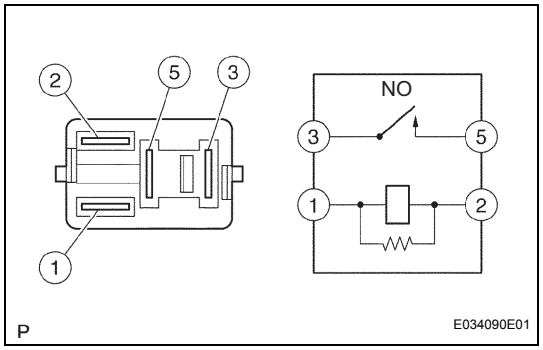
(a) Inspect the ECM power source circuit (see page ES-305).

NG → REPAIR OR REPLACE

OK

ES

3 INSPECT CIRCUIT OPENING RELAY (Marking: C/OPN)



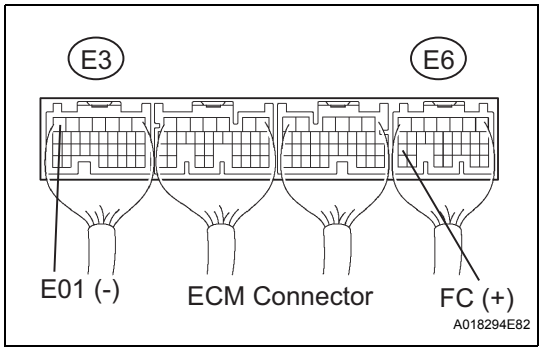
(a) Remove the circuit opening relay from the instrument panel junction block.
(b) Measure the resistance of the circuit opening relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → REPLACE CIRCUIT OPENING RELAY

OK

4 INSPECT ECM (FC VOLTAGE)



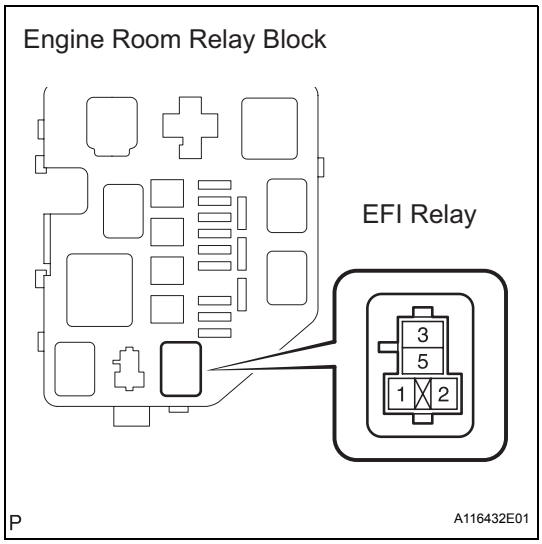
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard voltage

Tester Connection	Specified Condition
FC (E6-25) - E01 (E3-7)	9 to 14 V

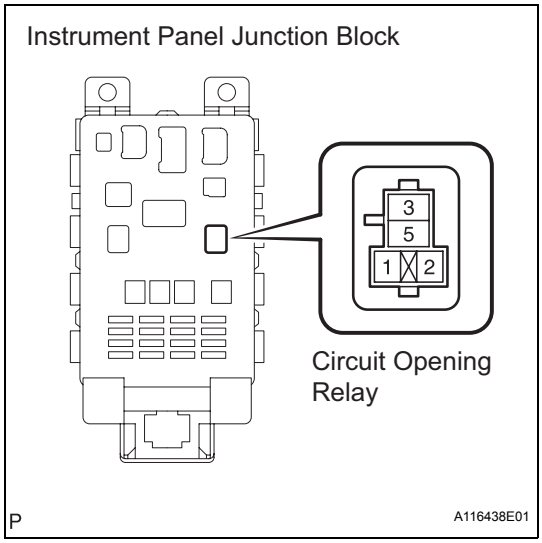
OK → REPLACE ECM

NG

5	CHECK HARNESS AND CONNECTOR (EFI RELAY (Marking: EFI) - CIRCUIT OPENING RELAY (Marking: C/OPN)



(a) Remove the EFI relay from the engine room relay block.



(b) Remove the circuit opening relay from the instrument panel junction block.

(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
Engine room relay block (EFI relay terminal 3) - Instrument panel junction block (Circuit opening relay terminal 1)	Below 1 Ω
Engine room relay block (EFI relay terminal 3) - Instrument panel junction block (Circuit opening relay terminal 5)	Below 1 Ω

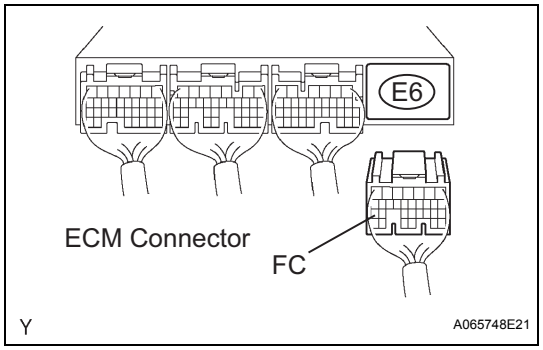
Standard resistance (Check for short)

Tester Connection	Specified Condition
Engine room relay block (EFI relay terminal 3) or Circuit opening relay (1) - Body ground	10 kΩ or higher
Instrument panel junction block (Circuit opening relay terminal 5) - Body ground	10 kΩ or higher

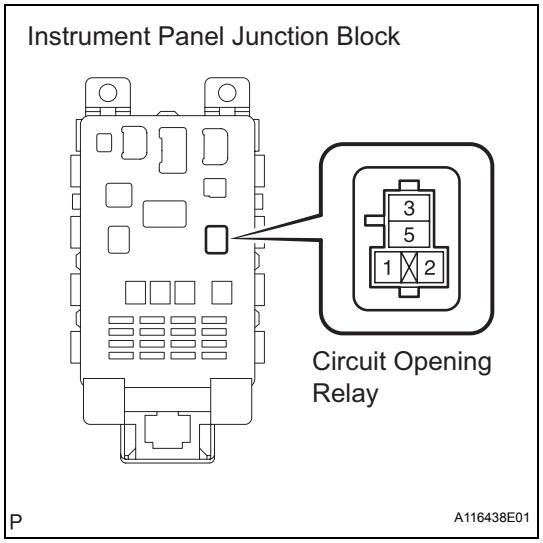
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR (ECM - CIRCUIT OPENING RELAY)



(a) Disconnect the E6 ECM connector.



(b) Remove the circuit opening relay from the instrument panel junction block.

(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
FC (E6-25) - Instrument panel junction block (Circuit opening relay terminal 2)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
FC (E6-25) or Instrument panel junction block (Circuit opening relay terminal 2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

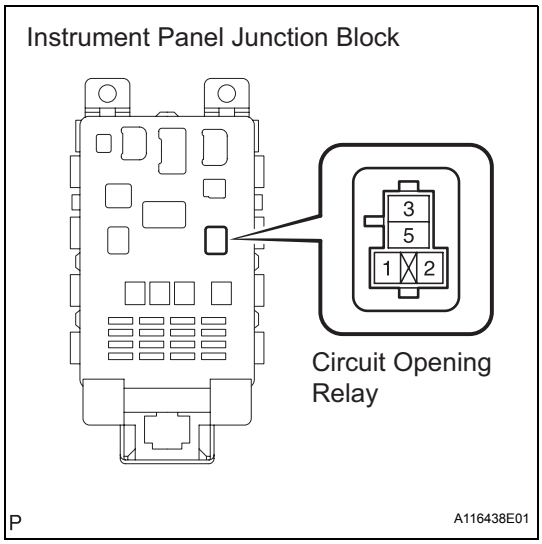
7 INSPECT FUEL PUMP

(a) Inspect the fuel pump (see page FU-21).

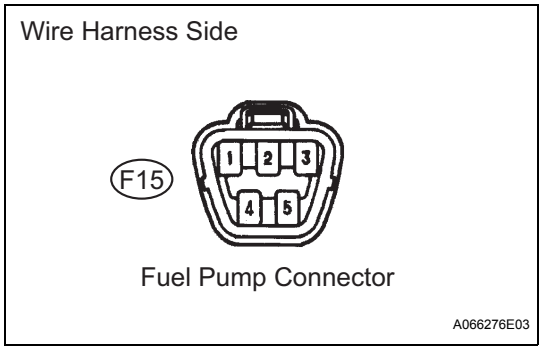
NG → **REPLACE FUEL PUMP**

OK

8	CHECK HARNESS AND CONNECTOR (CIRCUIT OPENING RELAY (Marking: C/OPN) - FUEL PUMP, FUEL PUMP - BODY GROUND)



(a) Remove the circuit opening relay from the instrument panel junction block.
(b) Disconnect the F15 fuel pump connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
Instrument panel junction block (Circuit opening relay terminal 3) - Fuel pump (F15-4)	Below 1 Ω
Fuel pump (F15-5) - Body ground	Below 1 Ω

Standard resistance Check for short)

Tester Connection	Specified Condition
Instrument panel junction block (Circuit opening relay terminal 3) or Fuel pump (F15-4) - Body ground	10 kΩ or higher

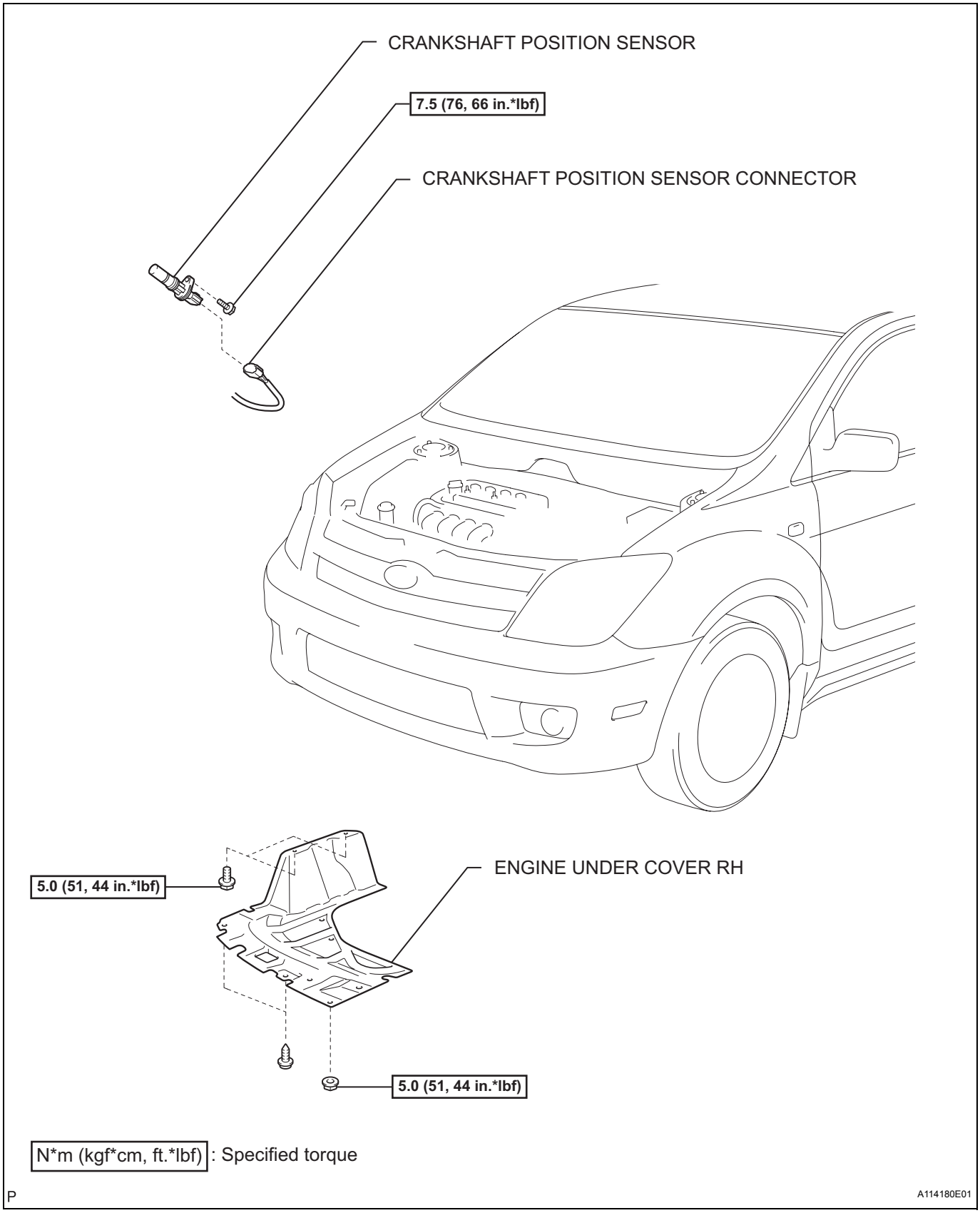
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

CRANKSHAFT POSITION SENSOR

COMPONENTS



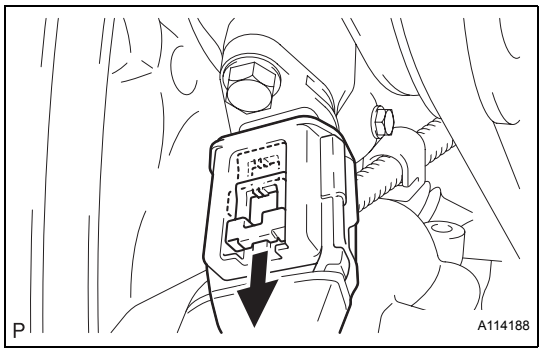
REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

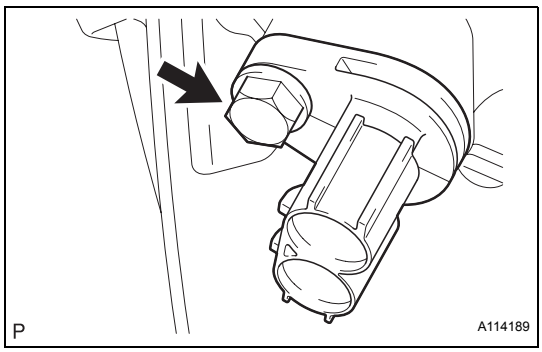
2. REMOVE ENGINE UNDER COVER RH

3. REMOVE CRANKSHAFT POSITION SENSOR

(a) Disconnect the sensor connector.



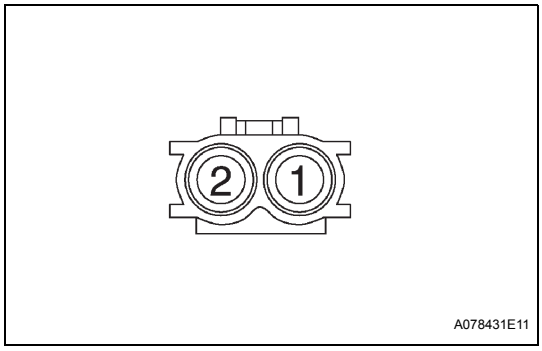
(b) Remove the bolt and sensor.



INSPECTION

1. INSPECT CRANKSHAFT POSITION SENSOR

(a) Measure the resistance of the sensor.
Standard resistance



Tester Connection	Condition	Specified Condition
1 - 2	Cold	985 to 1.600 Ω
1 - 2	Hot	1.265 to 1.890 Ω

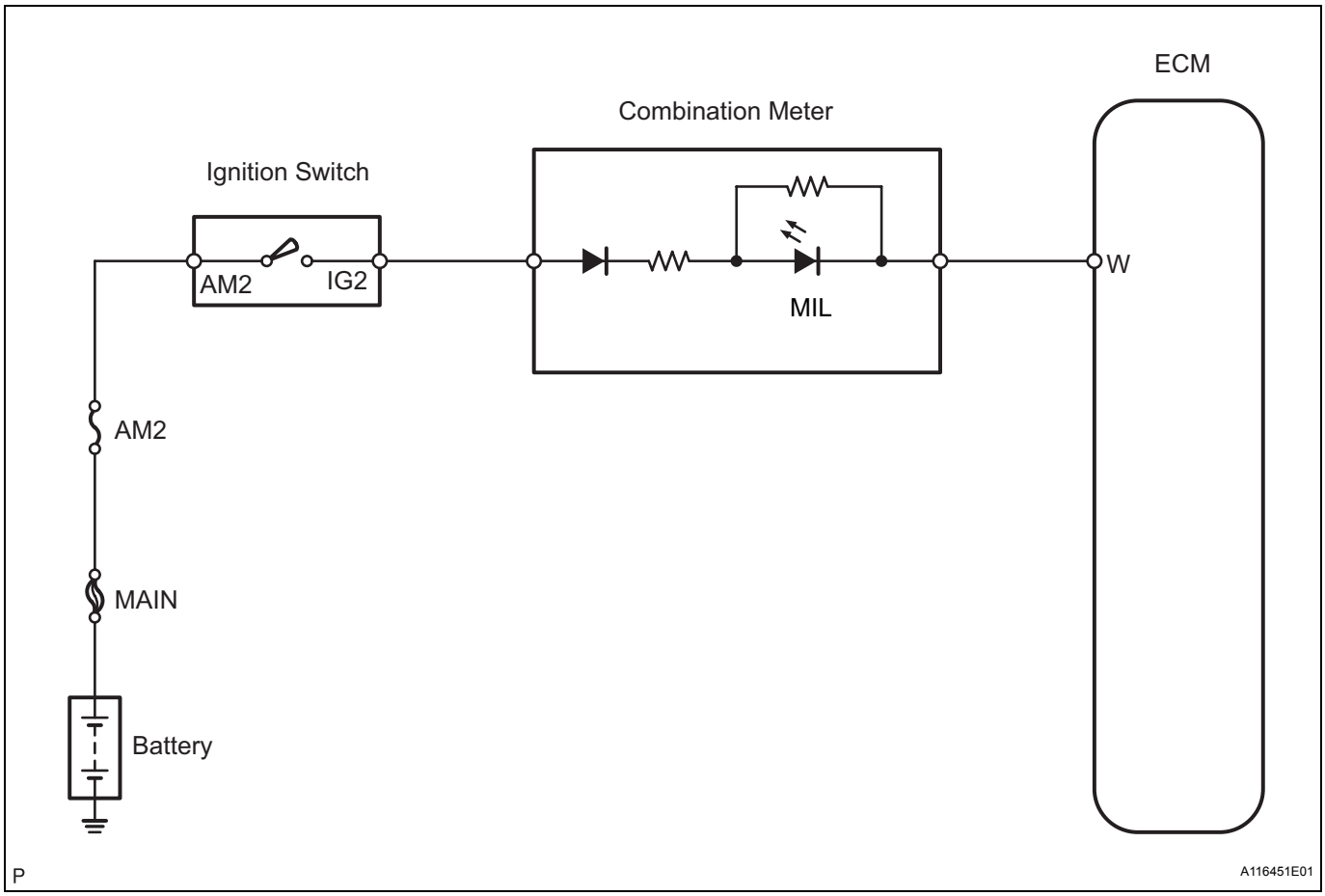
If the result is not as specified, replace the crankshaft position sensor.
NOTICE:
The terms cold and hot refer to the temperature of the sensors. Cold means approximately -10 to 50°C (14 to 122°F). Hot means approximately 50 to 100°C (122 to 212°F).

MIL Circuit

DESCRIPTION

The MIL (Malfunction Indicator Lamp) is used to indicate vehicle malfunction detections by the ECM.
By turning the ignition switch ON, power is supplied to the MIL circuit, and the ECM provides the circuit ground which illuminates the MIL.
The MIL operation can be checked visually: When the ignition switch is first turned ON, the MIL should be illuminated and should then turn OFF. If the MIL remains illuminated or is not illuminated, conduct the following troubleshooting procedure using the intelligent tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK THAT MIL IS ILLUMINATED

(a) Perform troubleshooting in accordance with the chart below.
Result

Condition	Proceed to
MIL remains ON	A
MIL does not illuminate	B

B	Go to step 5

A

2	CHECK WHETHER MIL TURNS OFF

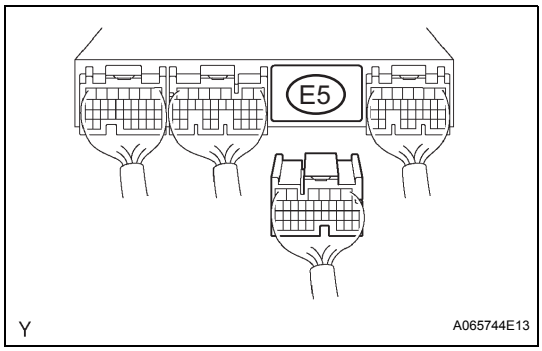
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Check whether any DTCs have been stored (see page ES-47). Write them down if necessary.
(d) Clear DTCs (see page ES-36).
(e) Check if the MIL turns off.
OK:
MIL should turn off.

ES

OK → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC**

NG

3	CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT IN WIRE HARNESS)



(a) Disconnect the E5 ECM connector.
(b) Turn the ignition switch ON.
(c) Check that the MIL is not illuminated.
OK:
MIL is not illuminated.

OK → **REPLACE ECM**

NG

4	CHECK HARNESS AND CONNECTOR (COMBINATION METER - ECM)

(a) Check the harness and connector (see page IN-33).

OK → **REPAIR OR REPLACE COMBINATION METER**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

5	CHECK THAT MIL IS ILLUMINATED

(a) Check if the MIL is illuminated when the ignition switch is turned ON.
Standard:
MIL should be illuminated.

OK → SYSTEM OK

NG

6	CHECK THAT ENGINE STARTS

(a) Turn the ignition switch ON.
(b) Start the engine.

Result

Condition	Proceed to
Engine starts	A
Engine does not start*	B

HINT:
*: The intelligent tester cannot communicate with the ECM.

B → GO TO VC OUTPUT CIRCUIT

A

7	INSPECT COMBINATION METER ASSEMBLY (MIL CIRCUIT)

(a) See the combination meter troubleshooting procedure (see page ME-7).

NG → REPAIR OR REPLACE COMBINATION METER

OK

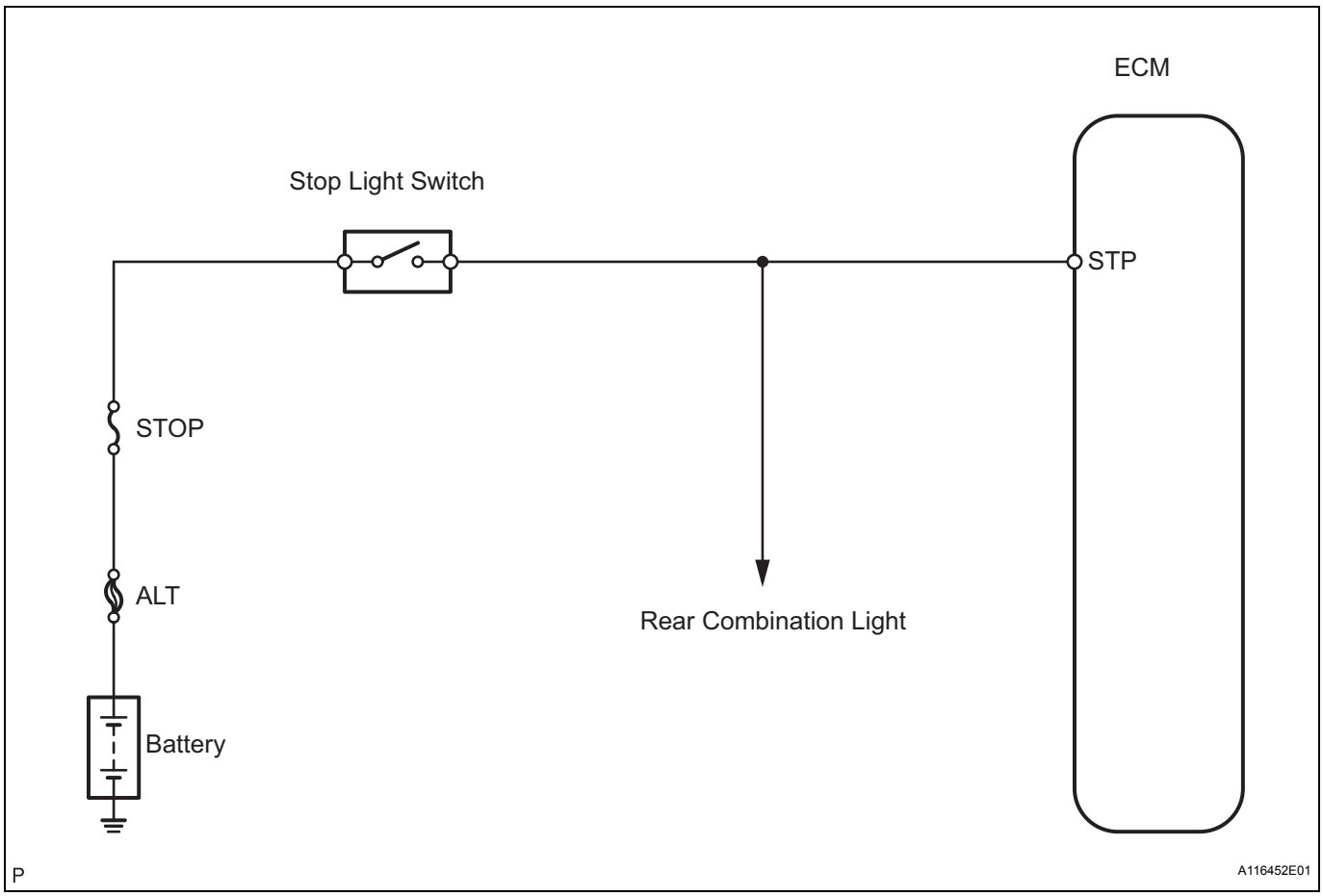
CHECK AND REPLACE HARNESS OR CONNECTOR (COMBINATION METER - ECM)

Stop Light Switch Circuit

DESCRIPTION

When the brake pedal is depressed, the stop light switch turns on and transmits an STP signal to the ECM. Upon receipt of the STP signal, the ECM determines that the brakes have been applied. The signal voltage level is the same as that of the voltage which is applied to the stop lights. In addition, the STP signal is used to control the fuel cut-off engine speed. Therefore, the fuel cut-off engine speed is slightly reduced when the vehicle is braking.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OPERATION OF STOP LIGHT

(a) Check whether the stop lights turn on and off normally when the brake pedal is depressed and released.
OK:
Stop lights turn ON when brake pedal is depressed.

NG → **REPAIR OR REPLACE STOP LIGHT SWITCH CIRCUIT**

OK

2	READ VALUE OF INTELLIGENT TESTER (STP SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STOP LIGHT SW.
(d) Read the value displayed on the tester.
Standard

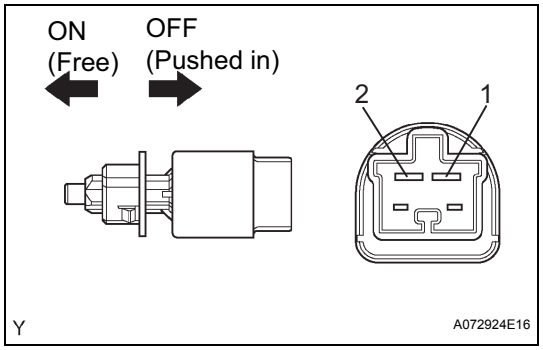
Brake Pedal Operation	Specified Condition
Depressed	STP Signal ON
Released	STP Signal OFF

ES

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

3	INSPECT STOP LIGHT SWITCH ASSEMBLY



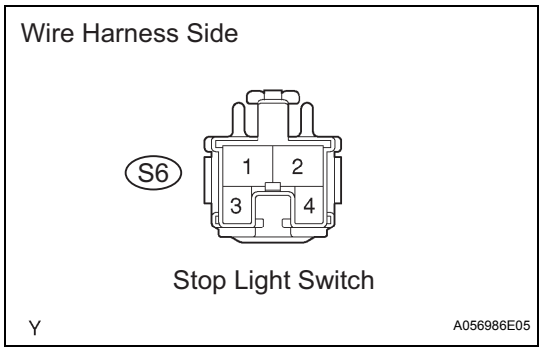
(a) Check the resistance when the stop light switch is ON and OFF.
Standard resistance

Switch Position	Tester Connection	Specified Condition
ON (Free)	1 - 2	Below 1 Ω
OFF (Pushed in)	1 - 2	10 kΩ or higher

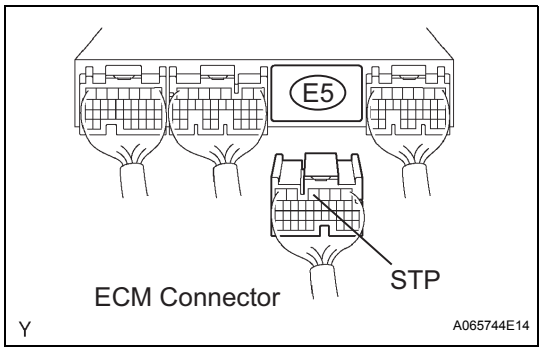
NG → REPLACE STOP LIGHT SWITCH ASSEMBLY

OK

4	CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - ECM)



(a) Disconnect the S6 stop light switch connector.



(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connector.

Standard resistance (Check for open)

Tester Connection	Specified Condition
S6-1 - STP (E5-4)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
S6-1 or STP (E5-4) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ES

OK

REPLACE ECM

INSPECTION

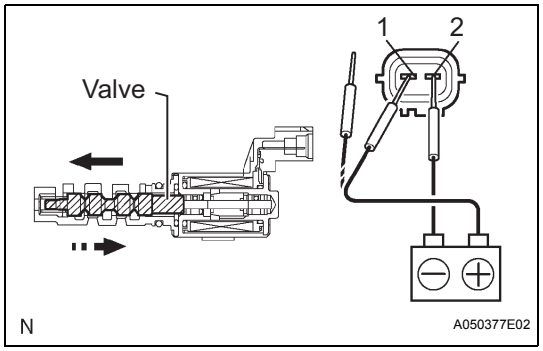
1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Measure the resistance of the oil control valve.

Standard resistance:

6.9 to 7.9 Ω at 20°C (68°F)

If the result is not as specified, replace the camshaft timing oil control valve assembly.



(b) Inspect the operation.

(1) Connect the battery positive (+) lead to terminal 1 and negative (-) lead to terminal 2, and inspect the movement of the valve.

Specified condition

Condition	Specified Condition
Battery positive (+) voltage is applied	Valve moves in left arrow direction shown in illustration
Battery positive (+) voltage is cut off	Valve moves in right arrow direction shown in illustration

If the result is not as specified, replace the camshaft timing oil control valve assembly.

NOTICE:

Confirm that the valve moves freely and is not stuck in any position.

HINT:

Foreign objects in the oil can cause subtle pressure leaks in the valve. The pressure leaks will cause the cam to advance. This condition will usually set a DTC.

ES

INSTALLATION

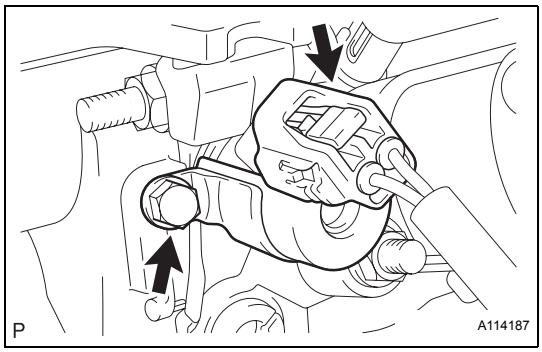
1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

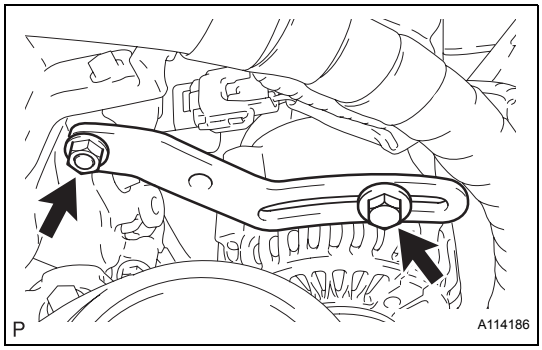
(a) Apply a light coat of engine oil to a new O-ring.

(b) Install the O-ring to the oil control valve.

(c) Install the oil control valve with the bolt.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

(d) Connect the oil control valve connector.





2. INSTALL FAN BELT ADJUSTING BAR

(a) Temporarily install the adjusting bar with the bolt and nut.

(b) Adjust the drive belt tension (see page EM-7).

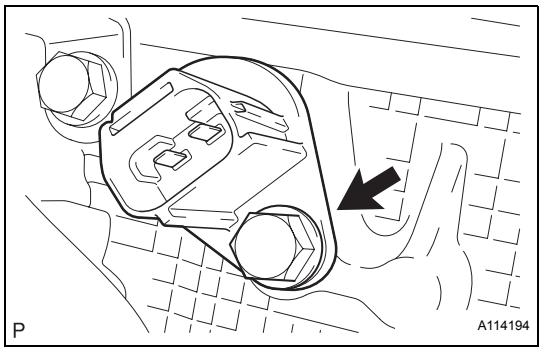
3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

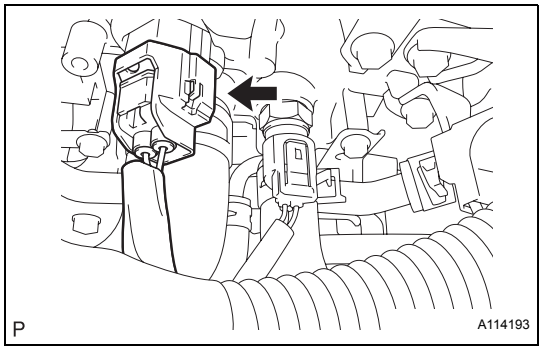
NOTICE:
The terms cold and hot refer to the temperature of the sensors. Cold means approximately -10 to 50°C (14 to 122°F). Hot means approximately 50 to 100°C (122 to 212°F).

INSTALLATION

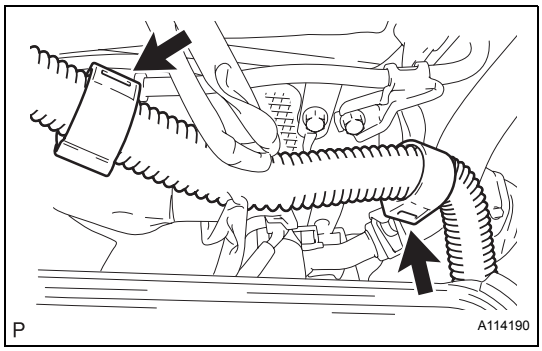


1. INSTALL CAMSHAFT POSITION SENSOR

(a) Install the sensor with the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



(b) Connect the sensor connector.



2. CONNECT ENGINE WIRE

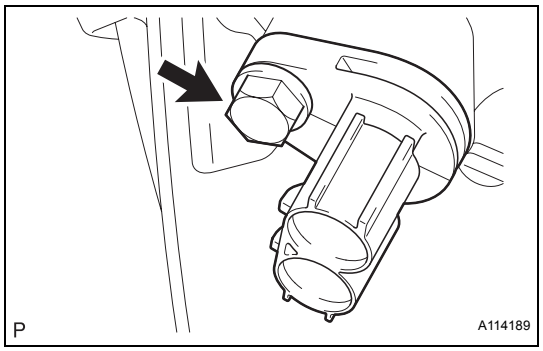
(a) Connect the 2 clamps of the engine wire.

3. INSTALL AIR CLEANER ASSEMBLY (See page ES-348)

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.



INSTALLATION

1. **INSTALL CRANKSHAFT POSITION SENSOR**
   (a) Install the sensor with the bolt.
   Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)
   (b) Connect the sensor connector.
2. **INSTALL ENGINE UNDER COVER RH**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

ES

INSPECTION

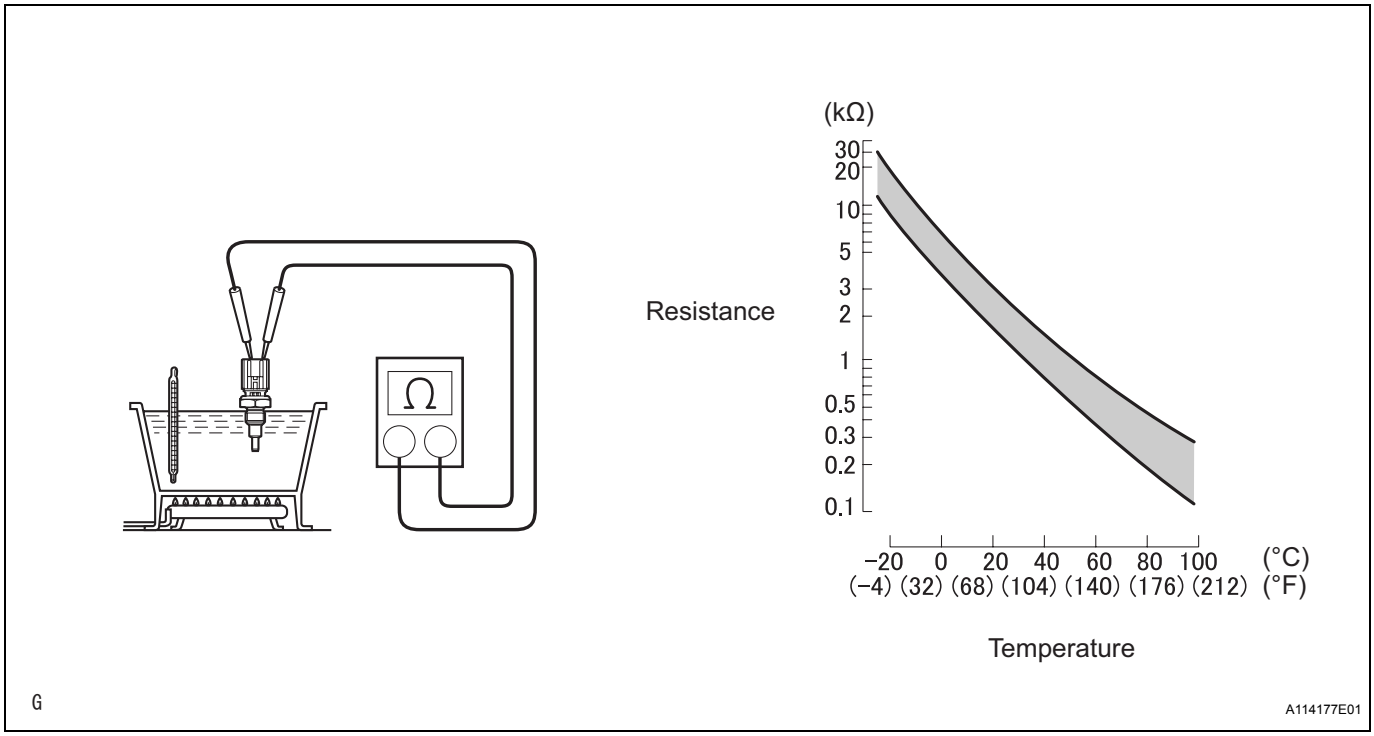
1. INSPECT ENGINE COOLANT TEMPERATURE SENSOR

(a) Measure the resistance of the sensor.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	2.29 to 2.60 kΩ
1 - 2	80°C (176°F)	0.301 to 0.327 kΩ

NOTICE:
If checking the engine coolant temperature sensor in water, be careful not to allow water to intrude the terminals. After checking, dry the sensor.



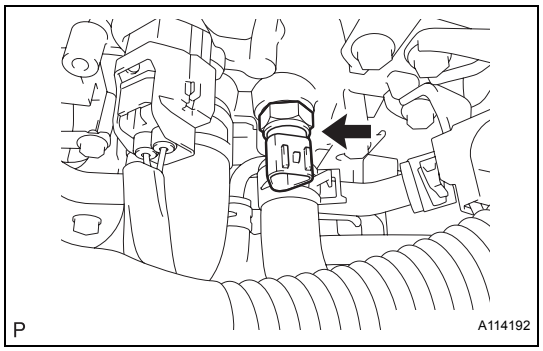
If the result is not as specified, replace the engine coolant temperature sensor.

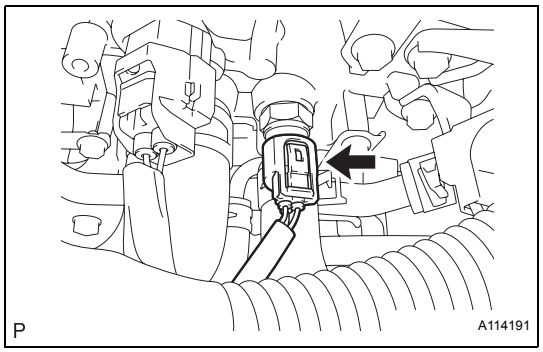
INSTALLATION

1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR

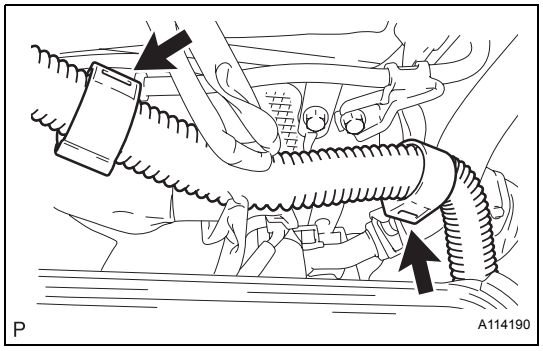
(a) Install a new gasket to the sensor.

(b) Install the sensor.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)





(c) Connect the sensor connector.



2. CONNECT ENGINE WIRE

(a) Connect the 2 clamps of the engine wire.

3. INSTALL AIR CLEANER ASSEMBLY (See page ES-348)

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

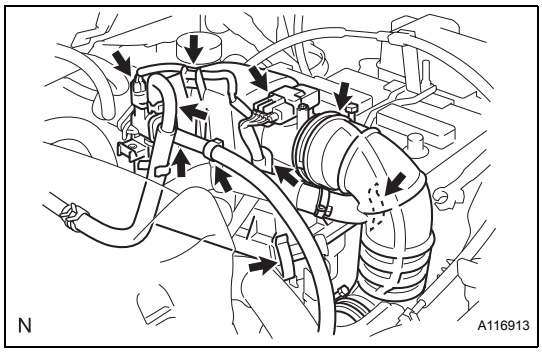
ES

REMOVAL

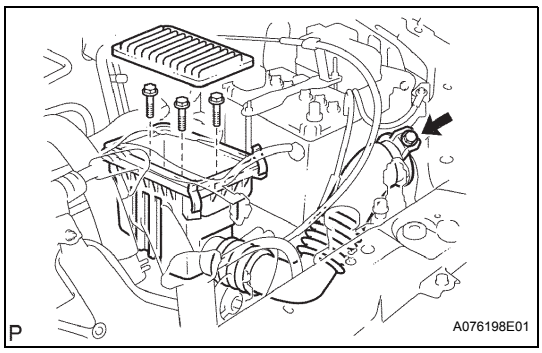
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **DRAIN ENGINE COOLANT**

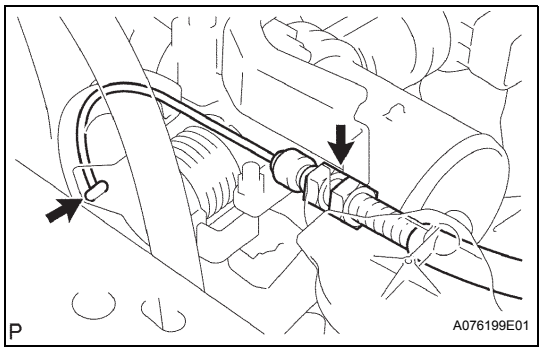
3. **REMOVE AIR CLEANER ASSEMBLY**
   (a) Disconnect the MAF meter connector.
   (b) Disconnect the purge VSV connector.
   (c) Detach the wire harness clamp.
   (d) Disconnect the No. 2 purge line hose.
   (e) Disconnect the ventilation hose.
   (f) Disconnect the No. 1 purge line hose.
   (g) Unlock the 2 clamp hooks.
   (h) Loosen the hose clamp and remove the air cleaner case.



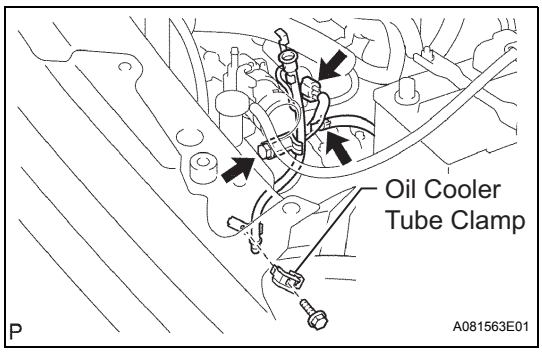
   (i) Remove the air cleaner filter element.
   (j) Remove the 4 bolts and air cleaner case.

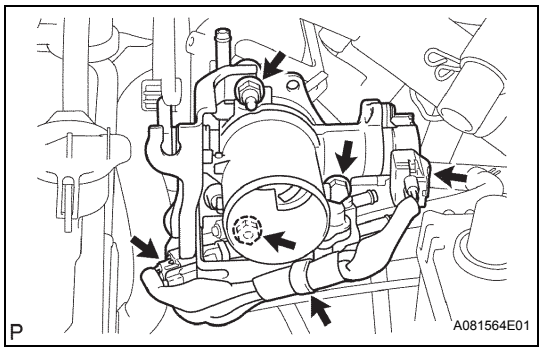


4. **REMOVE ACCELERATOR CONTROL CABLE**
   (a) Loosen the nut and disconnect the accelerator control cable.



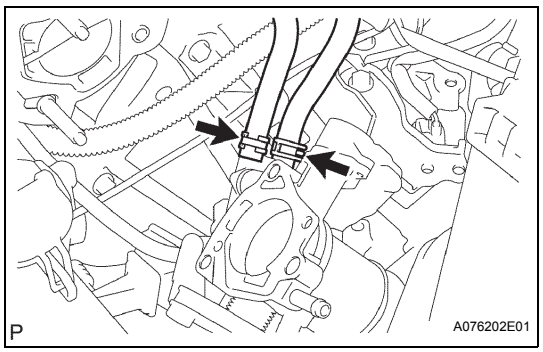
5. **REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)**
   (a) Disconnect the throttle position sensor connector.
   (b) Disconnect the hose.
   (c) Remove the bolt and oil cooler tube clamp.
   (d) Remove the bolt and transmission oil filler tube.
   (e) Remove the O-ring from the transmission oil filler tube.





6. REMOVE THROTTLE BODY ASSEMBLY

(a) Disconnect the IAC valve connector.
(b) Disconnect the throttle position sensor connector (for manual transaxle).
(c) Remove the wire harness clamp.
(d) Remove the bolt and 2 nuts, then remove the accelerator control cable bracket and throttle body.
(e) Remove the gasket from the intake manifold.



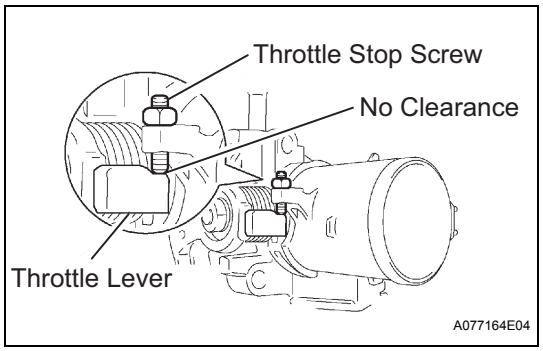
(f) Disconnect the No. 1 water by-pass hose.
(g) Disconnect the No. 2 water by-pass hose.

INSPECTION

1. INSPECT THROTTLE BODY ASSEMBLY

(a) Inspect that the throttle valve shaft is not rickety.
(b) Inspect that all ports are not clogged.
(c) Inspect that the throttle valve opens and closes smoothly.
(d) Inspect that there is no clearance between the throttle stop screw and throttle lever at throttle valve closed position.

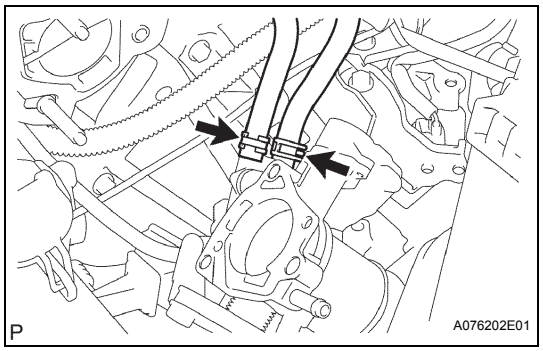
NOTICE:
Do not touch the throttle stop screw.



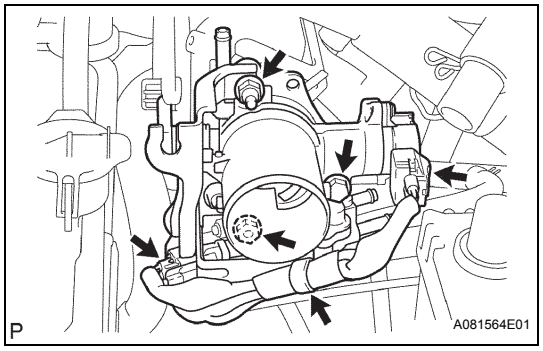
INSTALLATION

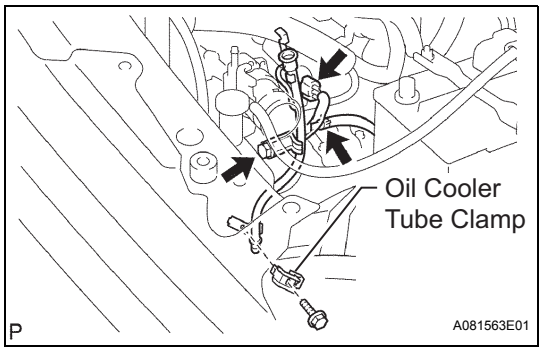
1. INSTALL THROTTLE BODY ASSEMBLY

(a) Connect the No. 1 water by-pass hose.
(b) Connect the No. 2 water by-pass hose.
(c) Install a new gasket into the intake manifold.

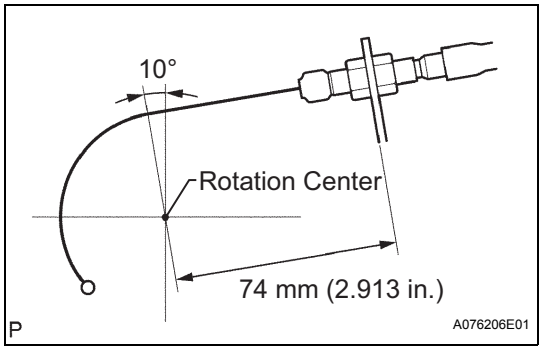


(d) Install the throttle body and accelerator control bracket with the bolt and 2 nuts.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
(e) Install the wire harness clamp.
(f) Connect the throttle position sensor connector (for manual transaxle).
(g) Connect the IAC valve connector.

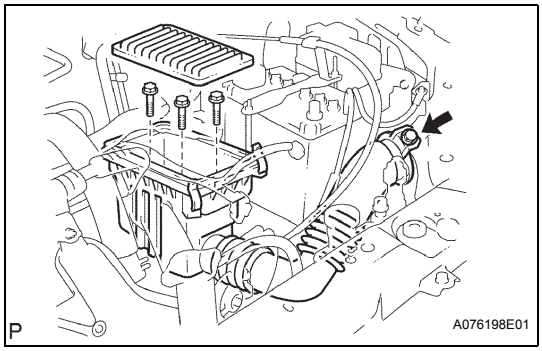




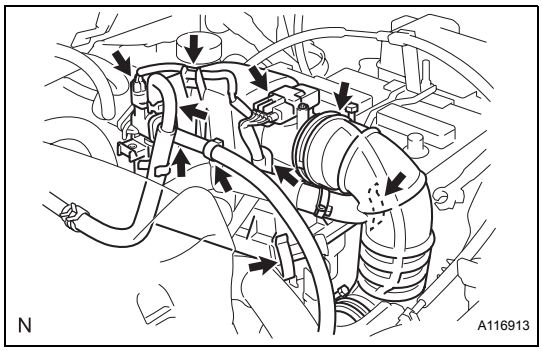
2. **INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)**
   (a) Install a new O-ring onto the transmission oil filler tube.
   (b) Install the transmission oil filler tube with the bolt.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
   (c) Install the oil cooler tube clamp with the bolt.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
   (d) Connect the hose.
   (e) Connect the throttle position sensor connector.



3. **INSTALL ACCELERATOR CONTROL CABLE ASSEMBLY**
   (a) Install the accelerator control cable as shown in the illustration.
   Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)



4. **INSTALL AIR CLEANER ASSEMBLY**
   (a) Install the air cleaner case to the air cleaner bracket with the 3 bolts.
   Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
   (b) Connect the air cleaner inlet to the engine compartment with the bolt.
   Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)



   (c) Tighten the hose clamp.
   (d) Connect the MAF meter connector.
   (e) Connect the purge VSV connector.
   (f) Attach the wire harness clamp.
   (g) Connect the No. 2 purge line hose.
   (h) Connect the ventilation hose.
   (i) Connect the No. 1 purge line hose.
   (j) Lock the 2 clamp hooks.

5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

6. **ADD ENGINE COOLANT (See page CO-5)**

7. **CHECK FOR ENGINE COOLANT LEAKS**
   (a) Check for engine coolant leaks (see page CO-1).

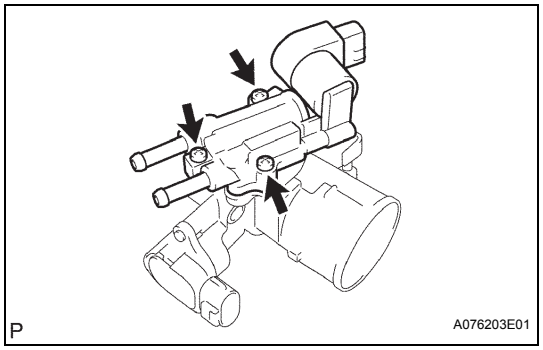
8. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE THROTTLE BODY ASSEMBLY**
   (a) Remove the throttle body (see page ES-346).

3. **REMOVE IDLE AIR CONTROL VALVE ASSEMBLY**
   (a) Remove the 3 screws, valve and gasket.



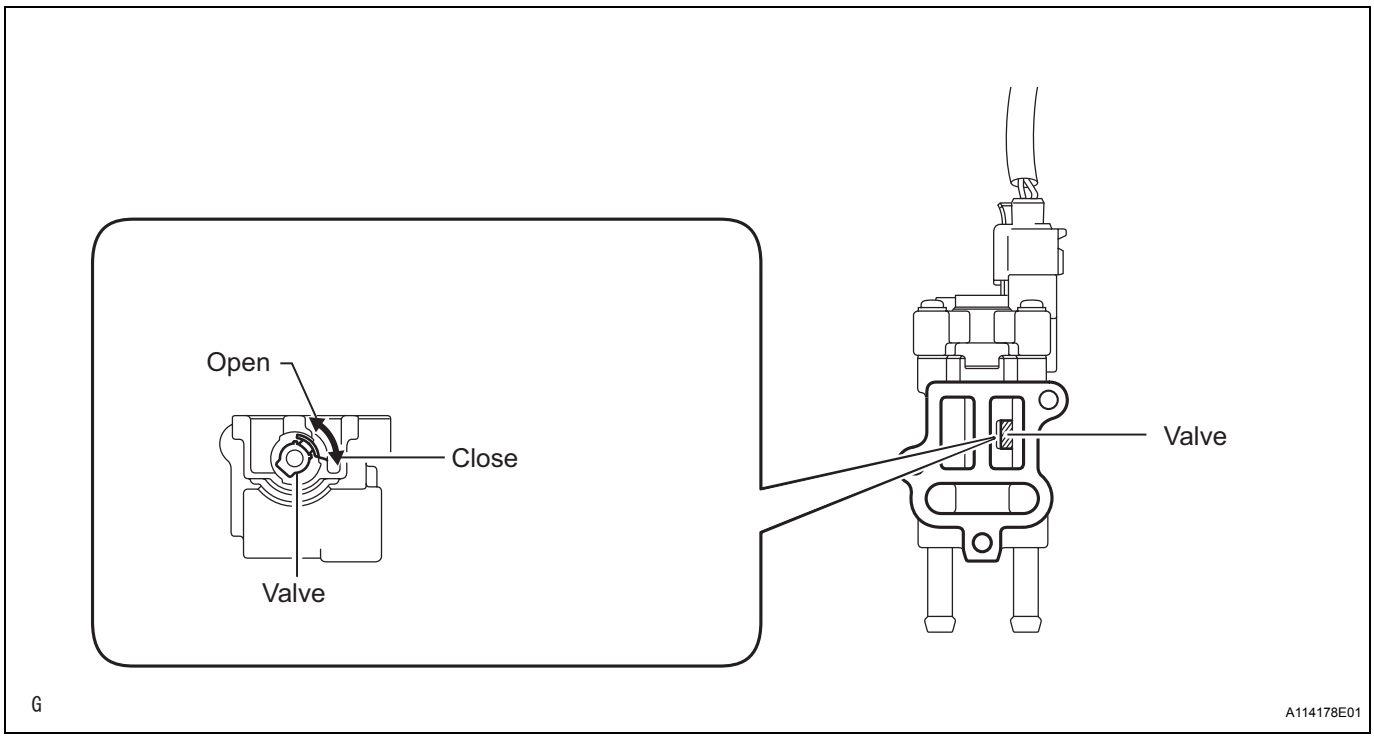
ES

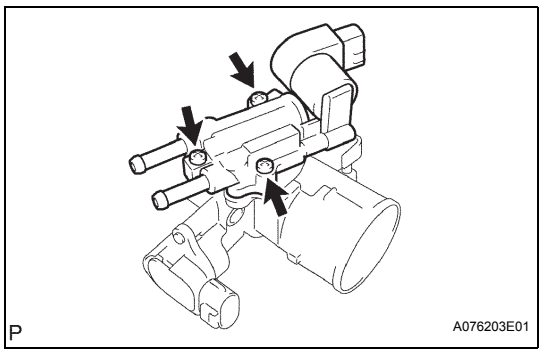
INSPECTION

1. **INSPECT IDLE AIR CONTROL VALVE ASSEMBLY**
NOTICE:
- **Since the IAC valve has an internal IC circuit which converts the ECM duty signal into the drive signal, it is impossible to check its resistor value and valve operation with the valve alone.**
- **Clear the DTC after inspection.**

HINT:
DTC P0505 (see page ES-234) will be set when the IAC valve is stuck.

(a) Connect the IAC valve connector to the IAC valve.
(b) Inspect the valve movement when the ignition switch is turned ON.
Standard movement:
Half open → fully closed → fully open → half open
HINT:
The series of the valve movements mentioned above occur within 0.5 seconds.





INSTALLATION

1. **INSTALL IDLE AIR CONTROL VALVE ASSEMBLY**
(a) Install a new gasket and the valve with the 3 screws.
Torque: 3.4 N*m (35 kgf*cm, 30 in.*lbf)

2. **INSTALL THROTTLE BODY ASSEMBLY**
(a) Install the throttle body (see page ES-347).

3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

4. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission related components, and indicate any detected abnormalities with DTCs (Diagnostic Trouble Codes). Since various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors.
- The intelligent tester's software must be version 9.0 or newer to view the Readiness Monitor status. To view the status, enter the following menus: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR STATUS.
- When the Readiness Monitor status reads COMPL (complete), the necessary conditions have been met for running the performance tests for that Readiness Monitor.
- A generic OBD II scan tool can also be used to view the Readiness Monitor status.

HINT:

Many state Inspection and Maintenance (I/M) programs require a vehicle's Readiness Monitor status to show COMPL before beginning emission tests.

The Readiness Monitor will be reset to INCMPL (incomplete) if:

- The ECM has lost battery power or blown a fuse.
- DTCs have been cleared.
- The conditions for running the Readiness Monitor have not been met.

If the Readiness Monitor status shows INCMPL, follow the appropriate Readiness Monitor Drive Pattern to change the status to COMPL.

CAUTION:

Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

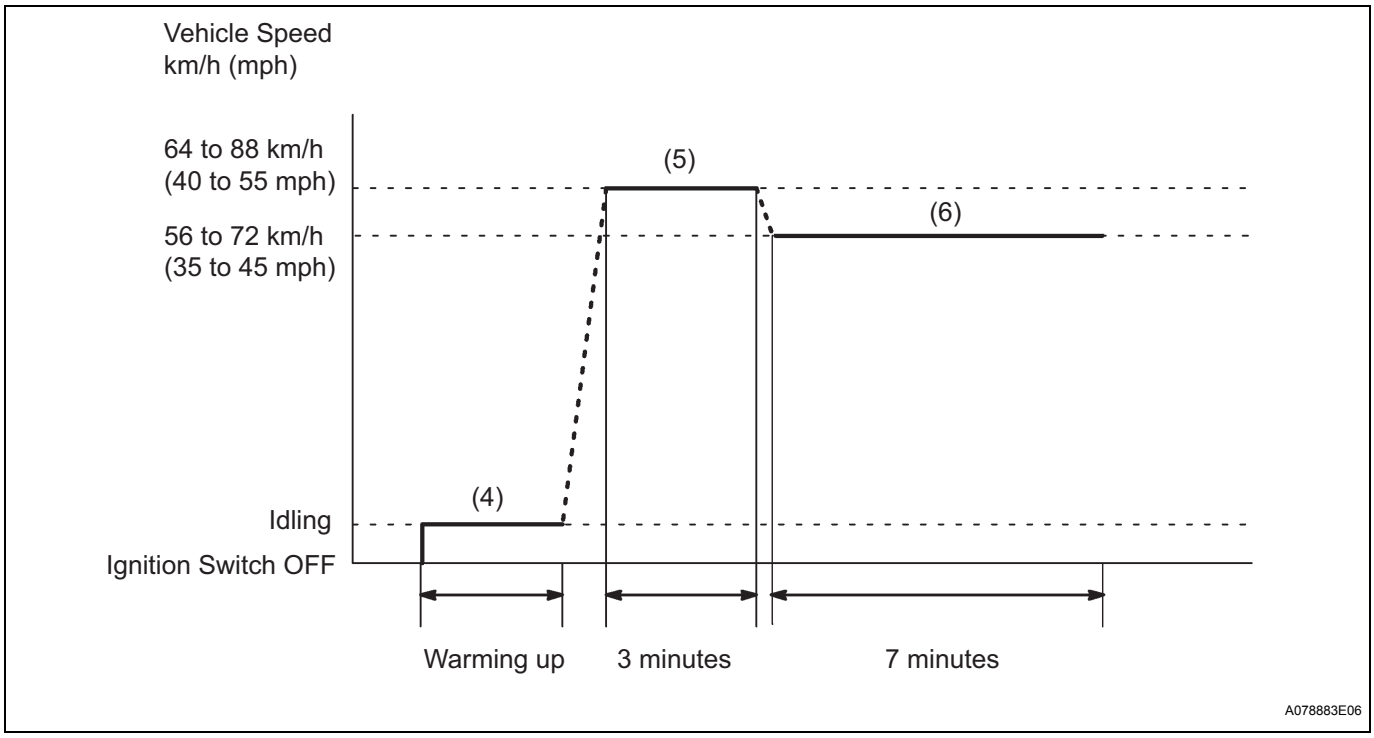
NOTICE:

These drive patterns represent the fastest method of satisfying all conditions necessary to achieve complete status for each specific Readiness Monitor.

In the event of a drive pattern being interrupted (possibly due to factors such as traffic conditions), the drive pattern can be resumed. In most cases, the Readiness Monitor will still achieve complete status upon completion of the drive pattern.

To ensure completion of the Readiness Monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (Front Heated Oxygen Sensor Type)



(a) Preconditions

The monitor will not run unless:

- MIL is OFF.
- Engine Coolant Temperature (ECT) is 75°C (167°F) or higher.
- Intake Air Temperature (IAT) is -10°C (14°F) or higher.

NOTICE:

The readiness test can be completed in cold ambient conditions (less than -10°C [14°F]), if the drive pattern is repeated a second time after turning the ignition switch OFF.

(b) Drive Pattern

(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch ON and turn the tester ON.

(3) Clear DTCs (if set) (see page ES-36).

(4) Start the engine, and warm it up until the ECT reaches 75°C (167°F) or higher.

(5) Drive the vehicle at between 64 km/h and 88 km/h (40 mph and 55 mph) for approximately 3 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden acceleration.

If the IAT was less than 10°C (50°F) when starting the engine, drive the vehicle at between 64 km/h and 88 km/h (40 mph and 55 mph) for approximately 3 additional minutes.

(6) Drive the vehicle at between 56 km/h and 72 km/h (35 mph and 45 mph) for approximately 7 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden deceleration that causes the throttle to close fully.

(c) Monitor Status

(1) Check the Readiness Monitor status displayed on the tester.

(2) If the status does not switch to COMPL (complete), make sure that the preconditions have been met, and turn the ignition switch OFF. Then, repeat steps (5) and (6) in Drive Pattern above.

3. EVAP SYSTEM MONITOR (KEY OFF TYPE)

(a) Preconditions

The monitor will not run unless:

- The fuel tank is less than 90% full.
- The altitude is less than 8,000 ft (2,450 m).
- The vehicle is stationary.
- The engine coolant temperature is 4.4 to 35°C (40 to 95°F).
- The intake air temperature is 4.4 to 35°C (40 to 95°F).
- Vehicle was driven in an urban area (or on a freeway) for 10 minutes or more.

(b) Monitor Conditions

(1) Turn the ignition switch OFF and wait for 6 hours.

HINT:

Do not start the engine until checking Readiness Monitor status. If the engine is started, the step described above must be repeated.

(c) Monitor Status

(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch ON and turn the tester ON.

(3) Check the Readiness Monitor status displayed on the tester.

If the status does not switch to COMPL (complete), restart the engine, make sure that the preconditions have been met, and then perform the Monitor Conditions again.

4. Heated Oxygen (HO2) Sensor Monitors (Front and Rear HO2 Sensor Type)

(a) Preconditions

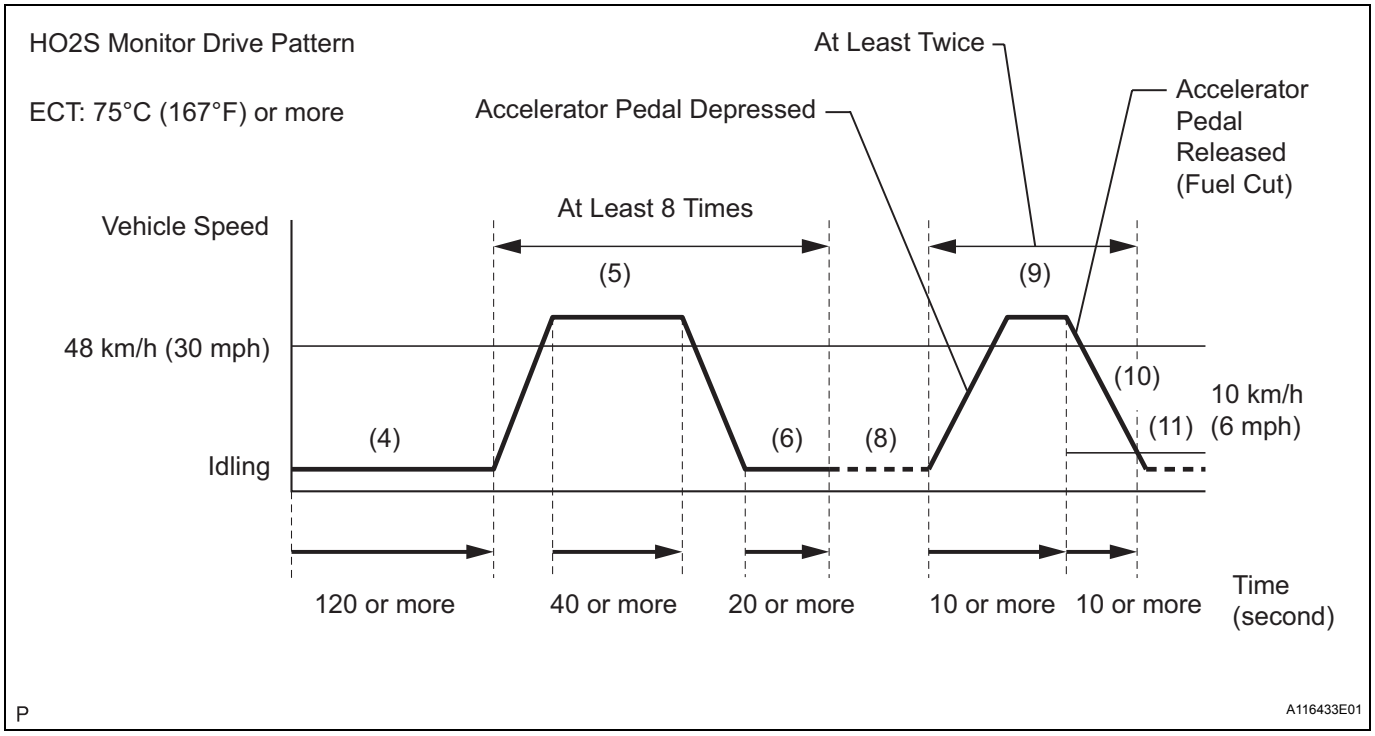
The monitor will not run unless:

- 2 minutes or more have elapsed since the engine was started.
- The Engine Coolant Temperature (ECT) is 75°C (167°F) or more.
- Cumulative driving time at a vehicle speed of 48 km/h (30 mph) or more exceeds 6 minutes.
- Air-fuel ratio feedback control is performed.

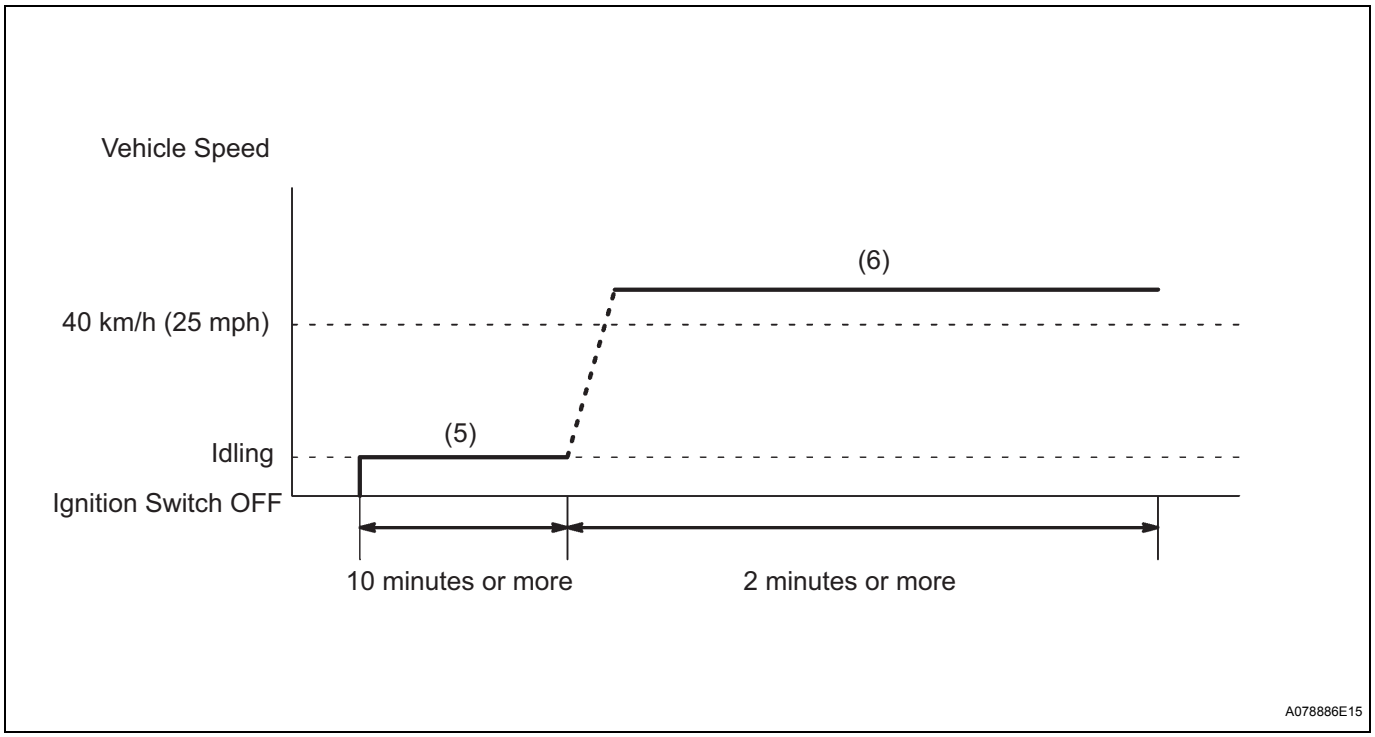
- Fuel cut control is performed for 8 seconds or more (for the Rear HO2 Sensor Monitor).

(b) Drive Pattern for Front and Rear HO2 Sensors
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON and turn the tester ON.
(3) Clear the DTCs (see page ES-36).
(4) Start the engine and warm it up until the ECT reaches 75°C (167°F) or higher.
(5) Drive the vehicle at 48 km/h (30 mph) or more for at least 40 seconds.
(6) Allow the engine to idle for 20 seconds or more.
(7) Repeat steps (5) and (6) at least 8 times in 1 driving cycle.
(8) Change the transmission to 2nd gear.
(9) Accelerate the vehicle to 48 km/h (30 mph) or more by depressing the accelerator pedal for at least 10 seconds.
(10) Soon after performing step (9) above, release the accelerator pedal for at least 10 seconds without depressing the brake pedal, in order to execute fuel-cut control.
(11) Allow the vehicle to decelerate until the vehicle speed declines to less than 10 km/h (6 mph).
(12) Repeat steps from (9) through (11) above at least twice in 1 driving cycle.

(c) Monitor Status
(1) Check the Readiness Monitor status displayed on the tester.
(2) If the status does not switch to COMPL (complete), make sure that the preconditions have been met, and then perform steps from (4) through (12) in the Drive Pattern above.



5. Heated Oxygen (HO2) Sensor Heater Monitors (Front and Rear HO2 Sensor Type)



(a) Preconditions
The monitor will not run unless:
- The MIL is OFF

(b) Drive Pattern
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON and turn the tester ON.
(3) Clear the DTCs (if set) (see page ES-36).

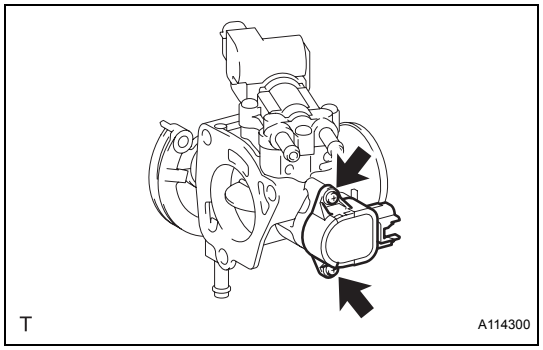
ES

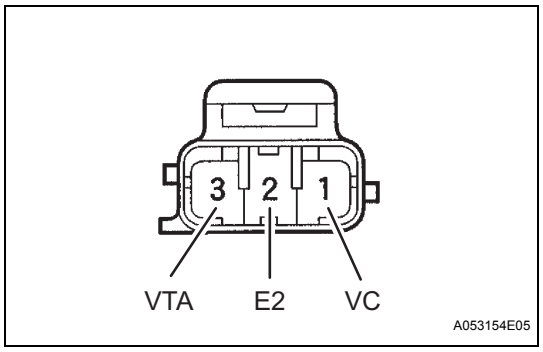
(4) Start the engine.
(5) Allow the engine to idle for 10 minutes or more.
(6) Drive the vehicle at 40 km/h (25 mph) or more for at least 2 minutes.

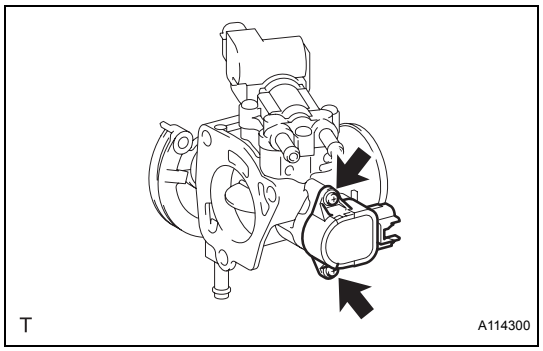
(c) Monitor Status
(1) Check the Readiness Monitor status displayed on the tester.
If the status does not switch to COMPL (complete), restart the engine, make sure the preconditions have been met, and repeat steps (5) and (6) described in the Drive Pattern above.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE THROTTLE BODY ASSEMBLY**
   (a) Remove the throttle body (see page ES-346).
3. **REMOVE THROTTLE POSITION SENSOR**
   (a) Remove the 2 screws and sensor.







INSPECTION

1. **INSPECT THROTTLE POSITION SENSOR**
   (a) Measure the resistance of the sensor.
   Standard resistance

Tester Connection	Throttle Valve Position	Specified Condition
1 (VC) - 2 (E2)	-	2.5 to 6.0 kΩ
3 (VTA) - 2 (E2)	Fully closed	0.2 to 11.0 kΩ
3 (VTA) - 2 (E2)	Fully open	2.0 to 16.0 kΩ

If the resistance is not as specified, replace the throttle position sensor.

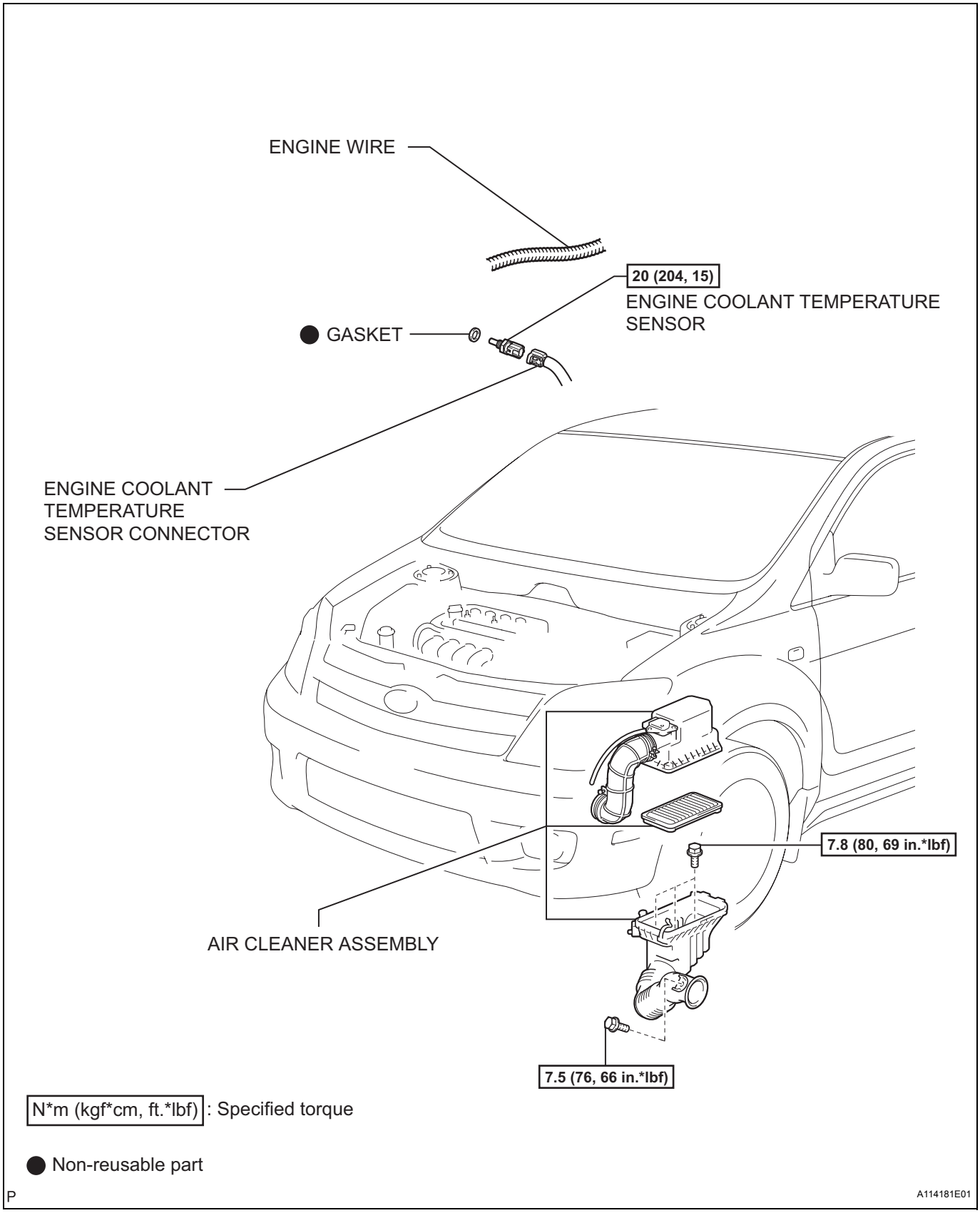
INSTALLATION

1. **INSTALL THROTTLE POSITION SENSOR**
   (a) Install the sensor with the 2 screws.
   Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)
2. **INSTALL THROTTLE BODY ASSEMBLY**
   (a) Install the throttle body (see page ES-347).
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

ES

ENGINE COOLANT TEMPERATURE SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

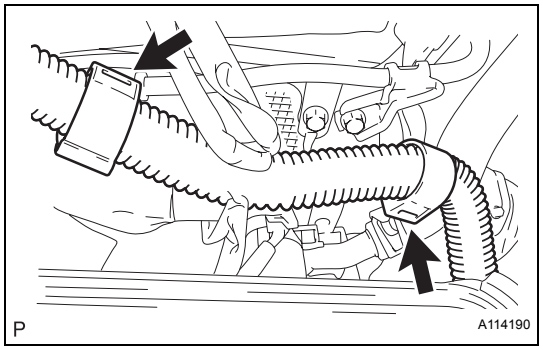
A114181E01

REMOVAL

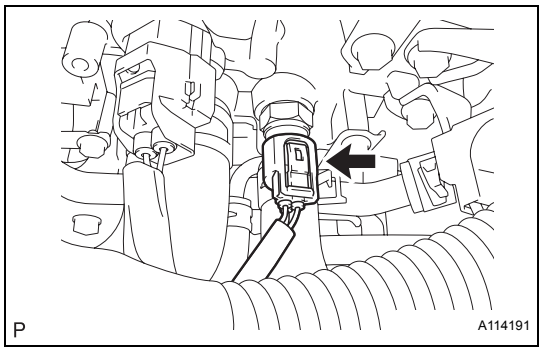
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE AIR CLEANER ASSEMBLY (See page ES-346)**

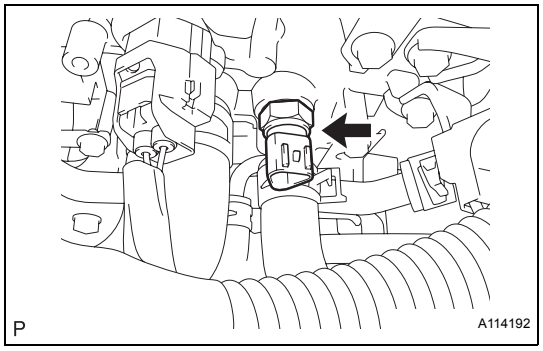
3. **DISCONNECT ENGINE WIRE**
   (a) Disconnect the 2 clamps of the engine wire.



4. **REMOVE ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Disconnect the sensor connector.



   (b) Remove the sensor and gasket.



ES

PROBLEM SYMPTOMS TABLE

HINT:
When a malfunction is not confirmed by a DTC (Diagnostic Trouble Code) check and the cause of problem cannot be identified through a basic inspection, troubleshoot according to the priority order indicated in the table below.

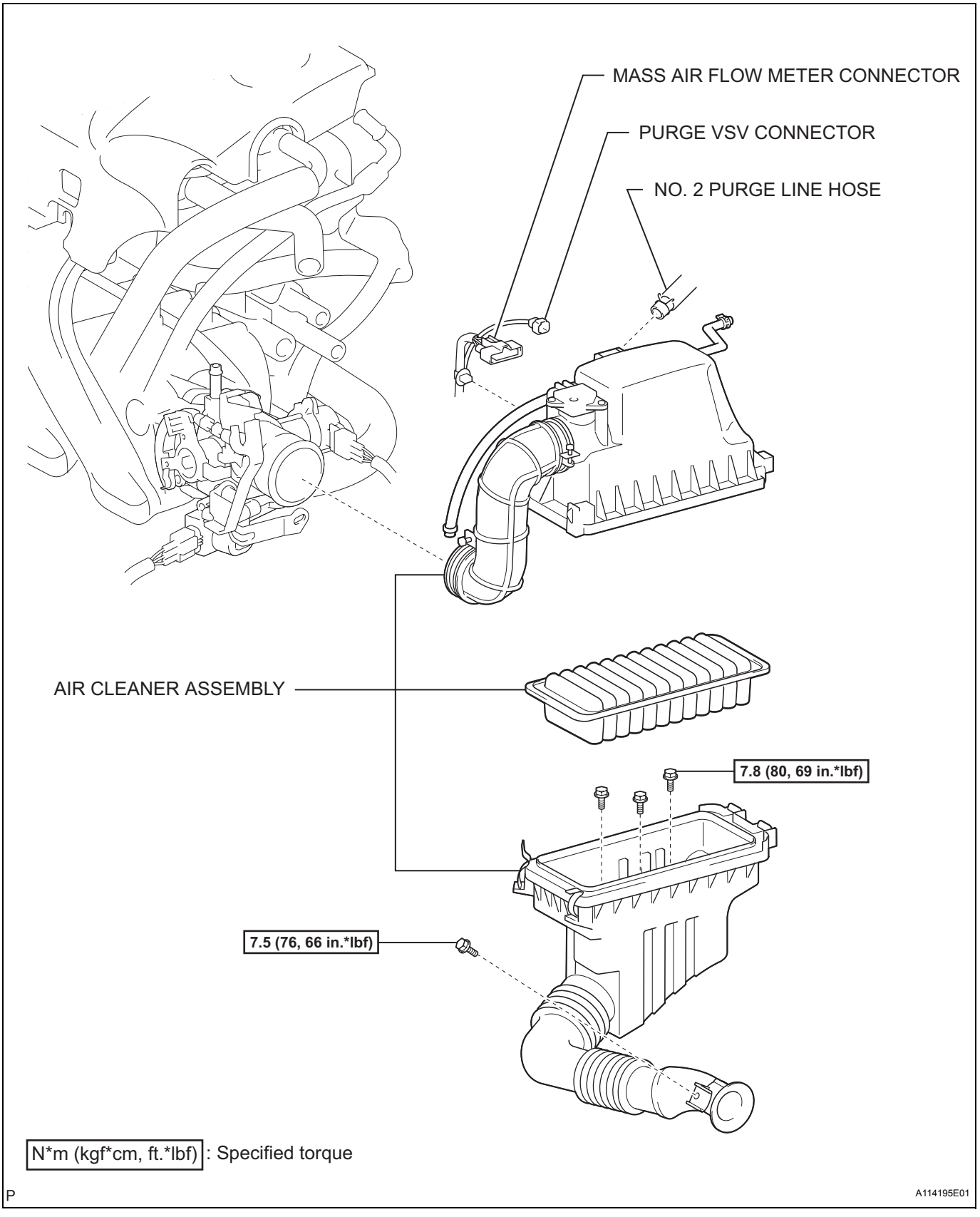
Symptom	Suspected area	See page
Engine does not crank (does not start)	1. Starter	ST-3
	2. Starter relay	ST-15
	3. Park/Neutral position switch circuit*1	AX-87
	4. Clutch start switch*2	CL-21
No initial combustion (does not start)	1. ECM power source circuit	ES-305
	2. VC output circuit	ES-311
	3. Ignition coil circuit	ES-184
	4. Fuel pump control circuit	ES-315
	5. Injector	FU-13
Incomplete combustion (does not start)	1. Fuel pump control circuit	ES-315
	2. Ignition coil circuit	ES-184
	3. Injector	FU-13
Engine cranks normally but difficult to start	1. Starter signal circuit	ES-249
	2. IAC valve circuit	ES-234
	3. Fuel pump control circuit	ES-315
	4. Ignition coil	ES-184
	5. Spark plug	IG-3
	6. Compression	EM-1
	7. Injector	FU-13
Difficult to start with cold engine	1. Starter signal circuit	ES-249
	2. IAC valve circuit	ES-234
	3. Fuel pump control circuit	ES-315
	4. Injector	FU-13
	5. Ignition coil	ES-184
	6. Spark plug	IG-3
Difficult to start with warm engine	1. Starter signal circuit	ES-249
	2. IAC valve circuit	ES-234
	3. Fuel pump control circuit	ES-315
	4. Injector	FU-13
	5. Ignition coil	ES-184
	6. Spark plug	IG-3
Incorrect fast idle (poor idling)	1. IAC valve circuit	ES-234
High engine idling speed (poor idling)	1. IAC valve circuit	ES-234
	2. ECM power source circuit	ES-305
	3. Park/Neutral position switch circuit*1	AX-87
Low engine idling speed (poor idling)	1. IAC valve circuit	ES-234
	2. Park/Neutral position switch circuit*1	AX-87
	3. Fuel pump control circuit	ES-315
	4. Injector	FU-13

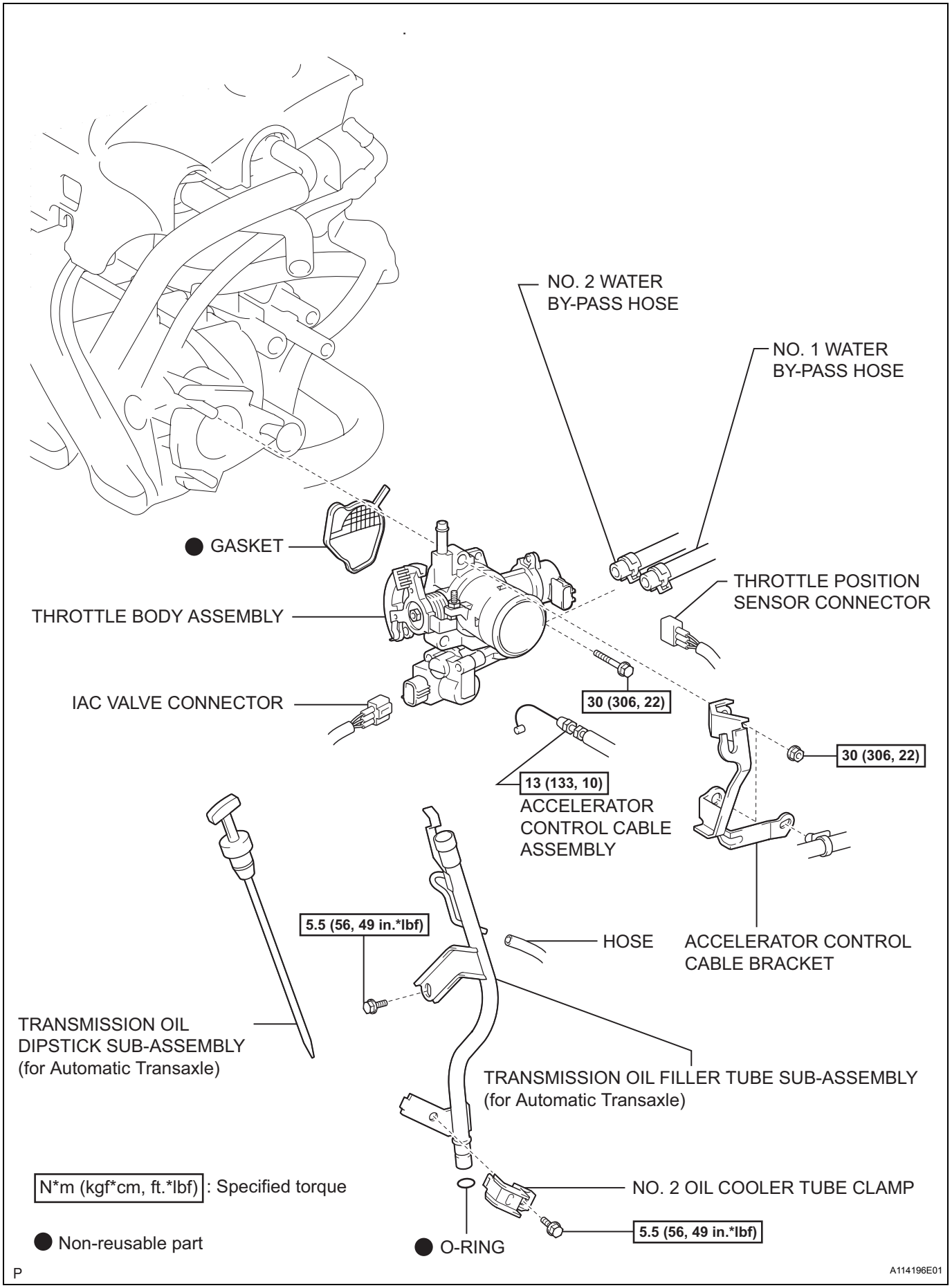
Symptom	Suspected area	See page
Rough idling	1. IAC valve circuit	ES-234
	2. Injector	FU-13
	3. Ignition coil	ES-184
	4. Compression	EM-1
	5. Fuel pump control circuit	ES-315
Hunting (poor idling)	1. IAC valve circuit	ES-234
	2. ECM power source circuit	ES-305
	3. Fuel pump control circuit	ES-315
Hesitation/Poor acceleration (poor driveability)	1. Injector	FU-13
	2. Fuel pump control circuit	ES-315
	3. Ignition coil circuit	ES-184
Muffler explosion, after fire (poor driveability)	1. Ignition coil	ES-184
	2. Spark plug	IG-3
	3. Injector	FU-13
Surging (poor driveability)	1. Fuel pump control circuit	ES-315
	2. Spark plug	IG-3
	3. Injector	FU-13
Engine stalls soon after starting	1. Fuel pump control circuit	ES-315
	2. IAC valve circuit	ES-234
Engine stalls when accelerator pedal released	1. Injector	FU-13
	2. IAC valve circuit	ES-234
	3. ECM	ES-29
Engine stalls when shifting from N to D	1. Park/Neutral position switch circuit*1	AX-87
	2. IAC valve circuit	ES-234
Unable/difficult to refuel	1. Refueling valve (canister)	-

HINT:
- *1: A/T (Automatic Transaxle) only
- *2: M/T (Manual Transaxle) only

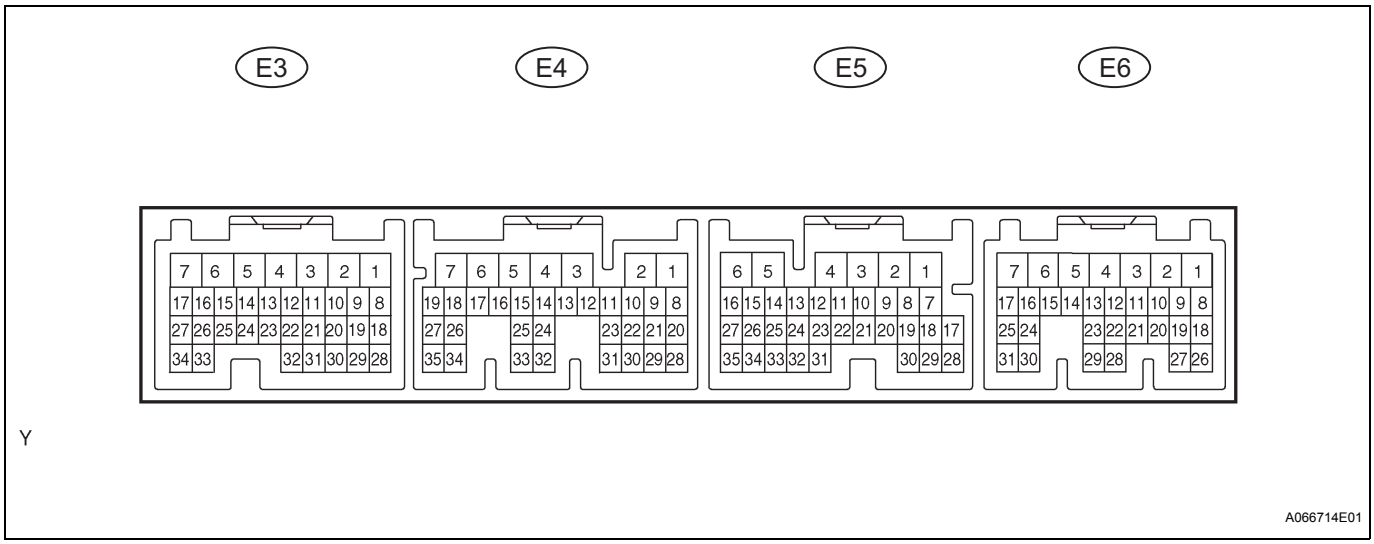
THROTTLE BODY

COMPONENTS




NO. 2 WATER BY-PASS HOSE
NO. 1 WATER BY-PASS HOSE
● GASKET
THROTTLE BODY ASSEMBLY
THROTTLE POSITION SENSOR CONNECTOR
IAC VALVE CONNECTOR
30 (306, 22)
30 (306, 22)
13 (133, 10)
ACCELERATOR CONTROL CABLE ASSEMBLY
5.5 (56, 49 in.*lbf)
HOSE
ACCELERATOR CONTROL CABLE BRACKET
TRANSMISSION OIL DIPSTICK SUB-ASSEMBLY (for Automatic Transaxle)
TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)
N*m (kgf*cm, ft.*lbf) : Specified torque
NO. 2 OIL COOLER TUBE CLAMP
5.5 (56, 49 in.*lbf)
● Non-reusable part
● O-RING
P
A114196E01

TERMINALS OF ECM



HINT:
The standard normal voltage between each pair of ECM terminals is shown in the table below. The appropriate conditions for checking each pair of terminals are also indicated.
The result of checks should be compared with the standard normal voltage for that pair of terminals, displayed in the Specified Condition column.
The illustration above can be used as a reference to identify the ECM terminal locations.

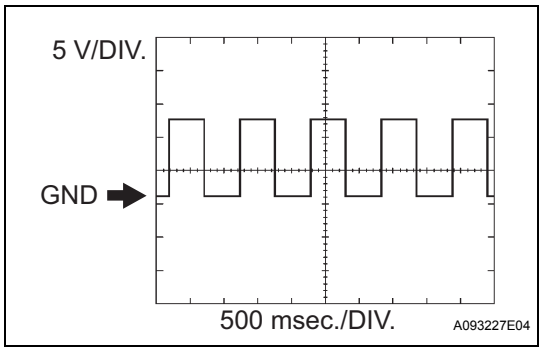
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (E6-3) - E1 (E3-3)	B-Y - BR	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
IGSW (E6-9) - E1 (E3-3)	B-R - BR	Ignition switch	Ignition switch ON	9 to 14 V
FC (E6-25) - E1 (E3-3)	G - BR	Fuel pump control	Ignition switch ON	9 to 14 V
FC (E6-25) - E1 (E3-3)	G - BR	Fuel pump control	Idling	Below 1.5 V
W (E5-30) - E1 (E3-3)	Y-R - BR	MIL	Idling	9 to 14 V
W (E5-30) - E1 (E3-3)	Y-R - BR	MIL	Ignition switch ON	Below 3.5 V
+B (E6-1) - E1 (E3-3)	B-R - BR	Power source of ECM	Ignition switch ON	9 to 14 V
+B2 (E6-2) - E1 (E3-3)	B-R - BR	Power source of ECM	Ignition switch ON	9 to 14 V
MREL (E6-8) - E1 (E3-3)	GR - BR	EFI relay	Ignition switch ON	9 to 14 V
STP (E5-4) - E1 (E3-3)	G-W - BR	Stop light switch	Ignition switch ON, Brake pedal depressed	9 to 14 V
STP (E5-4) - E1 (E3-3)	G-W - BR	Stop light switch	Ignition switch ON, Brake pedal released	Below 1.5 V
F/PS (E5-32) - E1 (E3-3)	Y - BR	Airbag sensor	Ignition switch ON	Pulse generation (see waveform 1)
STA (E6-12) - E1 (E3-3)	B-Y - BR	Starter signal	Cranking	5.5 V or more
PSP (E4-32) - E1 (E3-3)	Y - BR	Power steering oil pressure sensor	Ignition switch ON	9 to 14 V
SPD (E5-8) - E1 (E3-3)	V-W - BR	Speed signal from combination meter	Driving at 20 km/h (12 mph)	Pulse generation (see waveform 2)
TACH (E5-1) - E1 (E3-3)	B - BR	Engine speed	Idling	Pulse generation (see waveform 3)
VC (E3-18) - E2 (E3-28)	R-W - BR	Power source of sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
PRG (E4-23) - E01 (E3-7)	W-G - BR	Purge VSV	Ignition switch ON and engine stopping	9 to 14 V
PRG (E4-23) - E01 (E3-7)	W-G - BR	Purge VSV	Idling with warm engine	Pulse generation (see waveform 4)
VG (E4-28) - E2G (E4-30)	P - V	Mass air flow meter	Idling, A/C switch OFF	1.1 to 1.5 V
OX1A (E3-21) - E2 (E3-28)	W - BR	Heated oxygen sensor (Sensor 1)	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor	Pulse generation (see waveform 5)
HT1A (E3-1) - E03 (E4-4)	B-R - BR	Heated oxygen sensor heater (Sensor 1)	Idling	Below 3.0 V
HT1A (E3-1) - E03 (E4-4)	B-R - BR	Heated oxygen sensor heater (Sensor 1)	Ignition switch ON	9 to 14 V
OX1B (E3-25) - E2 (E3-28)	L - BR	Heated oxygen sensor (Sensor 2)	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor	Pulse generation (see waveform 6)
HT1B (E3-2) - E03 (E4-4)	W - BR	Heated oxygen sensor heater (Sensor 2)	Idling	Below 3.0 V
HT1B (E3-2) - E03 (E4-4)	W - BR	Heated oxygen sensor heater (Sensor 2)	Ignition switch ON	9 to 14 V
THW (E3-32) - E2 (E3-28)	R-L - BR	Engine coolant temperature sensor	Idling, Engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
G2+ (E3-26) - NE- (E3-34)	B - W	Camshaft position sensor	Idling	Pulse generation (see waveform 7)
NE+ (E3-27) - NE- (E3-34)	O - W	Crankshaft position sensor	Idling	Pulse generation (see waveform 7)
THA (E4-29) - E2 (E3-28)	Y-B - BR	Intake air temperature sensor	Idling, Intake air temperature 20°C (68°F)	0.5 to 3.4 V
VTA1 (E3-20) - E2 (E3-28)	Y-R - BR	Throttle position sensor	Ignition switch ON, Throttle valve fully closed	0.3 to 1.0 V
VTA1 (E3-20) - E2 (E3-28)	Y-R - BR	Throttle position sensor	Ignition switch ON, Throttle valve fully open	3.2 to 4.9 V
#10 (E4-6) - E01 (E3-7) #20 (E4-5) - E01 (E3-7) #30 (E4-2) - E01 (E3-7) #40 (E4-1) - E01 (E3-7)	B-O - BR B-Y - BR B-W - BR B-L - BR	Injector	Ignition switch ON	9 to 14 V
#10 (E4-6) - E01 (E3-7) #20 (E4-5) - E01 (E3-7) #30 (E4-2) - E01 (E3-7) #40 (E4-1) - E01 (E3-7)	B-O - BR B-Y - BR B-W - BR B-L - BR	Injector	Idling	Pulse generation (see waveform 8)
IGT1 (E3-17) - E1 (E3-3) IGT2 (E3-16) - E1 (E3-3) IGT3 (E3-15) - E1 (E3-3) IGT4 (E3-14) - E1 (E3-3)	G-R - BR G-B - BR G-O - BR G-Y - BR	Ignition coil (ignition signal)	Idling	Pulse generation (see waveform 9)
IGF1 (E3-23) - E1 (E3-3)	Y - BR	Ignition coil (ignition confirmation signal)	Ignition switch ON	4.5 to 5.5 V
IGF1 (E3-23) - E1 (E3-3)	Y - BR	Ignition coil (ignition confirmation signal)	Idling	Pulse generation (see waveform 9)
RSD (E3-5) - E01 (E3-7)	B-R - BR	Idle air control valve	Ignition switch ON	9 to 14 V
OC1+ (E3-13) - OC1- (E3-12)	R-Y - R-B	Camshaft timing oil control valve	Ignition switch ON	Pulse generation (see waveform 10)
KNK1 (E3-29) - EKNK (E3-30)	W - B	Knock sensor	Idling	Pulse generation (see waveform 11)
TC (E5-17) - E1 (E3-3)	P-B - BR	Terminal TC of DLC3	Ignition switch ON	9 to 14 V
NSW (E6-30)* - E1 (E3-3)	B - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever P or N position	Below 1 V
NSW (E6-30)* - E1 (E3-3)	B - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever except P or N position	9 to 14 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VPMP (E6-5) - E1 (E3-3)	P - BR	Vent valve (built into canister pump module)	Ignition switch ON	9 to 14 V
MPMP (E6-6) - E1 (E3-3)	V - BR	Leak detection pump (built into canister pump module)	Leak detection pump OFF	0 to 3 V
MPMP (E6-6) - E1 (E3-3)	V - BR	Leak detection pump (built into canister pump module)	Leak detection pump ON	9 to 14 V
PPMP (E6-31) - E1 (E3-3)	R - BR	Canister pressure sensor (built into canister pump module)	Ignition switch ON	3 to 3.6 V
CANH (E5-33) - E1 (E3-3)	B - BR	CAN communication line	Ignition switch ON	Pulse generation (see waveform 12)
CANL (E5-34) - E1 (E3-3)	W - BR	CAN communication line	Ignition switch ON	Pulse generation (see waveform 13)

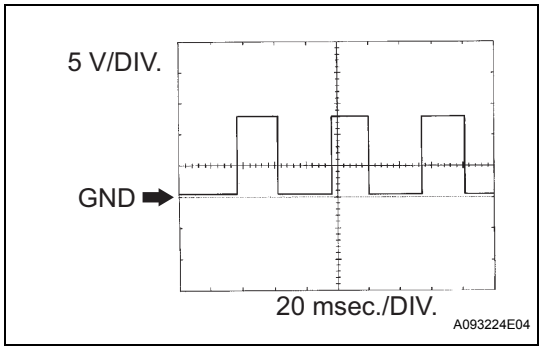
ES

*: A/T only



1. WAVEFORM 1
Airbag sensor assembly

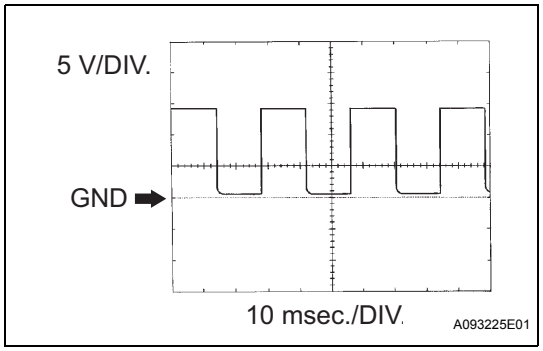
ECM Terminal Names	Between F/PS and E1
Tester Ranges	5 V/DIV., 500 msec./DIV.
Conditions	Idling with warm engine



2. WAVEFORM 2
Vehicle speed signal

ECM Terminal Names	Between SPD and E1
Tester Ranges	5 V/DIV., 20 msec./DIV.
Conditions	Driving at 25 mph (40 km/h)

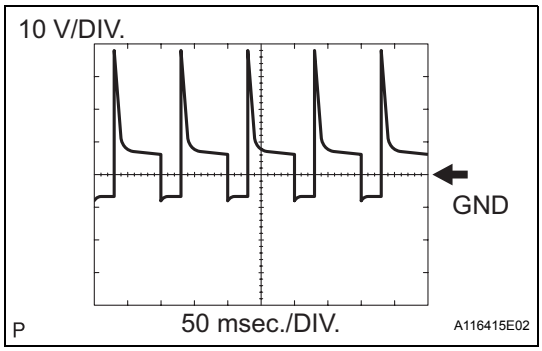
HINT:
The wavelength becomes shorter as the vehicle speed increases.



3. WAVEFORM 3
Engine speed signal

ECM Terminal Names	Between TACH and E1
Tester Ranges	5 V/DIV., 10 msec./DIV.
Conditions	Idling

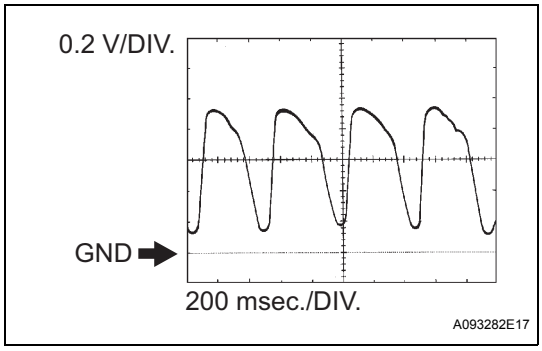
HINT:
The wavelength becomes shorter as the engine rpm increases.



4. WAVEFORM 4
Purge VSV

ECM Terminal Names	Between PRG and E01
Tester Ranges	10 V/DIV., 50 msec./DIV.
Conditions	Idling

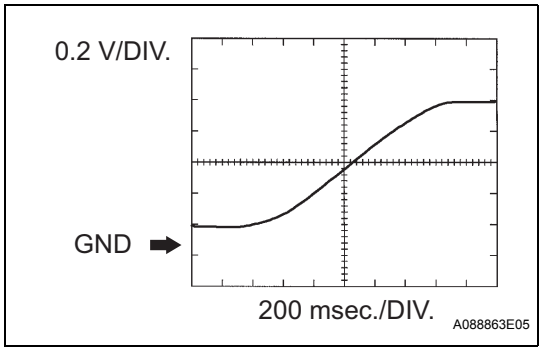
HINT:
If the waveform is not similar to the illustration, check the waveform again after idling for 10 minutes or more.



5. WAVEFORM 5
Heated Oxygen (HO2) sensor (sensor 1)

ECM Terminal Names	Between OX1A and E2
Tester Ranges	0.2 V/DIV., 200 msec./DIV.
Conditions	Engine maintained at 2,500 rpm when warmed up

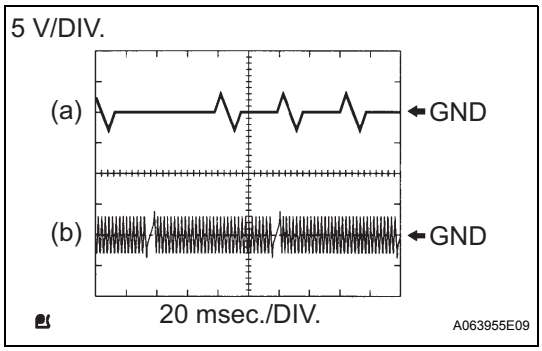
HINT:
In the DATA LIST, item O2S B1S1 shows the ECM input values from the front HO2 sensor (sensor 1).



6. WAVEFORM 6
Heated Oxygen (HO2) sensor (sensor 2)

ECM Terminal Names	Between OX1B and E2
Tester Ranges	0.2 V/DIV., 200 msec./DIV.
Conditions	Engine maintained at 2,500 rpm when warmed up

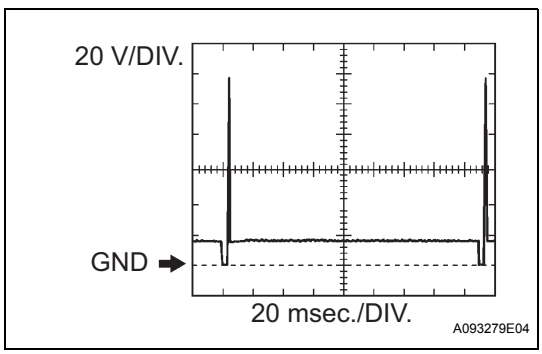
HINT:
In the DATA LIST, item O2S B1S2 shows the ECM input values from the rear HO2 sensor (sensor 2).



7. WAVEFORM 7
Camshaft position sensor and crankshaft position sensor

ECM Terminal Names	(a) Between G2+ and NE- (b) Between NE+ and NE-
Tester Ranges	5 V/DIV., 20 msec./DIV.
Conditions	Idling

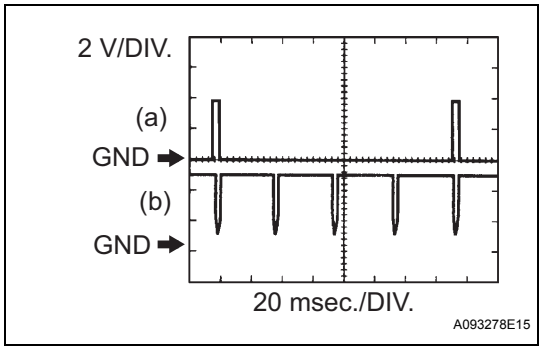
HINT:
The wavelength becomes shorter as the engine rpm increases.



8. WAVEFORM 8
Fuel injector

ECM Terminal Names	Between #10 (to 40) and E01
Tester Ranges	20 V/DIV., 20 msec./DIV.
Conditions	Idling

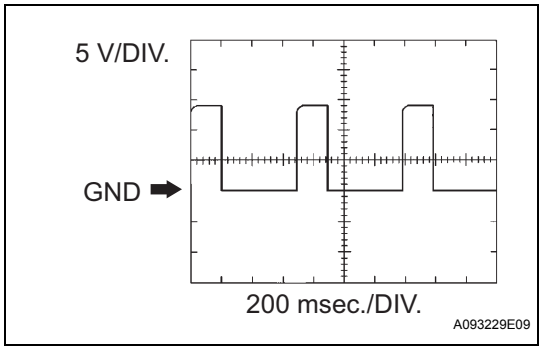
HINT:
The wavelength becomes shorter as the engine rpm increases.



9. WAVEFORM 9
Igniter IGT signal (from ECM to igniter) and igniter IGF signal (from igniter to ECM)

ECM Terminal Name	(a) Between IGT (1 to 4) and E1 (b) Between IGF and E1
Tester Ranges	2 V/DIV., 20 msec./DIV.
Conditions	Idling

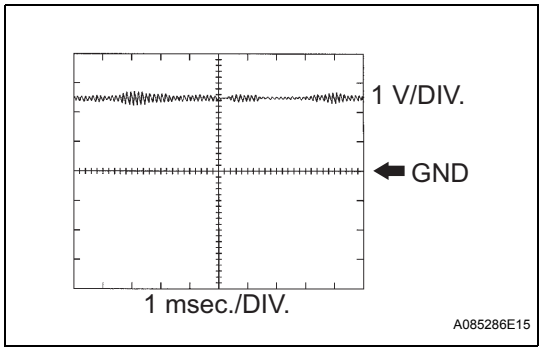
HINT:
The wavelength becomes shorter as the engine rpm increases.



10. WAVEFORM 10
Camshaft timing oil control valve (OCV)

ECM Terminal Names	Between OC1+ and OC1-
Tester Ranges	5 V/DIV., 200 msec./DIV.
Conditions	Idling

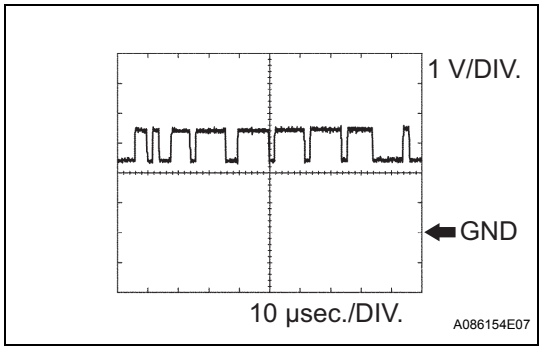
HINT:
The wavelength becomes shorter as the engine rpm increases.



11. WAVEFORM 11
Knock sensor

ECM Terminal Names	Between KNK1 and EKNK
Tester Ranges	0.01 to 10 V/DIV., 0.01 to 10 msec./DIV.
Conditions	Engine maintained at 4,000 rpm when warmed up

HINT:
- The wavelength becomes shorter as the engine rpm increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle.

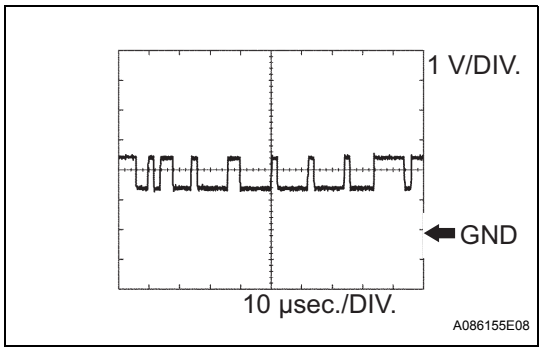


12. WAVEFORM 12
CAN communication signal

ECM Terminal Names	Between CANH and E1
Tester Ranges	1 V/DIV., 10 µsec./DIV.
Conditions	Engine stopped and ignition switch ON

HINT:
The waveform varies depending on the CAN communication signal.

ES



13. WAVEFORM 13
CAN communication signal

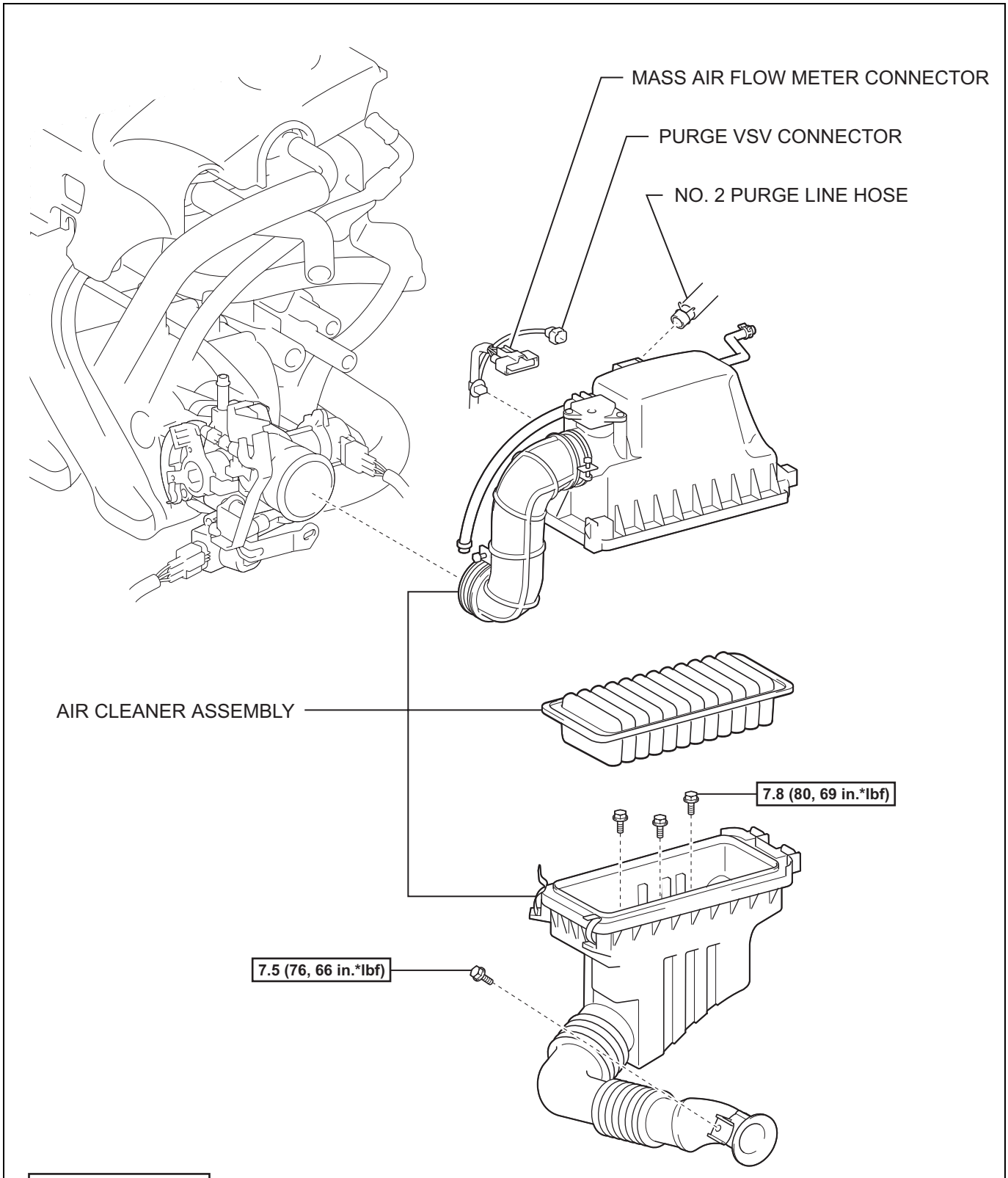
ECM Terminal Names	Between CANL and E1
Tester Ranges	1 V/DIV., 10 µsec./DIV.
Conditions	Engine stopped and ignition switch ON

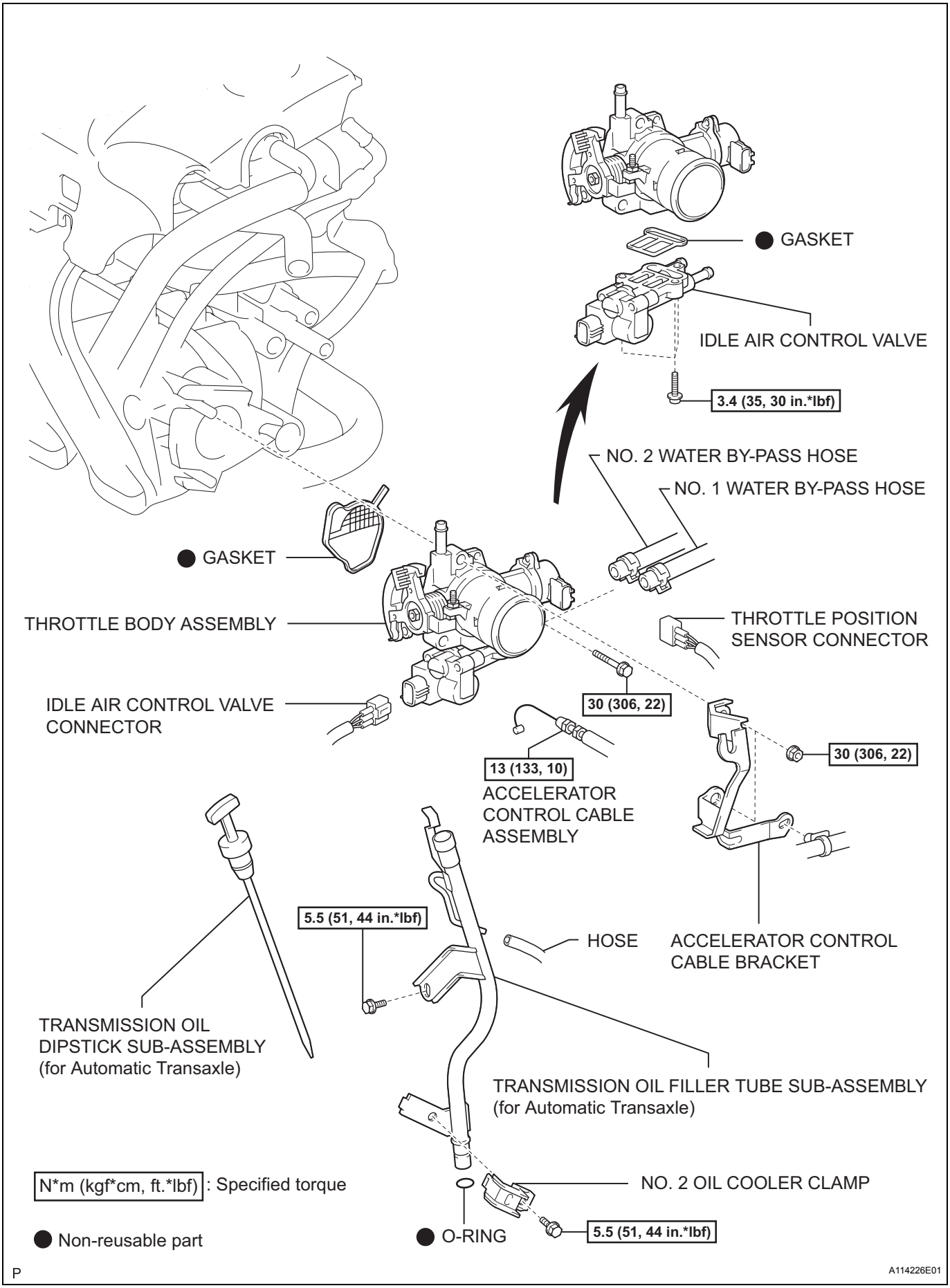
HINT:
The waveform varies depending on the CAN communication signal.

ES

IDLE AIR CONTROL VALVE

COMPONENTS




GASKET
IDLE AIR CONTROL VALVE
3.4 (35, 30 in.*lbf)
NO. 2 WATER BY-PASS HOSE
NO. 1 WATER BY-PASS HOSE
GASKET
THROTTLE BODY ASSEMBLY
THROTTLE POSITION SENSOR CONNECTOR
IDLE AIR CONTROL VALVE CONNECTOR
30 (306, 22)
13 (133, 10)
ACCELERATOR CONTROL CABLE ASSEMBLY
30 (306, 22)
5.5 (51, 44 in.*lbf)
HOSE
ACCELERATOR CONTROL CABLE BRACKET
TRANSMISSION OIL DIPSTICK SUB-ASSEMBLY (for Automatic Transaxle)
TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)
N*m (kgf*cm, ft.*lbf) : Specified torque
NO. 2 OIL COOLER CLAMP
Non-reusable part
O-RING
5.5 (51, 44 in.*lbf)
P
A114226E01

DIAGNOSIS SYSTEM

1. DESCRIPTION

When troubleshooting On-Board Diagnostics (OBD II) vehicles, the intelligent tester (complying with SAE J1987) must be connected to the Data Link Connector 3 (DLC3) of the vehicle. Various data in the vehicle's Engine Control Module (ECM) can then be read.

OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:

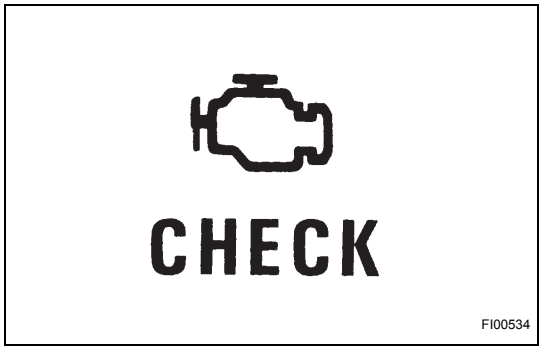
(a) The emission control systems components

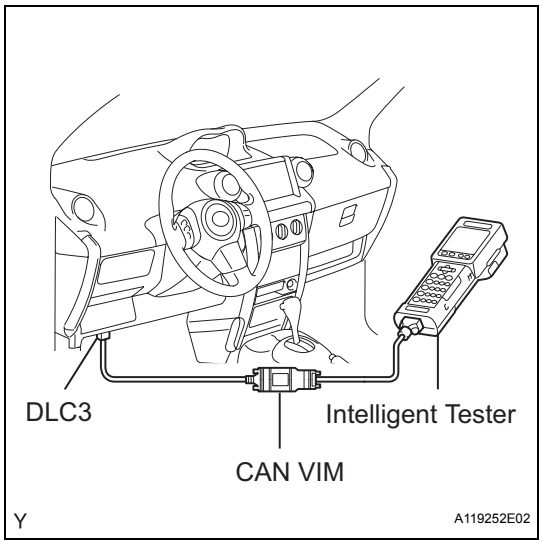
(b) The power train control components (which affect vehicle emissions)

(c) The computer itself

In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory. If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.

To check the DTCs, connect the intelligent tester to the DLC3. The tester displays DTCs, freeze frame data, and a variety of engine data. The DTCs and freeze frame data can be erased with the tester. In order to enhance OBD function on vehicles and develop the Off-Board diagnosis system, the Controller Area Network (CAN) communication is used in this system. It minimizes the gap between technician skills and vehicle technology. CAN is a network which uses a pair of data transmission lines that span multiple ECUs and sensors. It allows high speed communication between the systems and simplifies the wire harness connections. The CAN Vehicle Interface Module (CAN VIM) must be connected with the intelligent tester to display any information from the ECM. The intelligent tester and ECM uses CAN communication signals to communicate. Connect the CAN VIM between the intelligent tester and DLC3.





2. NORMAL MODE AND CHECK MODE

The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2 trip detection logic is used to ensure accurate detection of malfunctions. Check mode is also available as an option for technicians. In check mode, 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent problems (intelligent tester only).

3. 2 TRIP DETECTION LOGIC

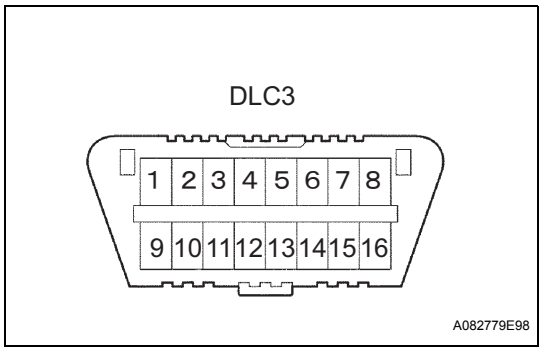
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next subsequent drive cycle, the MIL is illuminated (2nd trip).

4. FREEZE FRAME DATA

Freeze frame data records the engine conditions (fuel system, calculated engine load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

5. DATA LINK CONNECTOR 3 (DLC3)

The vehicle's ECM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols	Terminal No.	Names	Reference terminal	Results	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always
CANH	6	CAN "High" line	CANL	54 to 69 Ω	Ignition switch OFF
CANH	6	CAN "High" line	Battery positive	1 MΩ or higher	Ignition switch OFF
CANH	6	CAN "High" line	CG	1 kΩ or higher	Ignition switch OFF
CANL	14	CAN "Low" line	Battery positive	1 MΩ or higher	Ignition switch OFF
CANL	14	CAN "Low" line	CG	1 kΩ or higher	Ignition switch OFF

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

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.

If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

6. BATTERY VOLTAGE

Battery Voltage:

11 to 14 V

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

7. MIL (Malfunction Indicator Lamp)

(a) The MIL is illuminated when the ignition switch is first turned ON (the engine is not running).

(b) The MIL should turn OFF when the engine is started. If the MIL remains illuminated, the diagnosis system has detected a malfunction or abnormality in the system.

HINT:

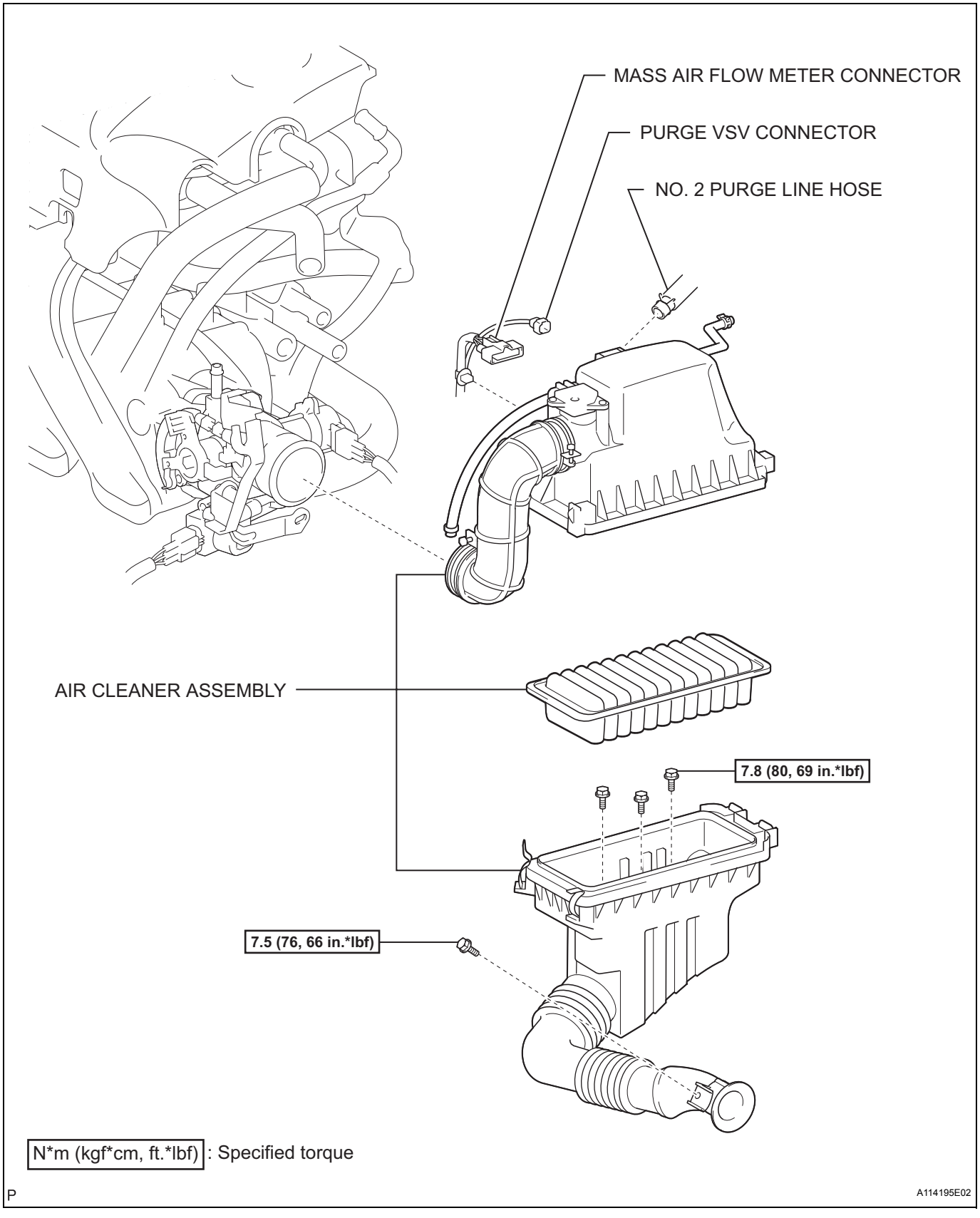
If the MIL is not illuminated when the ignition switch is first turned ON, check the MIL circuit (see page ES-321).

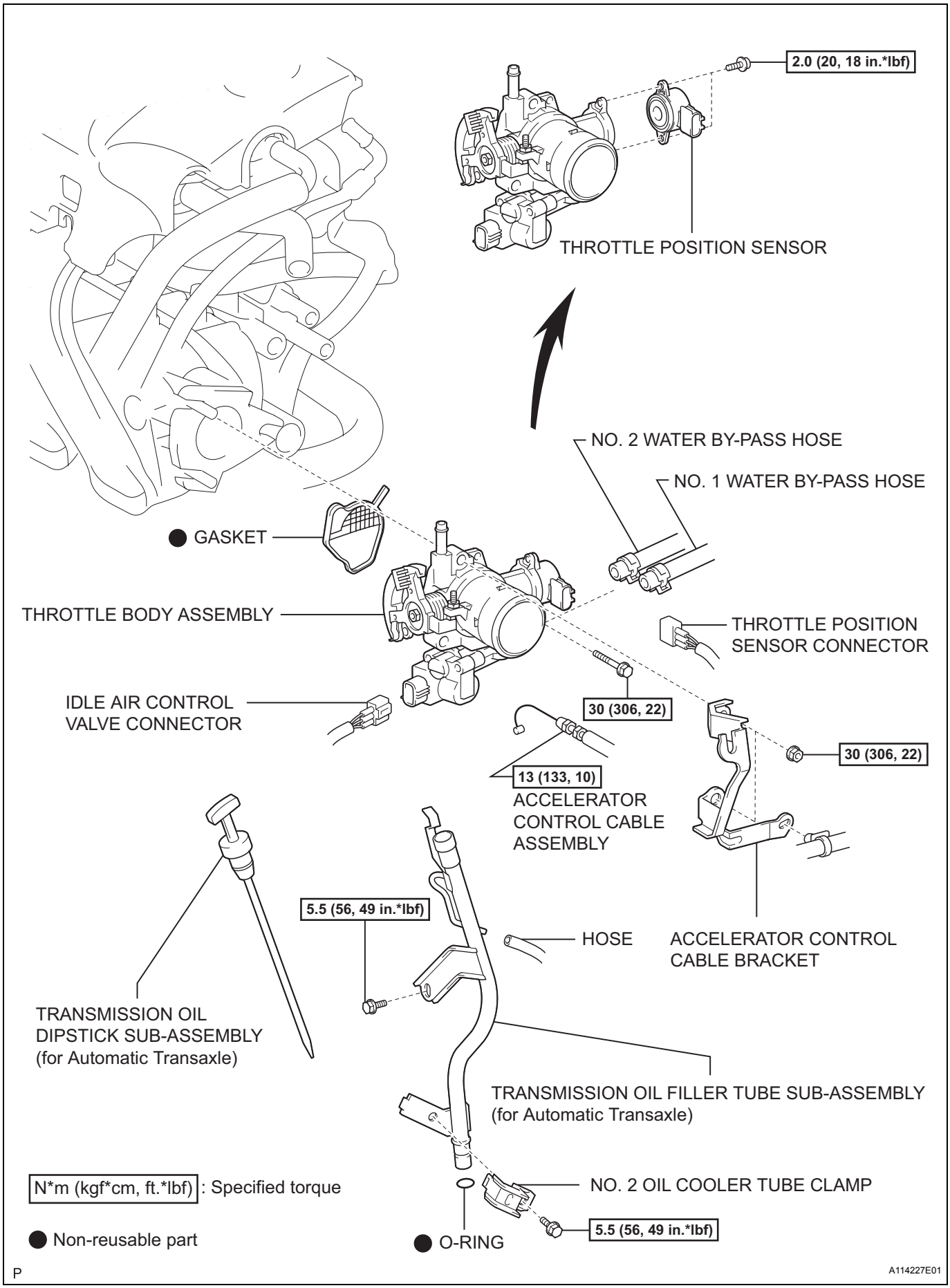
8. ALL READINESS

For the vehicle, using the intelligent tester allows readiness codes corresponding to all DTCs to be read. When diagnosis (normal or malfunctioning) has been completed, readiness codes are set. Enter the following menus on the intelligent tester: ENHANCED OBD II / MONITOR STATUS.

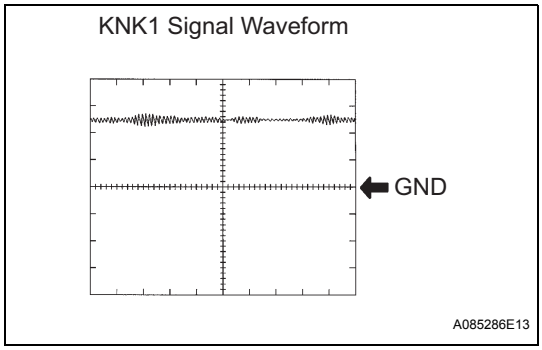
THROTTLE POSITION SENSOR

COMPONENTS

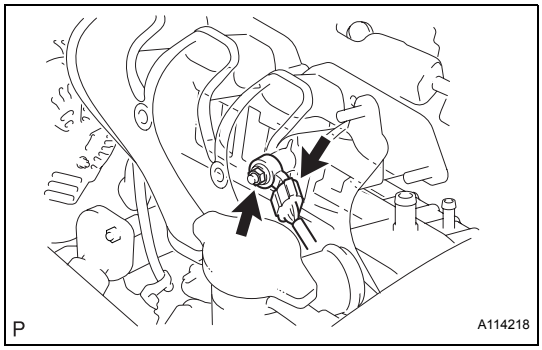



2.0 (20, 18 in.*lbf)
THROTTLE POSITION SENSOR
NO. 2 WATER BY-PASS HOSE
NO. 1 WATER BY-PASS HOSE
GASKET
THROTTLE BODY ASSEMBLY
THROTTLE POSITION SENSOR CONNECTOR
IDLE AIR CONTROL VALVE CONNECTOR
30 (306, 22)
30 (306, 22)
13 (133, 10)
ACCELERATOR CONTROL CABLE ASSEMBLY
5.5 (56, 49 in.*lbf)
HOSE
ACCELERATOR CONTROL CABLE BRACKET
TRANSMISSION OIL DIPSTICK SUB-ASSEMBLY (for Automatic Transaxle)
TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)
N*m (kgf*cm, ft.*lbf) : Specified torque
NO. 2 OIL COOLER TUBE CLAMP
5.5 (56, 49 in.*lbf)
Non-reusable part
O-RING
P
A114227E01

HINT:
When any of DTCs P0327 and P0328 are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the ignition switch is turned OFF.
Reference: Inspection using an oscilloscope.
The correct waveform is shown.



Items	Contents
Terminals	KNK1 - EKNK
Equipment Settings	0.01 to 10 V/Division, 0.01 to 10 msec./ Division
Conditions	Keep engine speed at 4,000 rpm with warm engine



INSTALLATION

1. **INSTALL KNOCK SENSOR**
   (a) Install the knock sensor with the nut.
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
   (b) Connect the sensor connector.
2. **INSTALL STARTER ASSEMBLY (See page ST-14)**
3. **INSTALL ENGINE UNDER COVER RH (See page ST-14)**
4. **INSTALL ENGINE UNDER COVER LH (See page ST-14)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY (See page IP-6)**

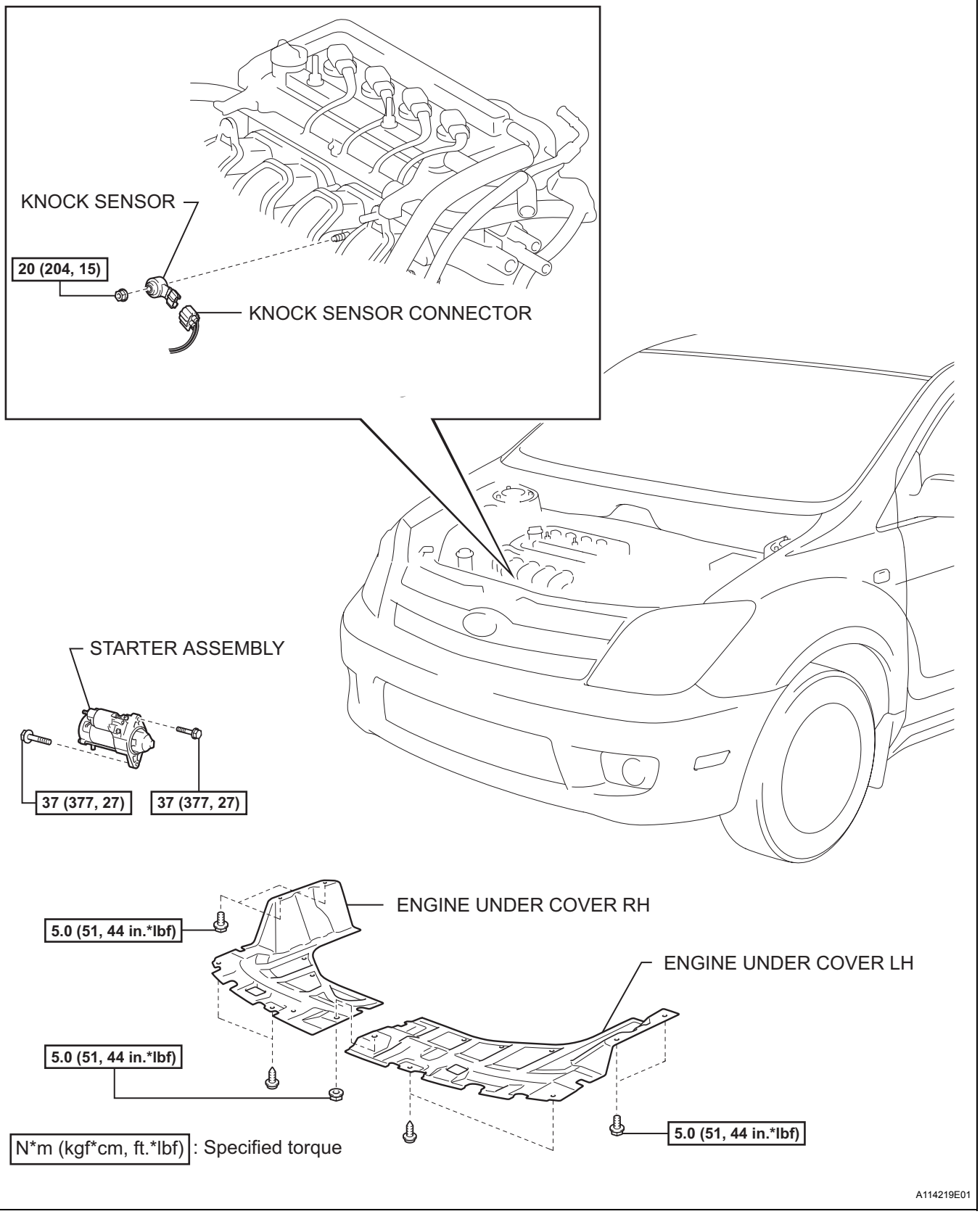
3. **REMOVE ECM**
   (a) Disconnect the 4 ECM connectors.
   (b) Remove the 2 bolts and ECM.
   (c) Remove the 2 screws and ECM bracket.
   (d) Remove the 2 screws and No. 2 ECM bracket.
   (e) Remove the 2 screws and No. 3 ECM bracket.

INSTALLATION

1. **INSTALL ECM**
   (a) Install the No. 3 ECM bracket with the 2 screws.
   (b) Install the No. 2 ECM bracket with the 2 screws.
   (c) Install the ECM bracket with the 2 screws.
   (d) Install the ECM with the 2 bolts.
   Torque: 3.0 N*m (31 kgf*cm, 27 in.*lbf)
   (e) Connect the 4 ECM connectors.
2. **INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY (See page IP-10)**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

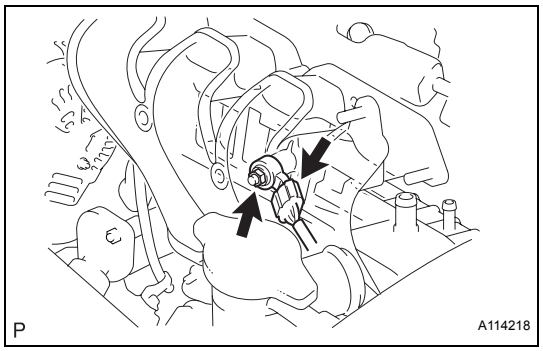
KNOCK SENSOR

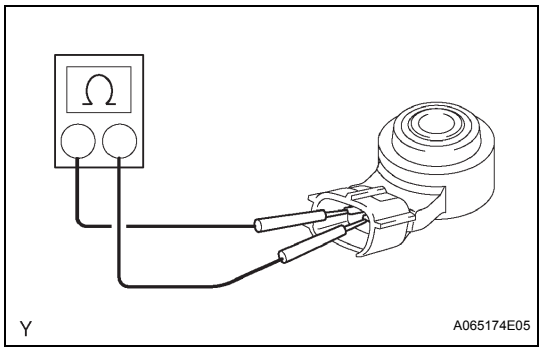
COMPONENTS



REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE ENGINE UNDER COVER LH (See page ST-8)**
3. **REMOVE ENGINE UNDER COVER RH (See page ST-8)**
4. **REMOVE STARTER ASSEMBLY (See page ST-8)**
5. **REMOVE KNOCK SENSOR**
   (a) Disconnect the sensor connector.
   (b) Remove the nut and sensor.





INSPECTION

1. **INSPECT KNOCK SENSOR**
   (a) Measure the resistance of the sensor.
   Standard resistance:
   120 to 280 kΩ at 20°C (68°F)
   If the result is not as specified, replace the knock sensor.
   DESCRIPTION
   A flat type knock sensor (non-resonant type) has a structure that can detect vibrations over a wide band of frequencies: between approximately 6 kHz and 15 kHz.
   Knock sensors are fitted onto the engine block to detect engine knocking.
   The knock sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The voltage is generated when the engine block vibrates due to knocking. Any occurrence of engine knocking can be suppressed by delaying the ignition timing.

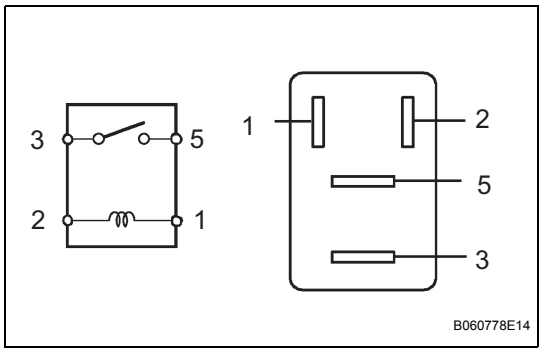
DTC No.	DTC Detection Condition	Trouble Area
P0327	Output voltage of knock sensor 0.5 V or less (1 trip detection logic)	• Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of knock sensor 4.5 V or more (1 trip detection logic)	• Open in knock sensor circuit • Knock sensor • ECM

EFI RELAY

ON-VEHICLE INSPECTION

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE EFI RELAY (Marking: EFI)**
   (a) Remove the engine room relay block cover.
   (b) Remove the EFI relay from the engine room relay block.



3. **INSPECT EFI RELAY**
   (a) Measure the resistance of the EFI relay.
   Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

   If the result is not as specified, replace the EFI relay.

4. **INSTALL EFI RELAY**

5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

6. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

CIRCUIT OPENING RELAY

ON-VEHICLE INSPECTION

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

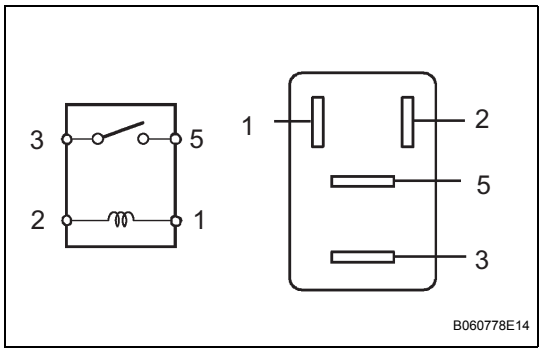
2. REMOVE CIRCUIT OPENING RELAY (Marking: C/OPN)

(a) Remove the circuit opening relay from the instrument panel junction block.

3. INSPECT CIRCUIT OPENING RELAY

(a) Measure the resistance of the circuit opening relay.

Standard resistance



Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the circuit opening relay.

4. INSTALL CIRCUIT OPENING RELAY

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. PERFORM INITIALIZATION

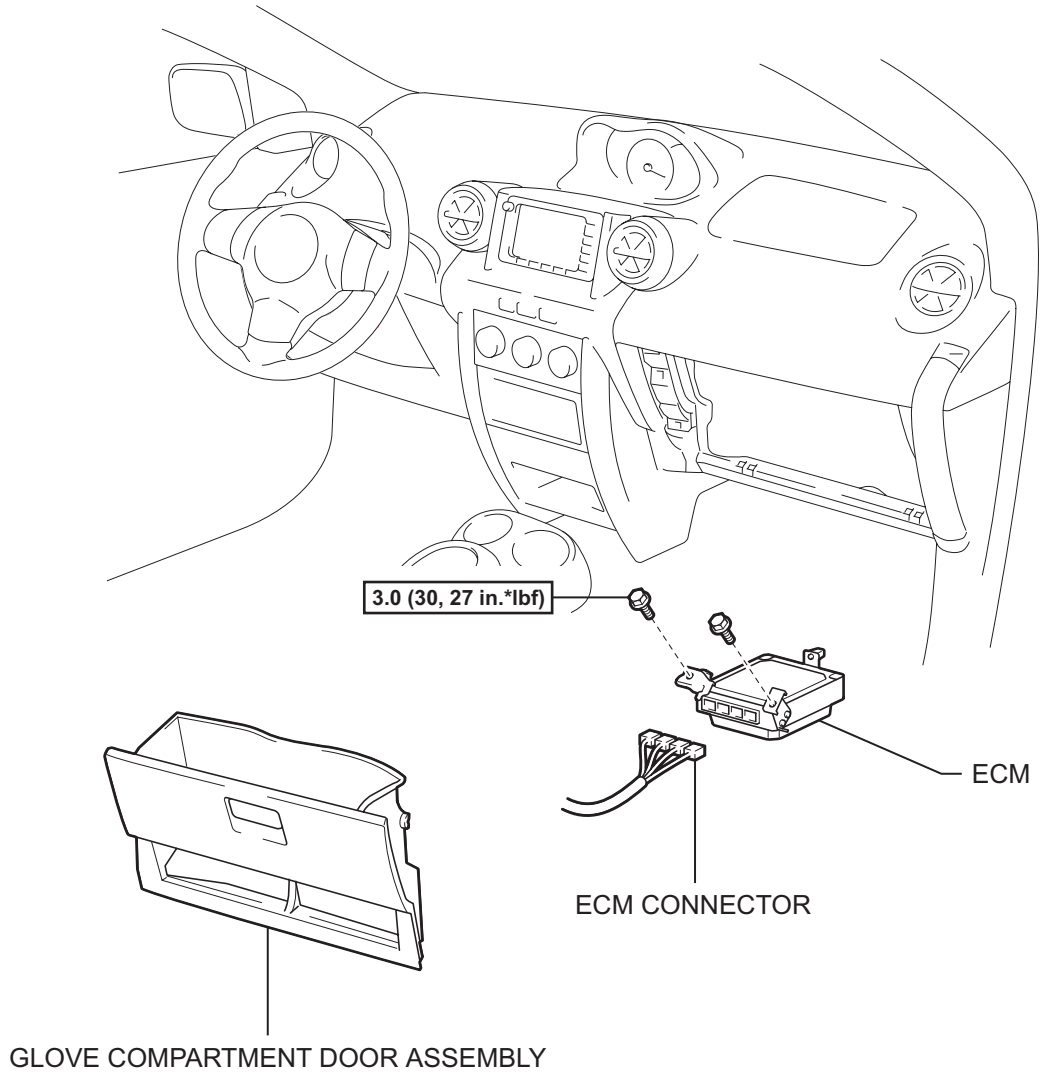
(a) Perform initialization (see page IN-23).

NOTICE:

Certain systems needs to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

ECM

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

P

A114222E01

ON-VEHICLE INSPECTION

1. CHECK ECM

(a) Check the ECM (see page ES-29).

INSTALLATION

1. INSTALL VANE PUMP V BELT

(a) Temporarily install the belt on each pulley.

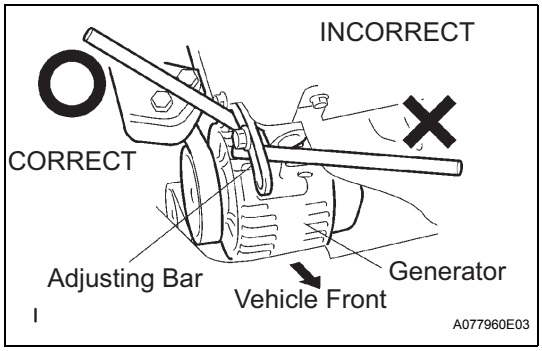
2. INSTALL GENERATOR V BELT

(a) Temporarily install the belt on each pulley.

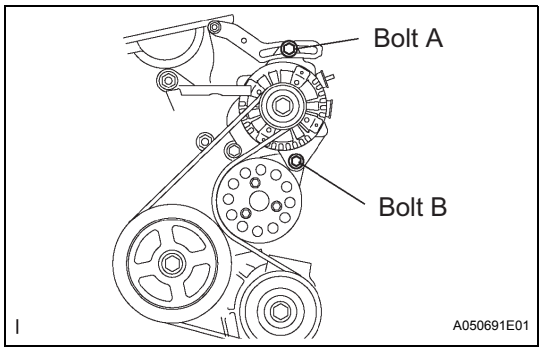
3. ADJUST GENERATOR V BELT

(a) Insert the adjusting bar between the engine RH mount bracket and generator. Push the bar towards the vehicle front to adjust the belt tension.

NOTICE:
Do not insert the bar between the oil control valve and generator. It could damage the oil control valve.



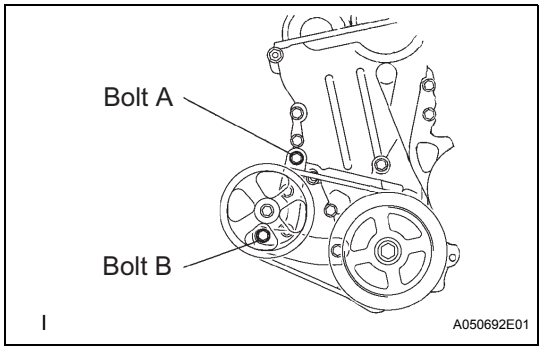
(b) First tighten bolt A, and then tighten bolt B.
Torque: 18.5 N*m (189 kgf*cm, 14 ft.*lbf) for bolt A
54 N*m (550 kgf*cm, 40 ft.*lbf) for bolt B



4. ADJUST VANE PUMP V BELT

(a) Using the bar, adjust the belt tension.

(b) First tighten bolt B, and then tighten bolt A.
Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)



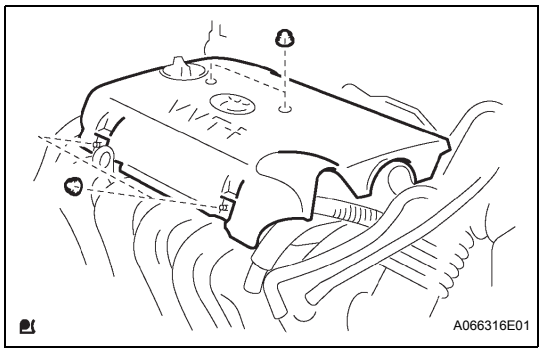
5. CHECK DRIVE BELT TENSION (See page EM-6)

6. INSTALL ENGINE UNDER COVER RH

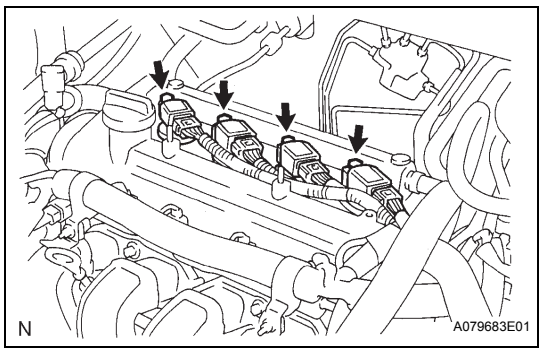
EM

REMOVAL

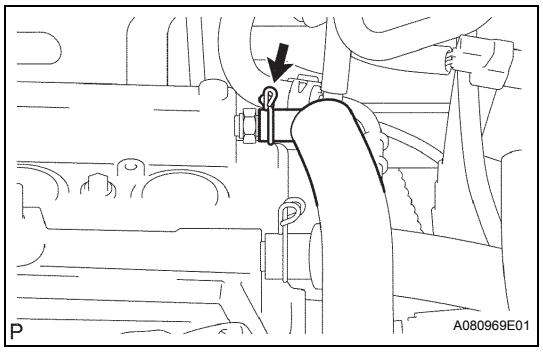
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE NO. 2 CYLINDER HEAD COVER**
   (a) Remove the 4 nuts and No. 2 cylinder head cover.



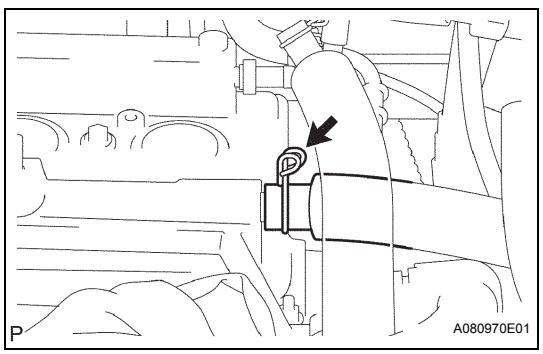
4. **REMOVE IGNITION COIL**
   (a) Remove the 4 bolts and pull out the 4 ignition coils.



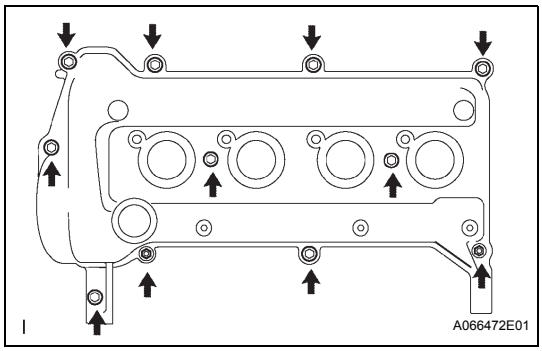
5. **REMOVE VENTILATION HOSE**
   (a) Disconnect the ventilation hose from the cylinder head cover.



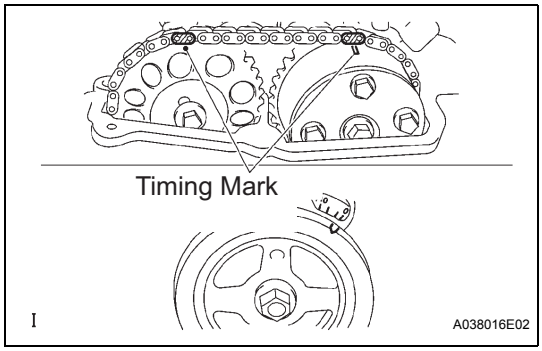
6. **REMOVE NO. 2 VENTILATION HOSE**
   (a) Disconnect the No. 2 ventilation hose from the cylinder head cover.



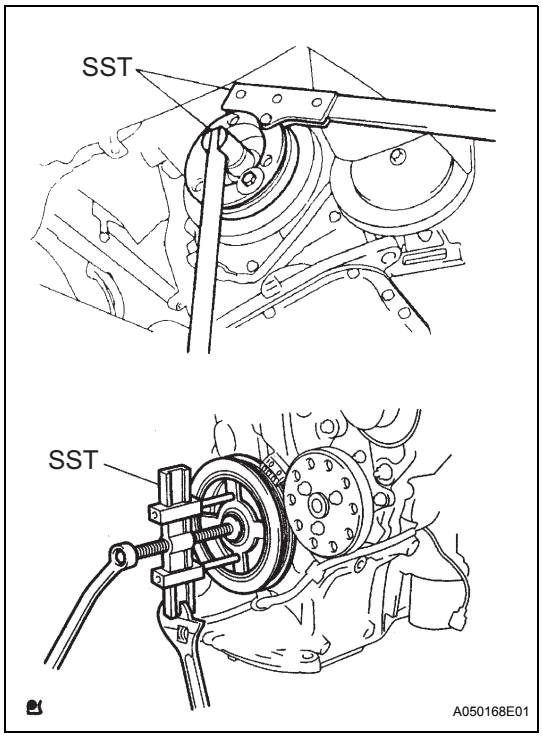
EM

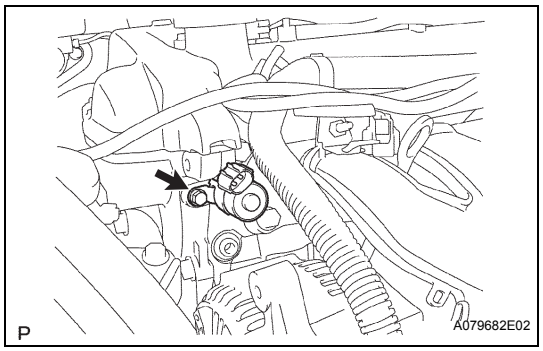


7. **REMOVE CYLINDER HEAD COVER**
   (a) Remove the 9 bolts, 2 nuts and cylinder head cover.
8. **REMOVE GENERATOR V BELT (See page EM-7)**
9. **REMOVE GENERATOR (See page CH-9)**
10. **REMOVE ENGINE UNDER COVER RH**
11. **DRAIN ENGINE OIL (See page LU-3)**
12. **DRAIN ENGINE COOLANT (See page CO-5)**
13. **REMOVE VANE PUMP V BELT (See page EM-7)**
14. **REMOVE WATER PUMP PULLEY (See page EM-91)**
15. **REMOVE WATER PUMP (See page EM-92)**
16. **REMOVE CRANKSHAFT PULLEY**
    (a) Set the No. 1 cylinder to the TDC/compression.
        (1) Turn the crankshaft pulley until its timing notch and the timing mark 0 of the chain cover are aligned.
        (2) Check that both timing marks on the camshaft timing sprocket and the camshaft timing gear are facing upward as shown in the illustration. If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.

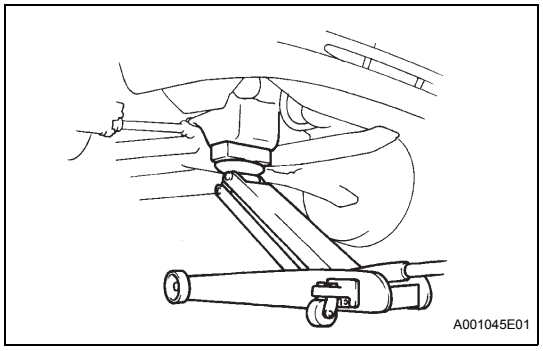


    (b) Using SST, remove the pulley bolt.
        SST 09213-58012 (91111-50845), 09330-00021
        If necessary, remove the pulley with SST.
        SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

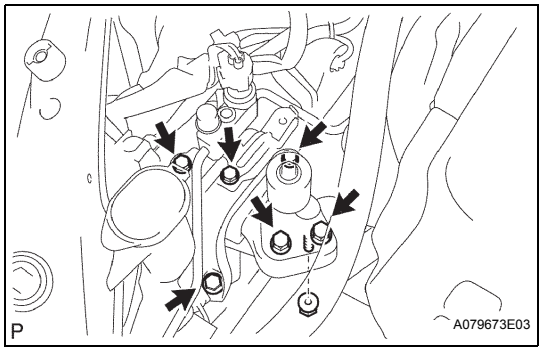




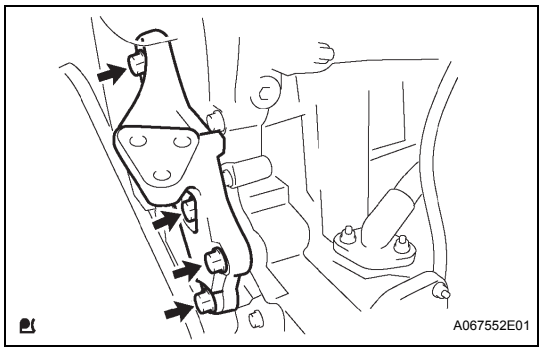
17. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**
    (a) Disconnect the oil control valve connector.
    (b) Remove the bolt, oil control valve and O-ring.
18. **REMOVE CRANKSHAFT POSITION SENSOR (See page ES-338)**



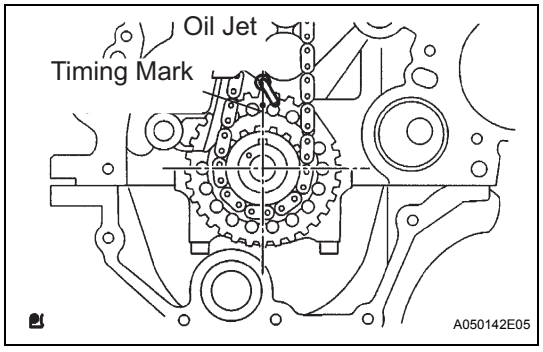
19. **REMOVE ENGINE MOUNTING BRACKET INSULATOR RH**
    (a) Place a wooden block on a jack underneath the engine.



    (b) Remove the bolt which is used to fix the liquid tube to the mounting insulator RH.
    (c) Remove the 5 bolts and nut, and then remove the mounting insulator RH.

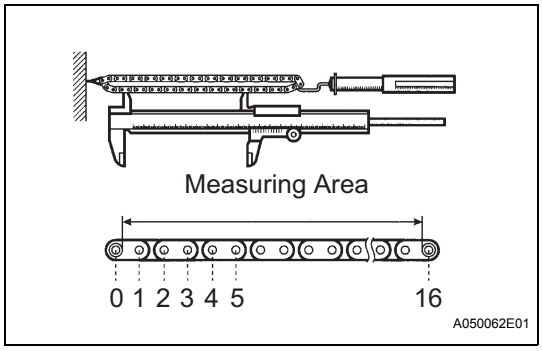


20. **REMOVE ENGINE MOUNTING BRACKET RH**
    (a) Remove the 4 bolts and mounting bracket RH.
21. **REMOVE TIMING CHAIN COVER (See page EM-92)**
22. **REMOVE OIL PUMP SEAL (See page EM-106)**
23. **REMOVE NO. 1 CHAIN TENSIONER**
    (a) Remove the 2 bolts and chain tensioner.
    NOTICE:
    - **Do not rotate the crankshaft with the chain tensioner removed.**
    - **When rotating the camshaft with the timing chain removed, rotate the crankshaft counterclockwise 40° from the TDC and align the oil jet hole with the paint mark to prevent the pistons from coming into contact with the valves.**



24. **REMOVE CHAIN TENSIONER SLIPPER**
    (a) Remove the bolt and tensioner slipper.
25. **REMOVE NO. 1 CHAIN VIBRATION DAMPER**
    (a) Remove the 2 bolts and chain vibration damper.

EM



26. REMOVE CHAIN

INSPECTION

1. INSPECT CHAIN

(a) Using a spring scale, pull the timing chain with a force of 140 N (14.3 kgf, 31.5 lbf) and measure the length of it.

Maximum chain elongation:

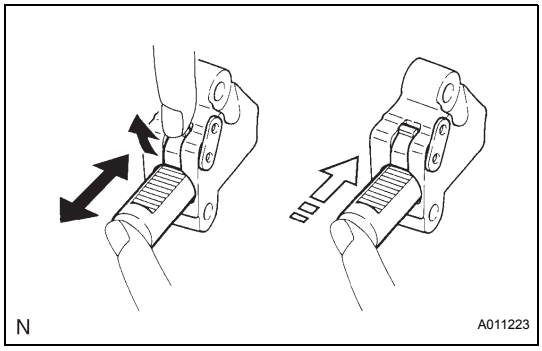
123.2 mm (4.850 in.)

If the elongation is greater than the maximum, replace the chain.

HINT:

Perform the same measurements by pulling at 3 or more random places to obtain the average length.

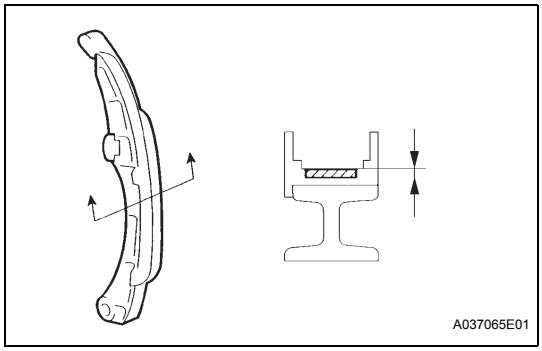
EM



2. INSPECT NO. 1 CHAIN TENSIONER

(a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.

(b) Release the ratchet pawl and check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.



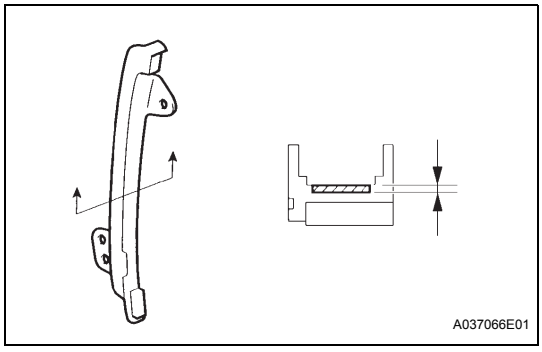
3. INSPECT CHAIN TENSIONER SLIPPER

(a) Measure the chain tensioner slipper wear.

Maximum wear:

1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the slipper.



4. INSPECT NO. 1 CHAIN VIBRATION DAMPER

(a) Measure the vibration damper wear.

Maximum wear:

1.0 mm (0.039 in.)

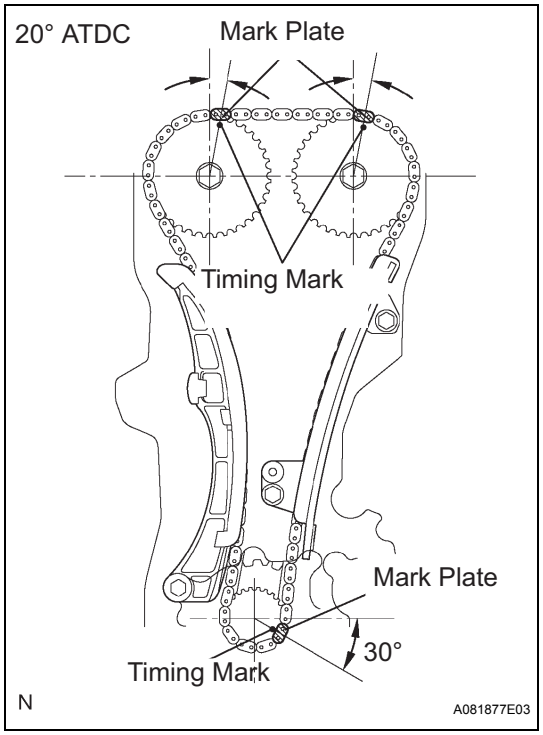
If the wear is greater than the maximum, replace the damper.

INSTALLATION

1. INSTALL CHAIN

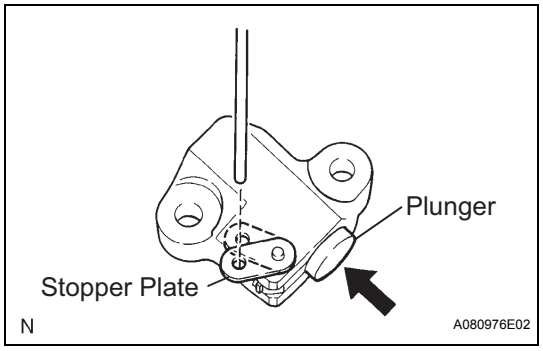
(a) Set the position of the No. 1 cylinder to 20° ATDC.
NOTICE:
To prevent the pistons from hitting against valves, the following procedures must be performed in the order below.
(1) Set the crankshaft between 40 to 140° ATDC.
(2) Set the cams of the intake and exhaust timing sprockets to 20° ATDC.
(3) Reset the crankshaft to 20° ATDC.

(b) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



(c) Align the timing marks of the camshaft timing sprocket, camshaft timing gear and crankshaft timing sprocket with each mark plate (colored in yellow) of the timing chain.
HINT:
To prevent the exhaust camshaft from springing back, turn it using a wrench and set it at the mark on the chain.

(d) Install the chain tensioner slipper with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



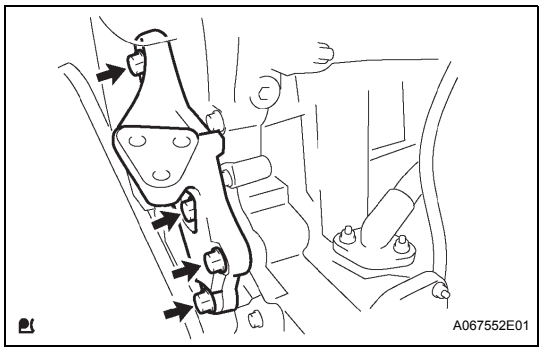
(e) Install the chain tensioner with the 2 bolts.
(1) While rotating the stopper plate of the chain tensioner upward as shown in the illustration, push in the plunger of the tensioner.
(2) While rotating the stopper plate of the tensioner downward, insert a 2.5 mm (0.098 in.) diameter bar into the holes of the stopper plate and the tensioner to hold the stopper plate.
(3) Install the chain tensioner with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
(4) Remove the bar from the chain tensioner.

(f) Check the tension between the intake and exhaust camshaft timing sprockets.

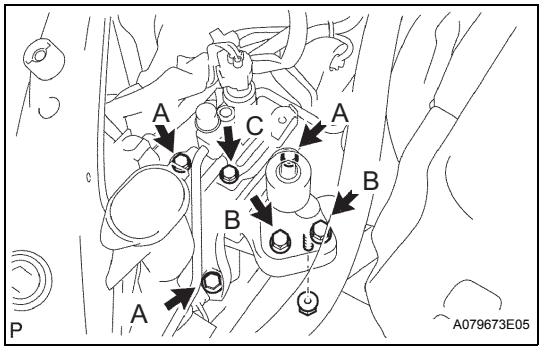
2. INSTALL OIL PUMP SEAL (See page EM-106)

3. INSTALL TIMING CHAIN COVER (See page EM-118)

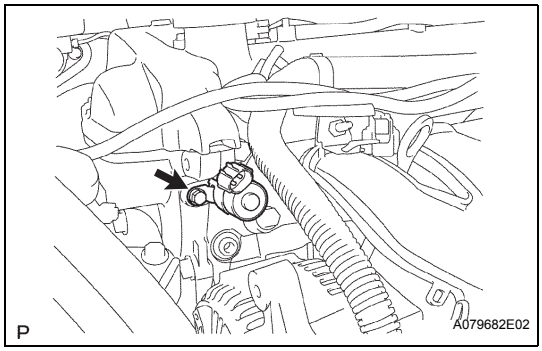
4. INSTALL WATER PUMP (See page EM-120)



5. **INSTALL ENGINE MOUNTING BRACKET RH**
   (a) Install the mounting bracket RH with the 4 bolts.
   Torque: 55 N*m (561 kgf*cm, 41 ft.*lbf)



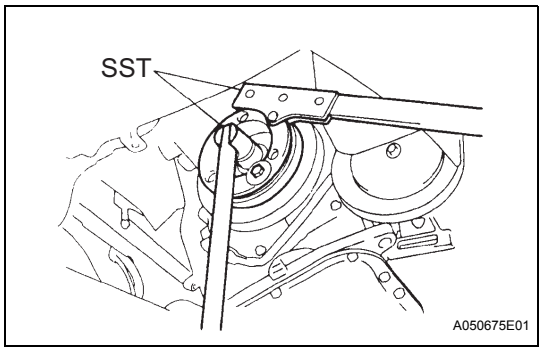
6. **INSTALL ENGINE MOUNTING INSULATOR RH**
   (a) Install the mounting insulator with the 5 bolts and nut.
   Torque: 45 N*m (459 kgf*cm, 33 ft.*lbf) for bolt A
   52 N*m (530 kgf*cm, 38 ft.*lbf) for bolt B and nut
   (b) Install the liquid tube with the bolt.
   Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf) for bolt C



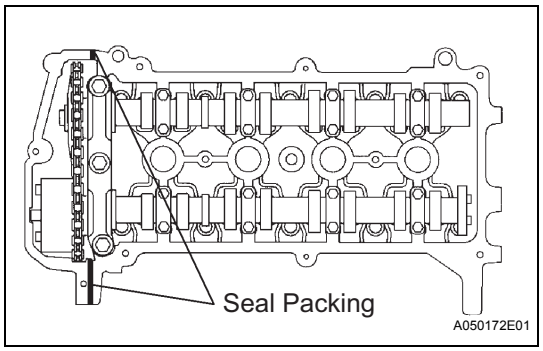
7. **INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**
   (a) Apply a light coat of engine oil to a new O-ring, and install it onto the camshaft timing oil control valve.
   (b) Install the camshaft timing oil control valve with the bolt.
   Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)
   NOTICE:
   Be careful not to twist an O-ring.

8. **INSTALL CRANKSHAFT POSITION SENSOR (See page ES-339)**

9. **INSTALL WATER PUMP PULLEY (See page EM-121)**



10. **INSTALL CRANKSHAFT PULLEY**
    (a) Align the pin hole of the crankshaft pulley with the pin position and install the crankshaft pulley.
    (b) Using SST, install the pulley bolt.
    SST 09330-00021, 09213-58012 (91111-50845)
    Torque: 128 N*m (1,305 kgf*cm, 95 ft.*lbf)

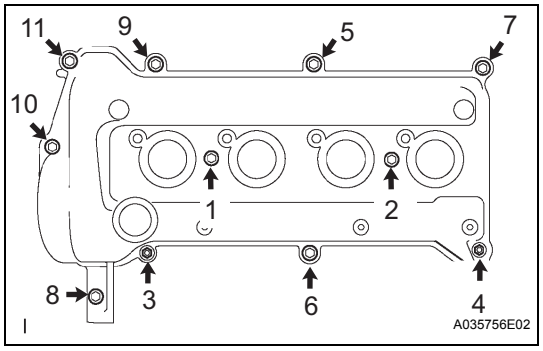


11. INSTALL CYLINDER HEAD COVER

(a) Apply seal packing to the 2 locations shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes of applying seal packing.**
- **Do not start the engine for at least 2 hours after installation.**

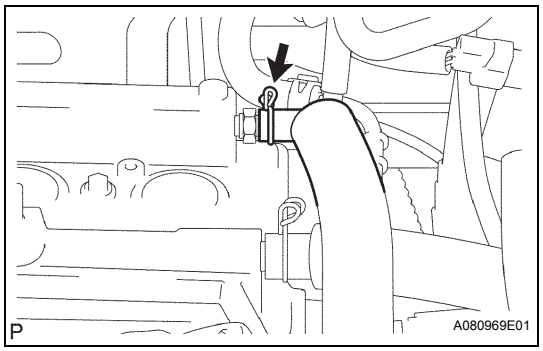
(b) Install the head cover with the 9 bolts, 2 seal washers and 2 nuts.

(c) Using several steps, uniformly tighten the bolts and nuts in the sequence shown in the illustration.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



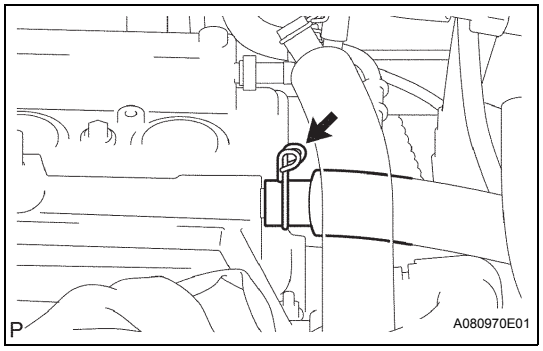
12. CONNECT NO. 2 VENTILATION HOSE

(a) Connect the No. 2 ventilation hose to the cylinder head cover.



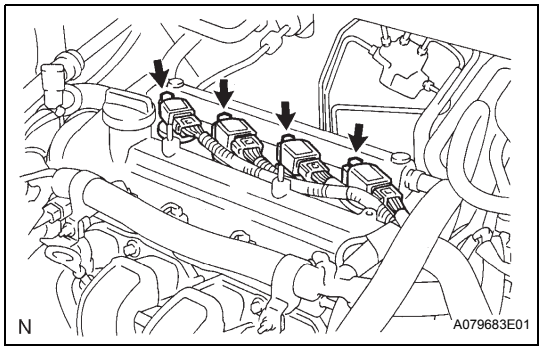
13. CONNECT VENTILATION HOSE

(a) Connect the ventilation hose to the cylinder head cover.

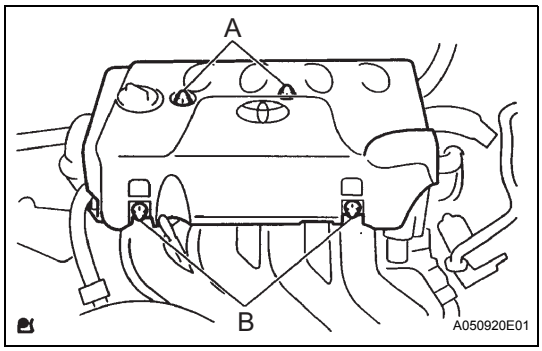


14. INSTALL IGNITION COIL

(a) Install the 4 ignition coils with the 4 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



EM



15. **INSTALL NO. 2 CYLINDER HEAD COVER**
    (a) First tighten the nuts labeled A, and then tighten the nuts labeled B.
    Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)
16. **INSTALL GENERATOR (See page CH-15)**
17. **INSTALL VANE PUMP V BELT (See page EM-7)**
18. **INSTALL GENERATOR V BELT (See page EM-7)**
19. **ADJUST GENERATOR V BELT (See page EM-7)**
20. **ADJUST VANE PUMP V BELT (See page EM-7)**
21. **INSPECT DRIVE BELT TENSION (See page EM-6)**
22. **INSTALL OIL PAN DRAIN PLUG**
    (a) Install the drain plug with a new gasket.
    Torque: 37.5 N*m (383 kgf*cm, 28 ft.*lbf)
23. **ADD ENGINE OIL (See page LU-3)**
24. **CHECK FOR ENGINE OIL LEAKS**
25. **ADD COOLANT (See page CO-5)**
26. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-7)**
27. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
28. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

EM

ENGINE

ON-VEHICLE INSPECTION

1. INSPECT AIR CLEANER FILTER ELEMENT

(a) Remove the air filter.

(b) Visually check that the air filter is not excessively damaged or oily.
If necessary, replace the air filter.

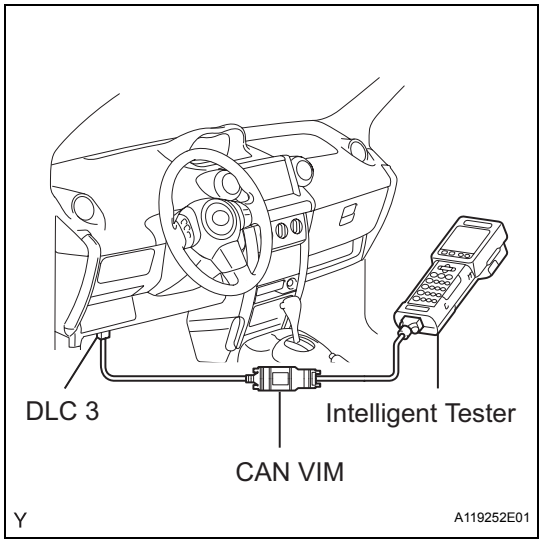
2. INSPECT IGNITION TIMING

(a) Warm up the engine.

(b) When using the intelligent tester or OBD II scan tool:

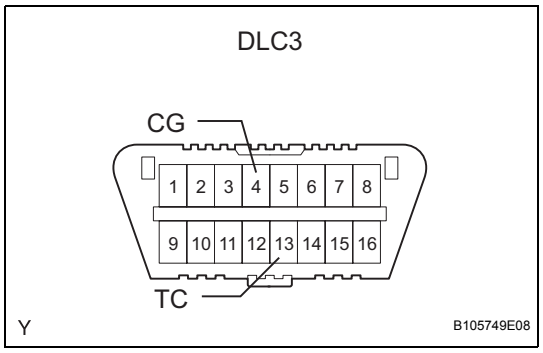
(1) Connect the intelligent tester or OBD II scan tool to the DLC3.

(2) Enter DATA LIST MODE on the intelligent tester or OBD II scan tool.
Standard ignition timing:
8 to 12° BTDC @ idle
HINT:
Refer to the intelligent tester or OBD II scan tool operator's manual if you need help to select the DATA LIST.



(c) When not using the intelligent tester or OBD II scan tool:

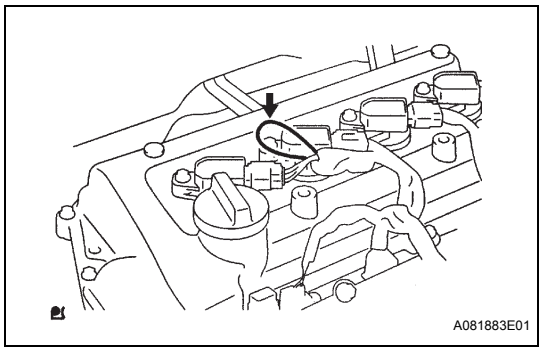
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
NOTICE:
- **Confirm the terminal numbers before connecting them. Connection with a wrong terminal could damage the engine.**
- **Turn OFF all electrical systems before connecting the terminals.**
- **Perform this inspection after the cooling fan motor is turned OFF.**



(2) Remove the No. 2 cylinder head cover.

(3) Pull out the wire harness as shown in the illustration.

(4) Connect the clip of the timing light to the engine.
NOTICE:
- **Use a timing light which can detect the first signal.**
- **After checking, be sure to tape the wire harness.**



(5) Check the ignition timing.
Standard ignition timing:
8 to 12° BTDC @ idle

NOTICE:
When checking the ignition timing, shift the transmission to the park or neutral position.
HINT:
Run the engine at 1,000 to 1,300 rpm for 5 seconds, and check that the engine rpm returns to idle speed.

(6) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
(7) Check the ignition timing.
Standard ignition timing:
0 to 14° BTDC @ idle
(8) Confirm that ignition timing advances when the engine rpm is increased.
(9) Remove the timing light.

3. INSPECT ENGINE IDLE SPEED

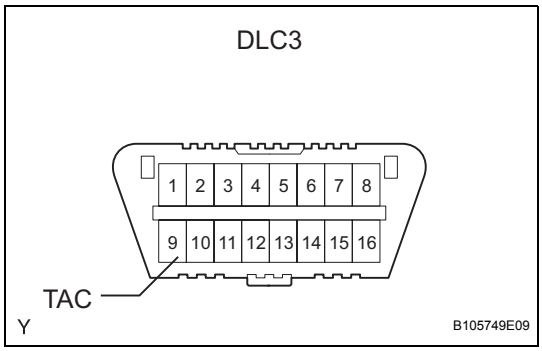
(a) Warm up the engine.
(b) When using the intelligent tester or OBD II scan tool:
(1) Connect the intelligent tester or OBD II scan tool to the DLC3.
(2) Enter DATA LIST MODE on the intelligent tester or OBD II scan tool.
Standard idle speed

Transmission	Specified Condition
M/T	600 to 700 rpm
A/T	650 to 750 rpm

NOTICE:
- **When checking the idle speed, the transmission is in the park or neutral position.**
- **Check the idle speed with the cooling fan OFF.**
- **Switch off all accessories and air conditioning before connecting the intelligent tester or OBD II scan tool.**

HINT:
Refer to the intelligent tester or OBD II scan tool operator's manual if you need help to select the DATA LIST.

(c) When not using the intelligent tester or OBD II scan tool:
(1) Using SST, connect the tachometer test lead to terminal 9 (TAC) of the DLC3.
SST 09843-18040
(2) Check the idle speed.
Standard idle speed

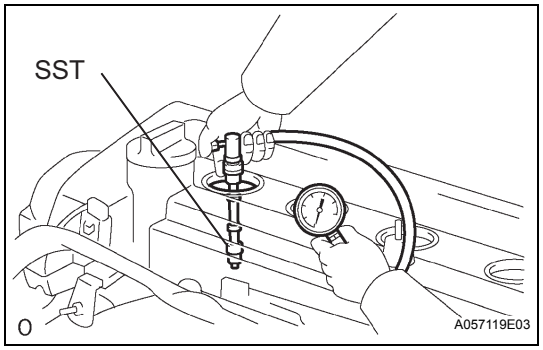


Transmission	Specified Condition
M/T	600 to 700 rpm
A/T	650 to 750 rpm

NOTICE:
- **When checking the idle speed, the transmission is in the park or neutral position.**
- **Check the idle speed with the cooling fan OFF.**
- **Switch off all accessories and air conditioning before connecting the test lead to the terminal.**

4. INSPECT COMPRESSION

(a) Warm up and stop the engine.
(b) Disconnect the injector connectors.
(c) Remove the ignition coils.
(d) Remove the spark plugs.



(e) Inspect cylinder compression pressure.
(1) Connect SST (attachment) to a compression gauge.
SST 09992-00500
(2) Install the compression gauge with SST into the spark plug hole.
(3) Fully open the throttle.
(4) While cranking the engine, measure the compression pressure.
Standard compression pressure:
1,471 kPa (15.0 kgf/cm^2, 213 psi)
Minimum pressure:
1,079 kPa (11.0 kgf/cm^2, 156 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi)
NOTICE:
- **Always use a fully charged battery to obtain an engine speed of 250 rpm or more.**
- **Check other cylinder's compression pressure in the same way.**
- **This measurement must be done in as short a time as possible.**

(5) If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole and check again.
HINT:
- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If pressure stays low, a valve may be sticking or seated improperly, or there may be leakage past the cylinder head gasket.

5. INSPECT CO/HC

(a) Start the engine.
(b) Run the engine at 2,500 rpm for approximately 180 seconds.
(c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft.) into tailpipe during idling.

EM

(d) When performing the 2 mode (2,500 rpm and idle) test, check that the CO/HC concentration complies with local regulations.
HINT:
When doing the 2 mode (with the engine at idle and 2,500 rpm) test, these procedures may vary according to local rules.

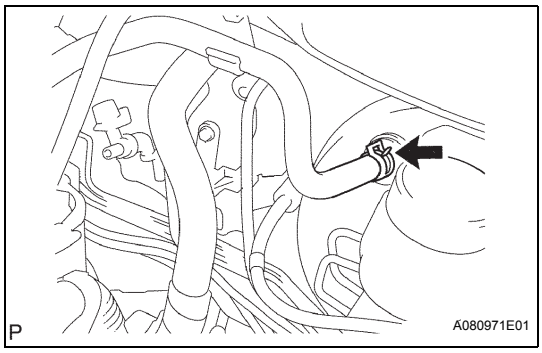
(e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.
(1) Check the heated oxygen sensor operation (see page ES-110).
(2) See the table below for possible causes, and then inspect the applicable causes and repair it if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignition: – Incorrect timing – Plugs are contaminated, plugs are shorted or plug gaps are incorrect 2. Incorrect valve clearance 3. Leaks in intake and exhaust valves 4. Leaks in cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: – Ventilation hoses – Intake manifold – Throttle body – IAC valve – Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged ventilation valve 3. Faulty SFI system: – Faulty pressure regulator – Defective ECT sensor – Defective mass air flow meter – Faulty ECM – Faulty injectors – Faulty throttle position sensor

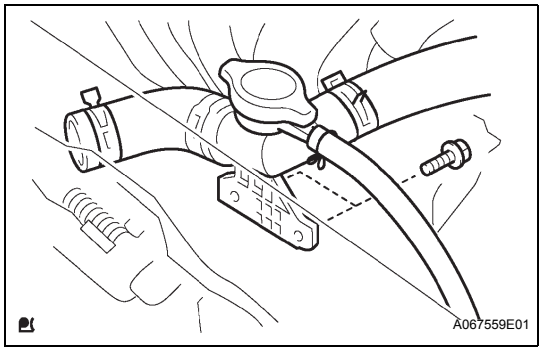
EM

REMOVAL

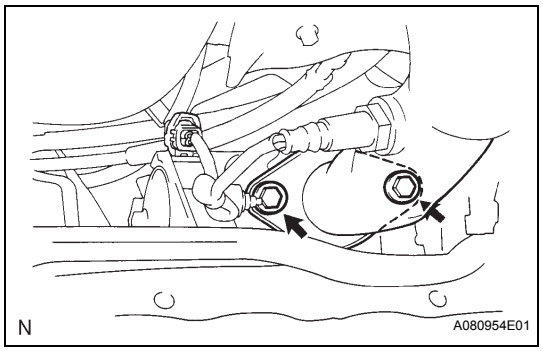
1. **DISCHARGE FUEL SYSTEM PRESSURE (See page FU-11)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **REMOVE AIR CLEANER (See page ES-346)**
4. **REMOVE NO. 2 CYLINDER HEAD COVER (See page EM-25)**
5. **REMOVE FRONT WHEEL RH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **DRAIN ENGINE OIL**
8. **DRAIN ENGINE COOLANT (See page CO-5)**
9. **DISCONNECT ENGINE WIRE**
10. **DISCONNECT ACCELERATOR CONTROL CABLE (See page ES-346)**
11. **DISCONNECT FUEL TUBE (See page FU-12)**
12. **DISCONNECT UNION TO CHECK VALVE HOSE**
    (a) Disconnect the union to check valve hose for the brake booster.



13. **DISCONNECT RADIATOR HOSE INLET**
    (a) Disconnect the radiator hose inlet from the union.
14. **DISCONNECT NO. 1 WATER BY-PASS PIPE**
    (a) Remove the bolt and disconnect the water by-pass pipe.
15. **DISCONNECT HEATER WATER INLET HOSE**
    (a) Disconnect the heater water inlet hose from the No. 2 water by-pass pipe.

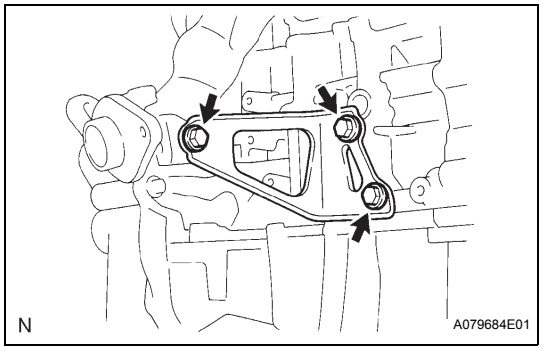


16. **REMOVE WATER FILLER**
    (a) Disconnect the radiator inlet hose.
    (b) Disconnect the No. 3 radiator hose.
    (c) Disconnect the radiator reservoir hose.
    (d) Remove the 2 bolts and water filler.



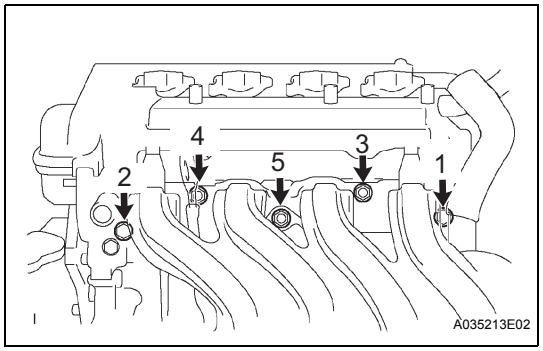
17. **DISCONNECT FRONT EXHAUST PIPE**
    (a) Remove the 2 bolts and 2 compression springs which are installed on the front side of the exhaust pipe.

18. **REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR**
    (a) Remove the 4 bolts and exhaust manifold heat insulator.

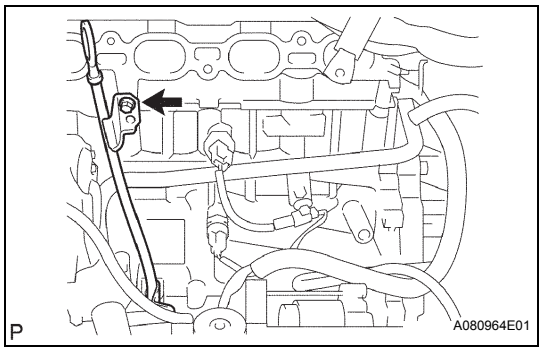


19. **REMOVE MANIFOLD SUPPORT BRACKET**
    (a) Remove the 3 bolts and manifold support bracket.

20. **REMOVE EXHAUST MANIFOLD**
    (a) Remove the 3 bolts, 2 nuts, exhaust manifold and gasket.



21. **REMOVE INTAKE MANIFOLD**
    (a) Using several steps, remove the 3 bolts and 2 nuts in the sequence shown in the illustration. Then remove the intake manifold.
    (b) Remove the gasket from the intake manifold.



22. **REMOVE OIL DIPSTICK GUIDE**
    (a) Remove the bolt and dipstick guide.

23. **REMOVE IGNITION COIL (See page EM-25)**

24. **REMOVE GENERATOR V BELT (See page EM-7)**

25. **REMOVE VANE PUMP V BELT (See page EM-7)**

26. **REMOVE GENERATOR (See page CH-9)**

27. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page EM-27)**

28. **DISCONNECT VENTILATION HOSE (See page EM-25)**

29. **DISCONNECT NO. 2 VENTILATION HOSE (See page EM-25)**

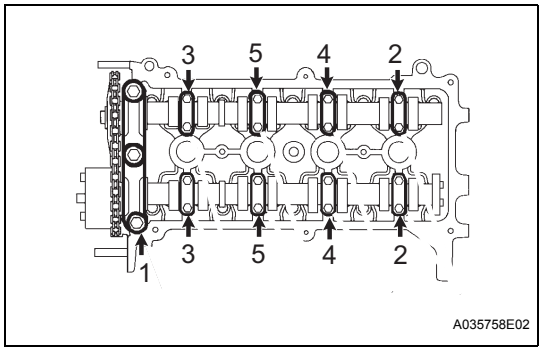
30. **REMOVE CYLINDER HEAD COVER (See page EM-26)**

31. **REMOVE WATER PUMP PULLEY (See page EM-91)**

32. **REMOVE TIMING CHAIN COVER (See page EM-92)**

33. **REMOVE WATER PUMP (See page EM-92)**

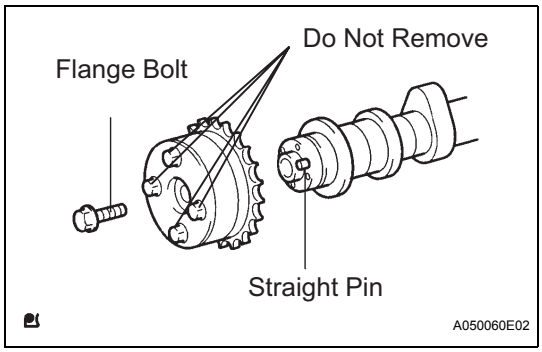
34. **REMOVE CRANKSHAFT PULLEY (See page EM-26)**
35. **REMOVE CRANKSHAFT POSITION SENSOR (See page ES-338)**
36. **REMOVE ENGINE MOUNTING INSULATOR RH (See page EM-27)**
37. **REMOVE ENGINE MOUNTING BRACKET RH (See page EM-27)**
38. **REMOVE NO. 1 CHAIN TENSIONER (See page EM-27)**
39. **REMOVE CHAIN TENSIONER SLIPPER (See page EM-27)**
40. **REMOVE NO. 1 CHAIN VIBRATION DAMPER (See page EM-27)**
41. **REMOVE CHAIN**
42. **REMOVE FUEL DELIVERY PIPE (See page EM-93)**
43. **REMOVE FUEL INJECTOR (See page EM-93)**
44. **REMOVE CAMSHAFT**



(a) Using several steps, uniformly loosen and remove the 19 bearing cap bolts in the sequence shown in the illustration, and then remove the 9 bearing caps, and the No. 1 and No. 2 camshafts.
NOTICE:
Loosen each bolt uniformly, keeping the camshaft level.

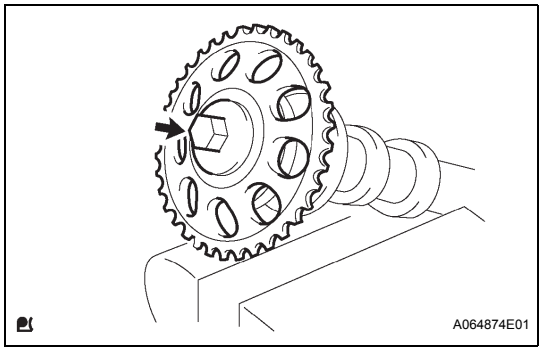
45. **REMOVE CAMSHAFT TIMING GEAR**

(a) Turn the camshaft timing gear at the most advanced angle (see page EM-49).

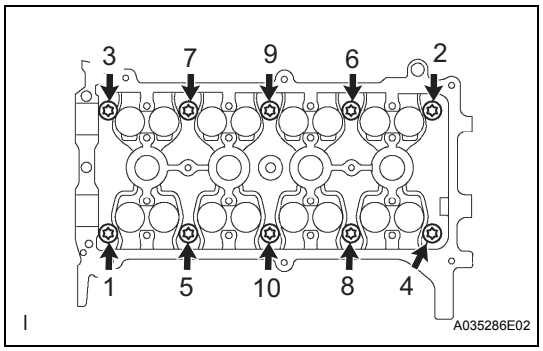


(b) Remove the flange bolt and camshaft timing gear.
NOTICE:
- **Be careful not to remove the other 4 bolts.**
- **If reusing the camshaft timing gear, unlock the lock pin inside the camshaft timing gear first.**

46. **REMOVE CAMSHAFT TIMING SPROCKET**



(a) Clamp the camshaft in a vise.
(b) Remove the flange bolt and camshaft timing sprocket.
NOTICE:
Be careful not to damage the camshaft.



47. REMOVE CYLINDER HEAD

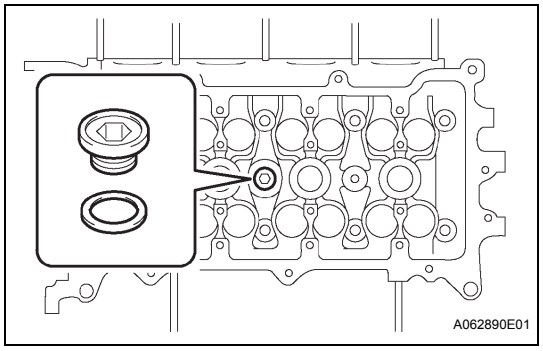
(a) Using several steps, uniformly loosen and remove the 10 cylinder head bolts with an 8 mm bi-hexagon wrench in the sequence shown in the illustration. Remove the 10 cylinder head bolts and plate washers.

NOTICE:

- **Be careful not to drop the washers into the cylinder head.**
- **Head warpage or cracking could result from removing bolts in the incorrect order.**

48. REMOVE CYLINDER HEAD GASKET

DISASSEMBLY



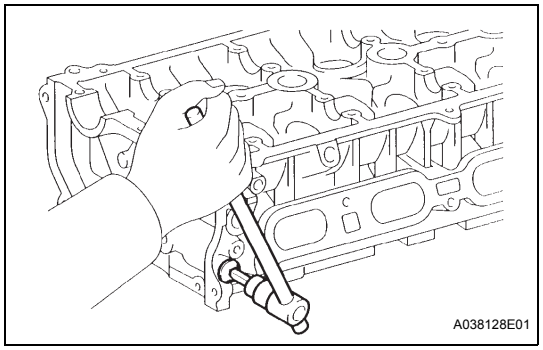
1. REMOVE NO. 1 TAPER SCREW PLUG

(a) Using a 10 mm hexagon wrench, remove the taper screw plug and gasket.

2. REMOVE VALVE LIFTER

HINT:

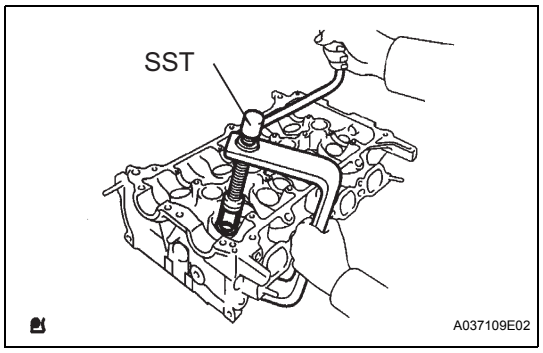
Keep the valve lifters in the correct order so they can be returned to the original locations when reassembling.



3. REMOVE OIL CONTROL VALVE FILTER

(a) Using an 8 mm hexagon wrench, remove the taper screw plug.

(b) Remove the filter and gasket.



4. REMOVE INTAKE VALVE

(a) Using SST, compress the valve spring and remove the 2 retainer locks, valve, retainer and valve spring.

SST 09202-70020 (09202-00010)

HINT:

Keep the valves, valve springs and spring retainers in the correct order so they can be returned to the original locations when reassembling.

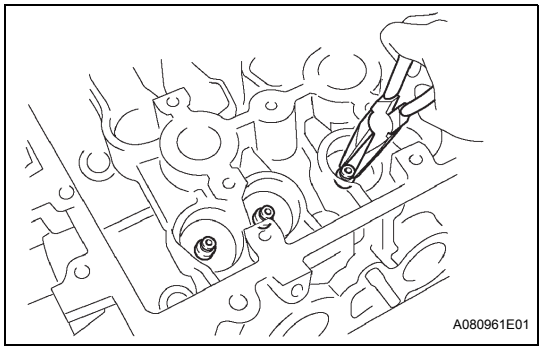
5. REMOVE EXHAUST VALVE

(a) Using SST, compress the valve spring and remove the 2 retainer locks, valve, retainer and valve spring.

SST 09202-70020 (09202-00010)

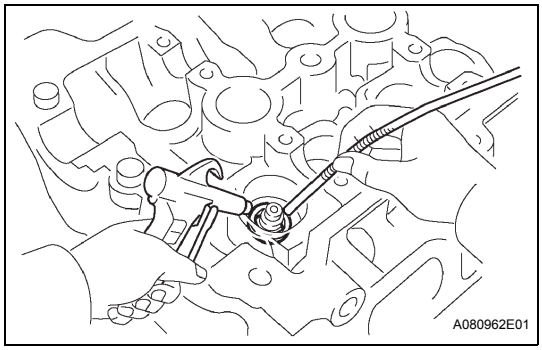
HINT:

Keep the valves, valve springs and spring retainers in the correct order so they can be returned to the original locations when reassembling.



6. REMOVE VALVE STEM OIL SEAL

(a) Using needle-nose pliers, remove the oil seal.



7. REMOVE VALVE SPRING SEAT

(a) Using compressed air and a magnetic finger, remove the valve spring seat.
HINT:
Keep the valve seats in the correct order so they can be returned to the original locations when reassembling.

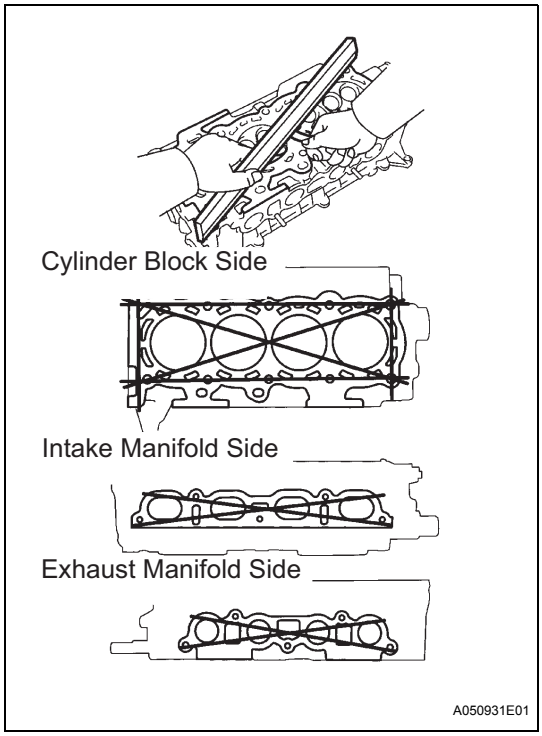
8. REMOVE UNION

9. REMOVE STUD BOLT

(a) Using E5 and E7 "torx" sockets, remove the 7 stud bolts.

10. REMOVE CAMSHAFT BEARING CAP SETTING RING PIN

INSPECTION

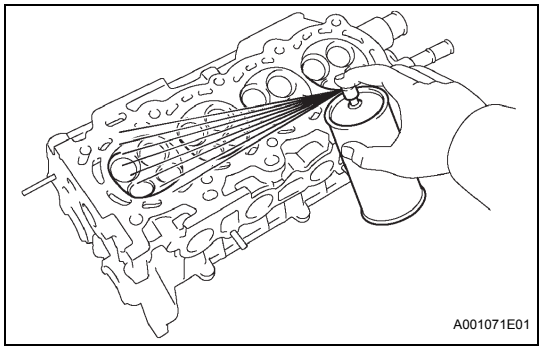


1. INSPECT CYLINDER HEAD FOR FLATNESS

(a) Using a precision straightedge and feeler gauge, measure the surface that is in contact with the cylinder block and the manifolds for warpage.
Maximum warpage

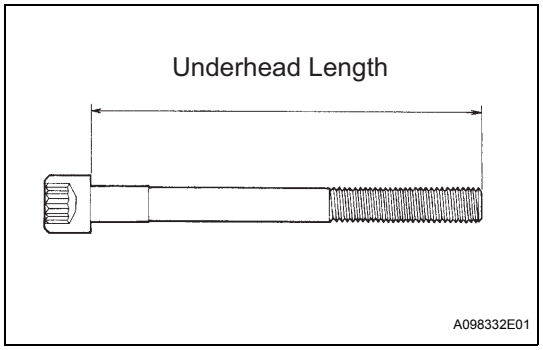
Surface	Specified Condition
Cylinder block side	0.05 mm (0.0020 in.)
Intake manifold side	0.10 mm (0.0039 in.)
Exhaust manifold side	0.10 mm (0.0039 in.)

If the warpage is greater than the maximum, replace the cylinder head.


A001071E01

2. INSPECT CYLINDER HEAD FOR CRACKS

(a) Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.
If cracked, replace the cylinder head.

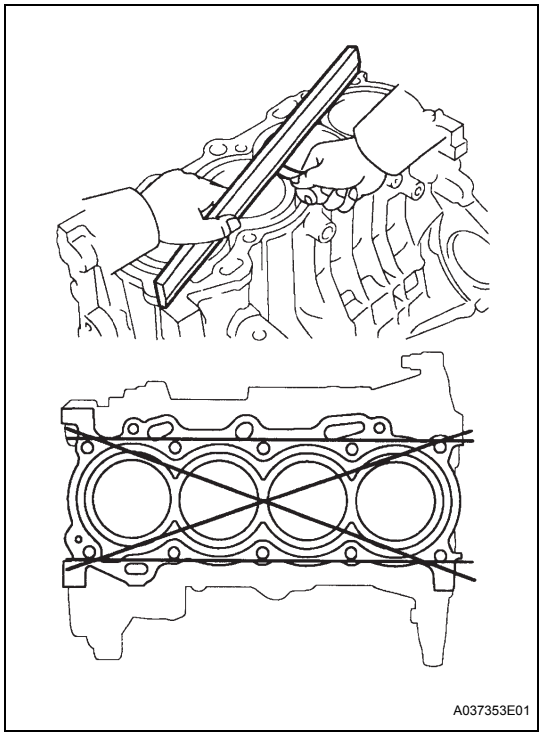


A098332E01

3. INSPECT CYLINDER HEAD SET BOLT

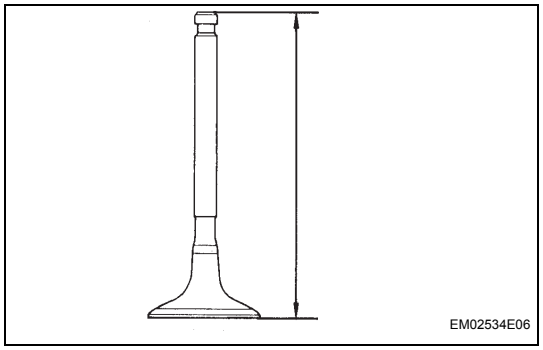
(a) Using a vernier caliper, measure the length of head bolts from the seat to the end.
Standard length:
142.8 to 144.2 mm (5.622 to 5.677 in.)
Maximum length:
147.1 mm (5.791 in.)
If the length is greater than the maximum, replace the bolt.

EM


A037353E01

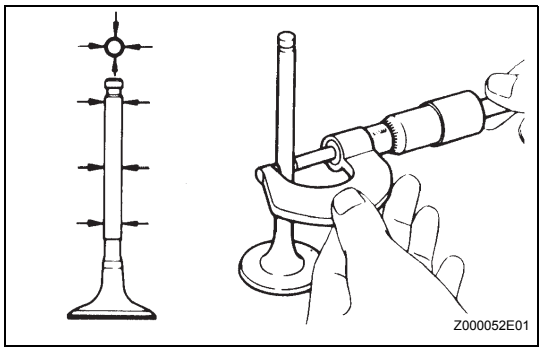
4. INSPECT CYLINDER BLOCK FOR FLATNESS

(a) Using a precision straightedge and feeler gauge, measure the surface which is in contact with the cylinder head gasket for warpage.
Maximum warpage:
0.05 mm (0.0020 in.)
If the warpage is greater than the maximum, replace the cylinder block.

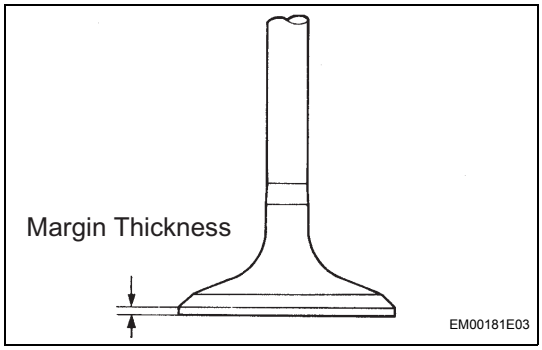

EM02534E06

5. INSPECT INTAKE VALVE

(a) Check the overall valve length.
Standard overall length:
89.25 mm (3.5138 in.)
Minimum overall length:
88.75 mm (3.4941 in.)
If the overall length is less than the minimum, replace the valve.



(b) Using a micrometer, measure the diameter of the valve stem.
Standard valve stem diameter:
4.970 to 4.985 mm (0.1957 to 0.1963 in.)



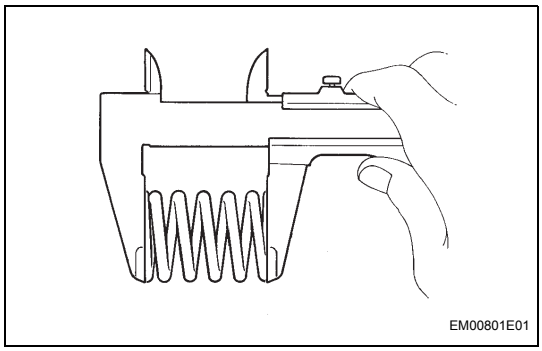
(c) Check the valve head margin thickness.
Standard margin thickness:
1.0 mm (0.039 in.)
Minimum margin thickness:
0.7 mm (0.028 in.)
If the margin thickness is less than the minimum, replace the valve.

6. INSPECT EXHAUST VALVE

(a) Check the overall valve length.
Standard overall length:
87.90 mm (3.4606 in.)
Minimum overall length:
87.40 mm (3.4409 in.)
If the overall length is less than the minimum, replace the valve.

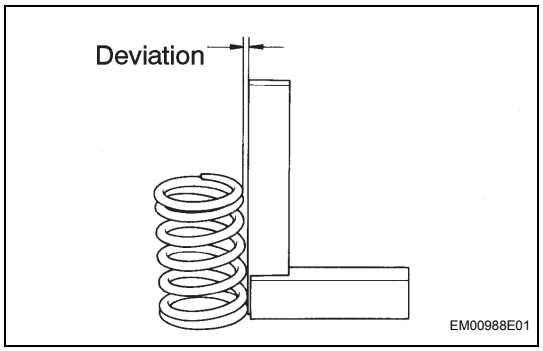
(b) Using a micrometer, measure the diameter of the valve stem.
Standard valve stem diameter:
4.965 to 4.980 mm (0.1955 to 0.1961 in.)

(c) Check the valve head margin thickness.
Standard margin thickness:
1.15 mm (0.045 in.)
Minimum margin thickness:
0.7 mm (0.028 in.)
If the margin thickness is less than the minimum, replace the valve.

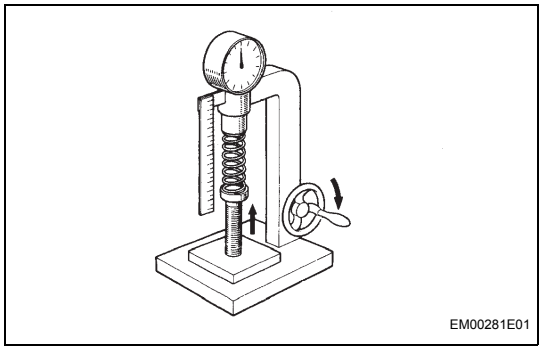


7. INSPECT VALVE SPRING

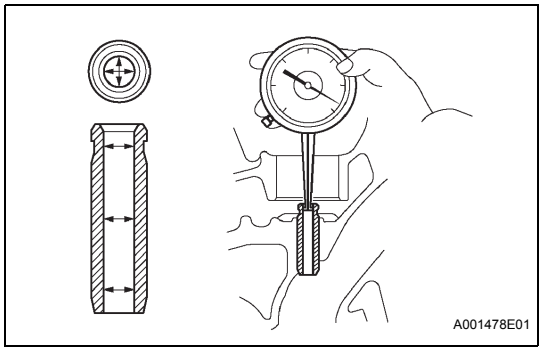
(a) Using a vernier caliper, measure the free length of the valve spring.
Standard free length:
45.05 to 45.15 mm (1.774 to 1.778 in.)
If the free length is not as specified, replace the spring.



(b) Using a steel square, measure the deviation of the valve spring.
Maximum deviation:
1.6 mm (0.063 in.)
Maximum angle (reference):
2°
If the deviation is greater than the maximum, replace the spring.



(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.
Standard installed tension:
149 to 165 N (15.2 to 16.8 kgf, 33.5 to 37.1 lbf) at 32.5 mm (1.280 in.)
Maximum working tension:
286 to 316 N (29.1 to 32.2 kgf, 64.2 to 71.0 lbf) at 23.9 mm (0.941 in.)
If the installed tension is not as specified, replace the valve spring.



8. INSPECT VALVE GUIDE BUSH OIL CLEARANCE

(a) Using a caliper gauge, measure the inside diameter of the guide bush.
Bush inside diameter:
5.010 to 5.030 mm (0.1972 to 0.1980 in.)

(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.
Standard oil clearance

Guide Bush	Specified Condition
Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust	0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum oil clearance

Guide Bush	Specified Condition
Intake	0.08 mm (0.0032 in.)
Exhaust	0.10 mm (0.0039 in.)

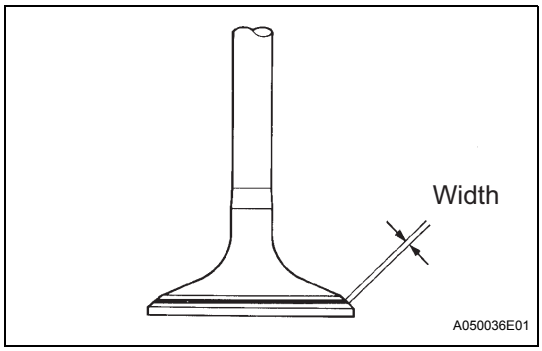
If the clearance is greater than the maximum, replace the valve and guide bush (see page EM-53).

9. INSPECT INTAKE VALVE SEAT

(a) Apply a light coat of Prussian blue (or white lead) to the valve face.

(b) Lightly press the valve against the seat.

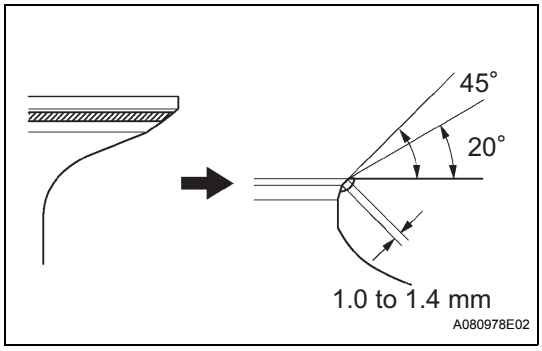
EM



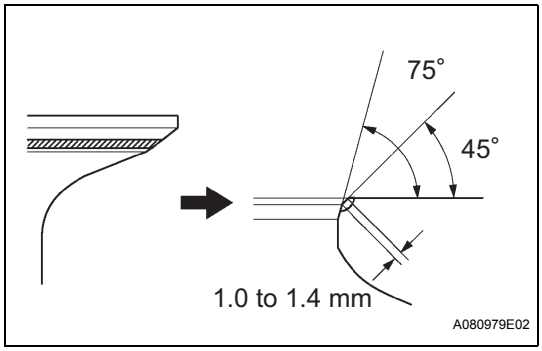
(c) Check the valve face and seat according to the following procedure.
  (1) If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
  (2) If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
  (3) Check that the seat contact is in the middle of the valve face with the width between 1.0 to 1.4 mm (0.039 to 0.055 in.).

10. REPAIR INTAKE VALVE SEAT

(a) If the seating is too high on the valve face, use 20° and 45° cutters to correct the seat.

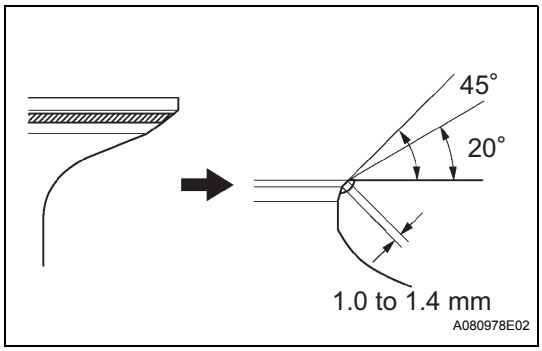


(b) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.
(c) Hand-lab the valve and valve seat with an abrasive compound.
(d) Recheck the valve seating position.

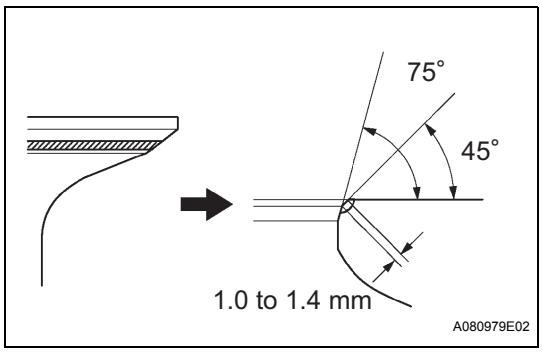


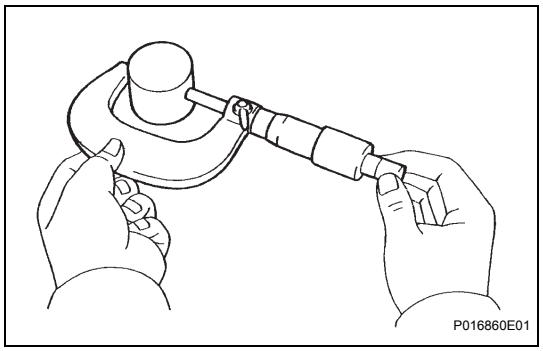
11. REPAIR EXHAUST VALVE SEAT

(a) If the seating is too high on the valve face, use 20° and 45° cutters to correct the seat.



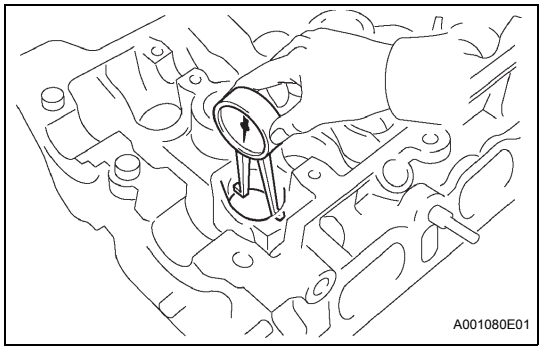
(b) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.
(c) Hand-lap the valve and valve seat with an abrasive compound.
(d) Recheck the valve seating position.





12. INSPECT VALVE LIFTER

(a) Using a micrometer, measure the lifter diameter.
Standard lifter diameter:
30.966 to 30.976 mm (1.2191 to 1.2195 in.)



13. INSPECT VALVE LIFTER OIL CLEARANCE

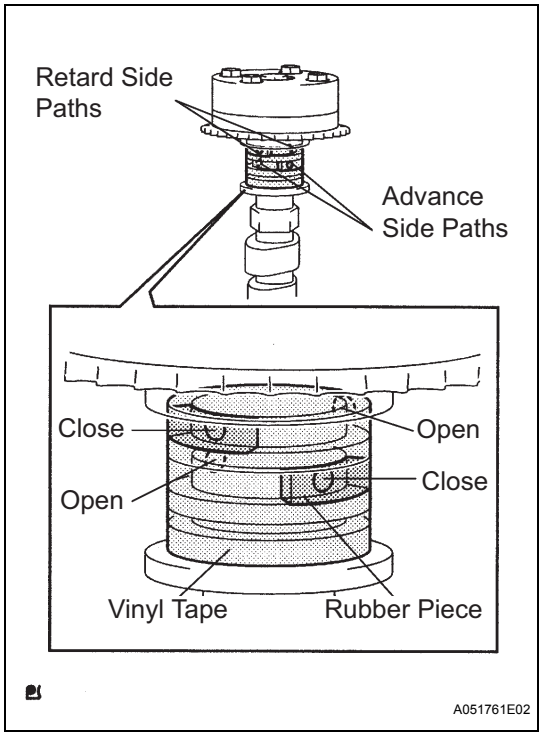
(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Standard lifter bore diameter:
31.000 to 31.025 mm (1.2205 to 1.2215 in.)

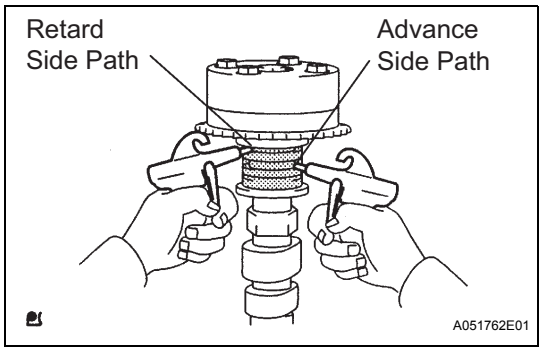
(b) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.024 to 0.059 mm (0.0009 to 0.0023 in.)
Maximum oil clearance:
0.1 mm (0.0039 in.)
If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder head.

14. INSPECT CAMSHAFT TIMING GEAR OPERATION

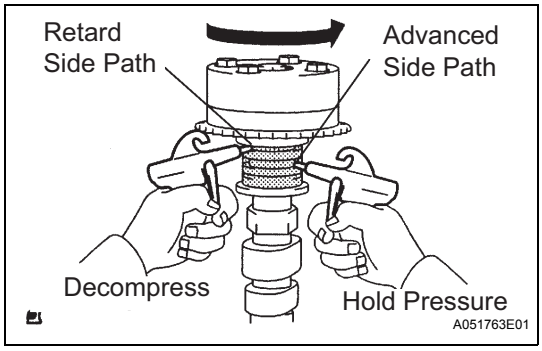
(a) Check the lock of the camshaft timing gear.
(1) Clamp the camshaft in a vise, and check that the camshaft timing gear is locked.
NOTICE:
Be careful not to damage the camshaft.

(b) Release the lock pin.
(1) Cover the 4 oil paths of the cam journal with tape as shown in the illustration.
HINT:
One of the 2 grooves located on the cam journal is for retarding cam timing (upper) and the other is for advancing cam timing (lower). Each groove has 2 oil paths. Plug one of the oil paths for each groove with rubber pieces before wrapping the cam journal with the tape.
(2) Puncture the tape for the advance oil path and for the retard oil path on the opposite side from the advance oil path.





(3) Apply air pressure into the 2 broken tape paths (the advance side path and retard side path) with about 150 kPa (1.5 kgf/cm^2, 22 psi).
NOTICE:
Cover the paths with cloth or equivalent to prevent oil from splashing.



(4) Confirm if the camshaft timing gear assembly revolves in the timing advance direction when reducing the air pressure of the timing retard path.
HINT:
The lock pin is released, and the camshaft timing gear revolves in the advance direction.

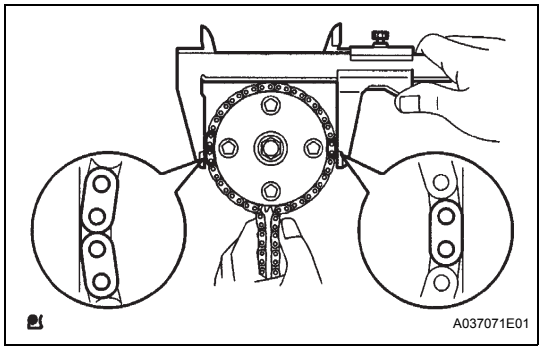
(5) When the camshaft timing gear reaches the most advanced position, remove the air pressure of the timing retard side path, and then release the air pressure of the timing advance side path.
NOTICE:
The camshaft timing gear assembly occasionally shifts to the retard side abruptly if the air compression of the advanced side path is released first. This often results in the breakage of the lock pin.

(c) Check smooth revolution.
(1) Except the position where the lock pin meets at the most retarded angle, let the valve timing controller assembly turn back and forth. Check the movable range and that there is no disturbance.
Standard condition:
Smooth movable range is about 22.5°
NOTICE:
Be sure to perform this check by hand, instead of air pressure.

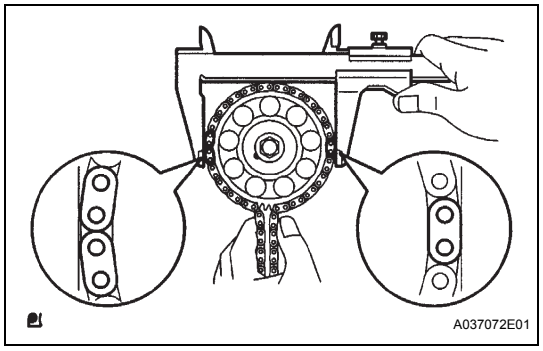
(d) Check the lock in the most retarded position.
(1) Confirm that the camshaft timing gear assembly is locked at the most retarded position.

15. INSPECT CAMSHAFT TIMING GEAR

(a) Wrap the chain around the timing sprocket.
(b) Using a vernier caliper, measure the diameter of the timing gear with the chain.
Minimum gear diameter (w/ chain):
96.2 mm (3.787 in.)
If the diameter is less than the minimum, replace the sprocket.



NOTICE:
Vernier caliper must come into contact with the chain link for measuring.



16. INSPECT CAMSHAFT TIMING SPROCKET

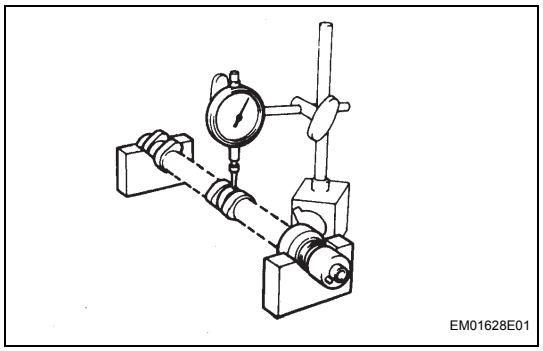
(a) Wrap the chain around the timing sprocket.

(b) Using a vernier caliper, measure the diameter of the timing gear with the chain.

Minimum gear diameter (w/ chain):
96.2 mm (3.787 in.)

If the diameter is less than the minimum, replace the sprocket.

NOTICE:
Vernier caliper must come into contact with the chain link for measuring.



17. INSPECT CAMSHAFT

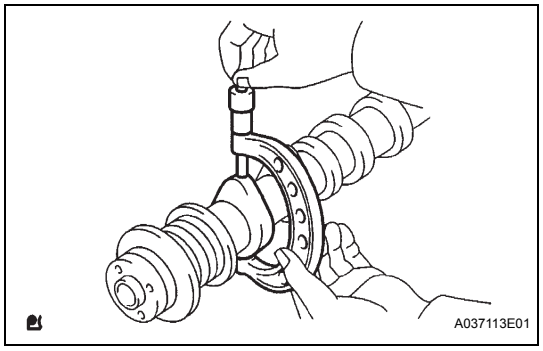
(a) Inspect the camshaft for runout.

(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:
0.03 mm (0.0012 in.)

If the circle runout is greater than the maximum, replace the camshaft.



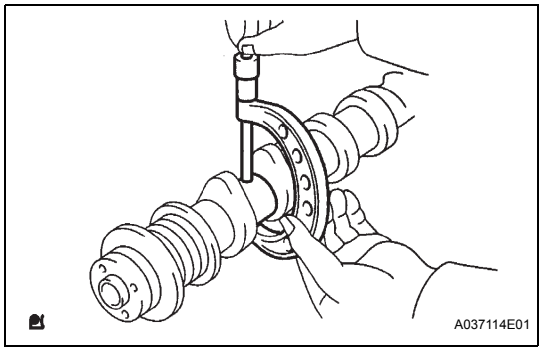
(b) Inspect the cam lobes.

(1) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:
44.617 to 44.717 mm (1.7566 to 1.7605 in.)

Minimum cam lobe height:
44.47 mm (1.7508 in.)

If the cam lobe height is less than the minimum, replace the camshaft.



(c) Inspect the camshaft journals.

(1) Using a micrometer, measure the journal diameter.

Standard journal diameter

Journal	Specified Condition
No.1 journal	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
Other journals	22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the journal diameter is not as specified, check the oil clearance.

18. INSPECT NO. 2 CAMSHAFT

(a) Inspect the camshaft for runout.

(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.03 mm (0.0012 in.)
If the circle runout is greater than the maximum, replace the camshaft.

(b) Inspect the cam lobes.
(1) Using a micrometer, measure the cam lobe height.
Standard cam lobe height:
44.666 to 44.766 (1.7585 to 1.7624 in.)
Minimum cam lobe height:
44.52 mm (1.7528 in.)
If the cam lobe height is less than the minimum, replace the camshaft.

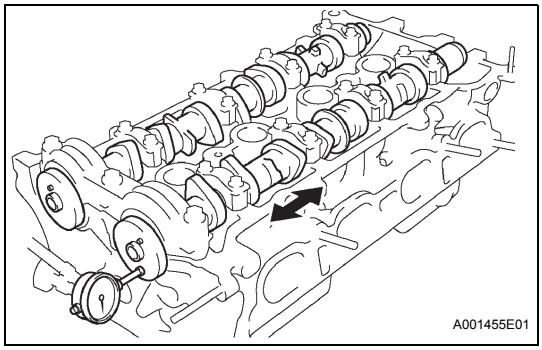
(c) Inspect the camshaft journals.
(1) Using a micrometer, measure the journal diameter.
Standard journal diameter

Journal	Specified Condition
No.1 journal	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
Other journals	22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the journal diameter is not as specified, check the oil clearance.

19. INSPECT CAMSHAFT THRUST CLEARANCE

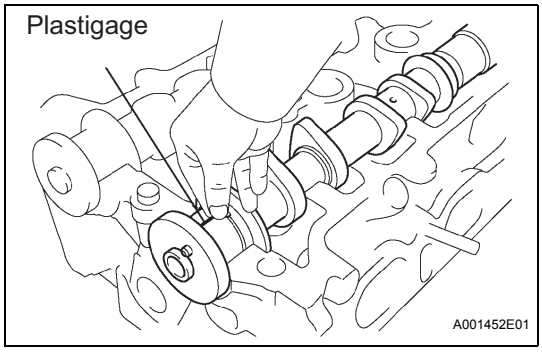
(a) Install the camshafts.


A001455E01

(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Maximum thrust clearance:
0.11 mm (0.0043 in.)
If the thrust clearance is greater than the maximum, replace the camshaft. If necessary, replace the bearing caps and the cylinder head together.

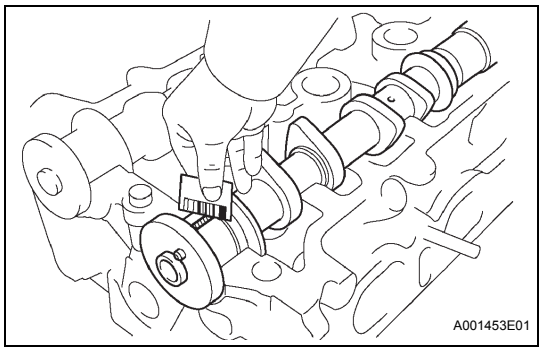
20. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the bearing caps and the camshaft journals.
(b) Place the camshafts on the cylinder head.



A001452E01

(c) Lay a strip of Plastigage across each of the camshaft journals.
(d) Install the bearing caps.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf) for No. 1
13 N*m (129 kgf*cm, 9 ft.*lbf) for No. 2
NOTICE:
Do not turn the camshaft.
(e) Remove the bearing caps.

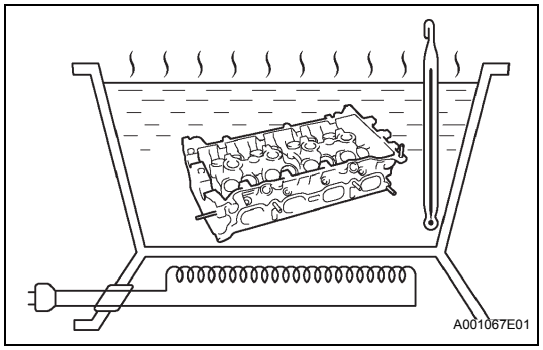


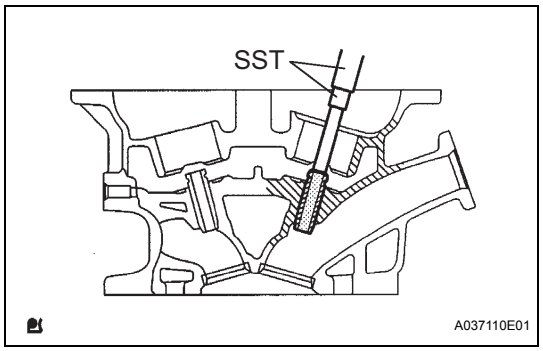
(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Maximum oil clearance:
0.115 mm (0.0045 in.)
If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the bearing caps and the cylinder head together.
NOTICE:
Completely remove the Plastigage.

REPLACEMENT

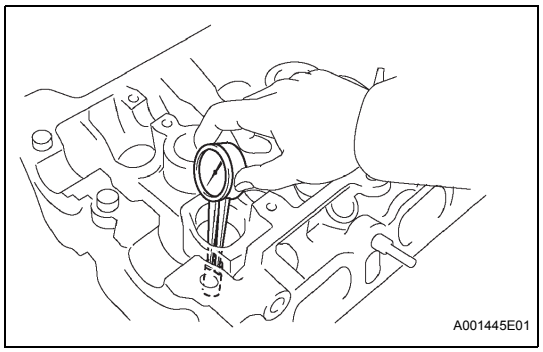
1. REPLACE INTAKE VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).





(b) Using SST and a hammer, tap out the guide bush.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

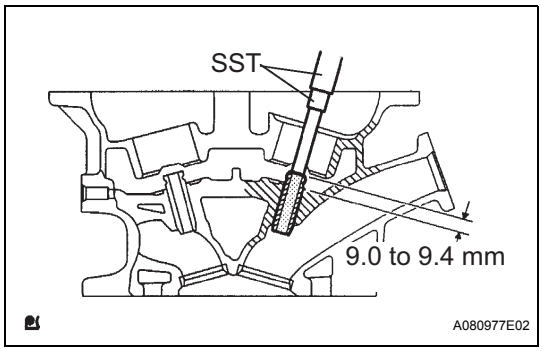


(c) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Standard bore diameter

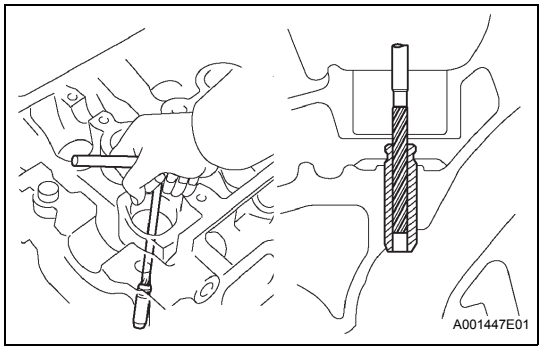
Bush size	Specified Condition
STD	9.685 to 9.706 mm (0.3813 to 0.3821 in.)
O/S 0.05	9.735 to 9.756 mm (0.3833 to 0.3841 in.)

If the bush bore diameter of the cylinder head is greater than 9.706 mm (0.3821 in.), machine the bush bore to a dimension of 9.735 to 9.755 mm (0.3833 to 0.3841 in.).
If the bush bore diameter of the cylinder head is greater than 9.756 mm (0.3841 in.), replace the cylinder head.

(d) Heat the cylinder head to 80 to 100°C (176 to 212°F).



(e) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Standard protrusion height:
9.0 to 9.4 mm (0.354 to 0.370 in.)



(f) Using a sharp 5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and the valve stem.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)

2. REPLACE EXHAUST VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Using SST and a hammer, tap out the guide bush.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

(c) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Standard bore diameter

Bush size	Specified Condition
STD	9.685 to 9.706 mm (0.3813 to 0.3821 in.)
O/S 0.05	9.735 to 9.756 mm (0.3833 to 0.3841 in.)

If the bush bore diameter of the cylinder head is greater than 9.706 mm (0.3821 in.), machine the bush bore to a dimension of 9.735 to 9.755 mm (0.3833 to 0.3841 in.).
If the bush bore diameter of the cylinder head is greater than 9.756 mm (0.3841 in.), replace the cylinder head.

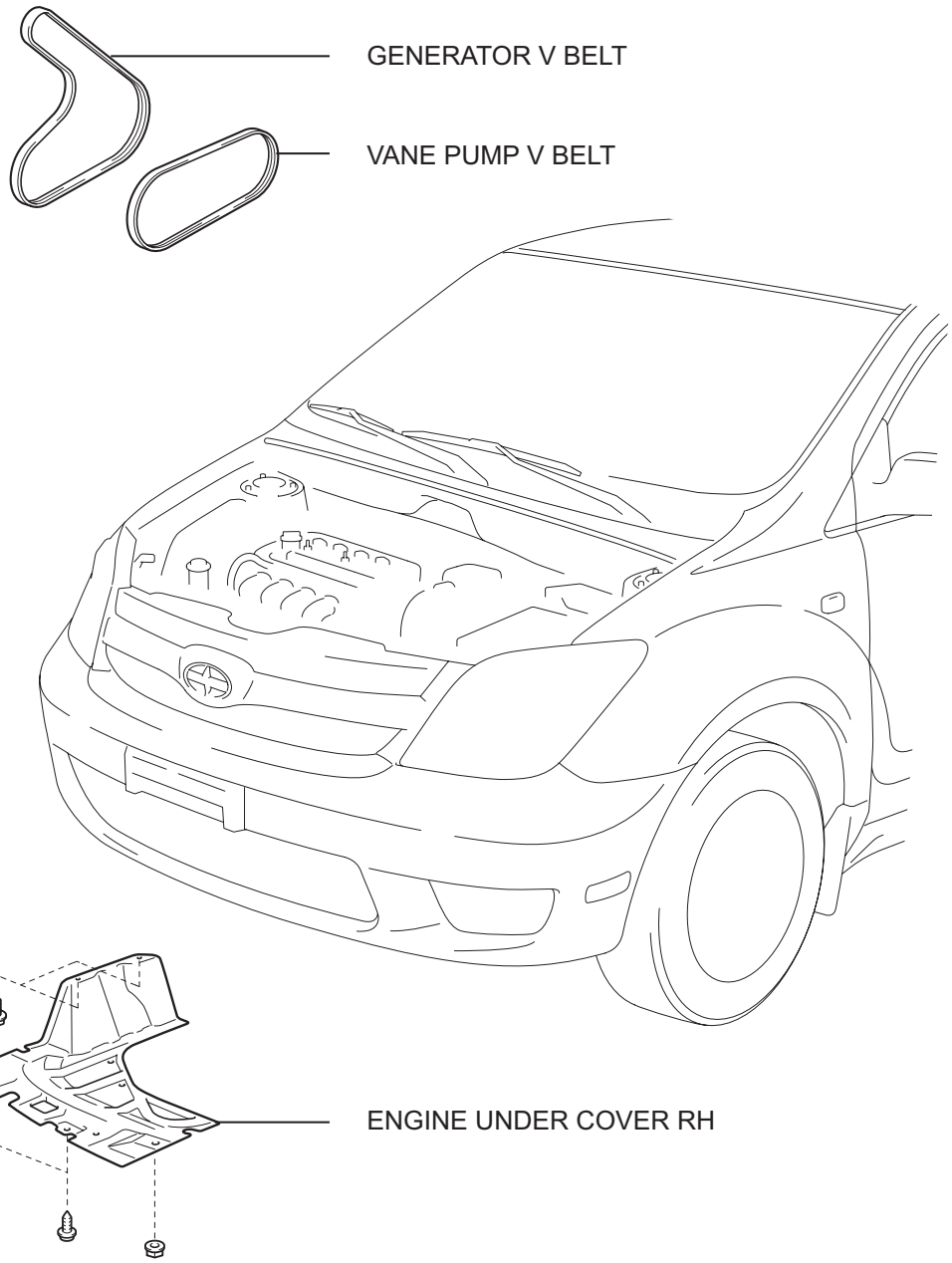
(d) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(e) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Standard protrusion height:
9.0 to 9.4 mm (0.354 to 0.370 in.)

(f) Using a sharp 5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.
Standard oil clearance:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)

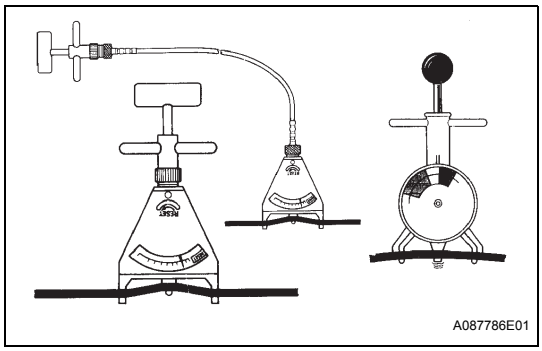
DRIVE BELT

COMPONENTS



T

A117489E01

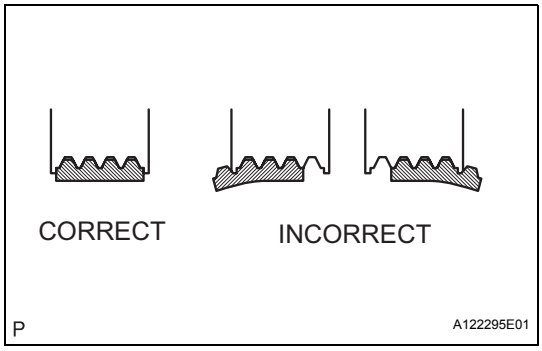


ON-VEHICLE INSPECTION

1. CHECK DRIVE BELT TENSION

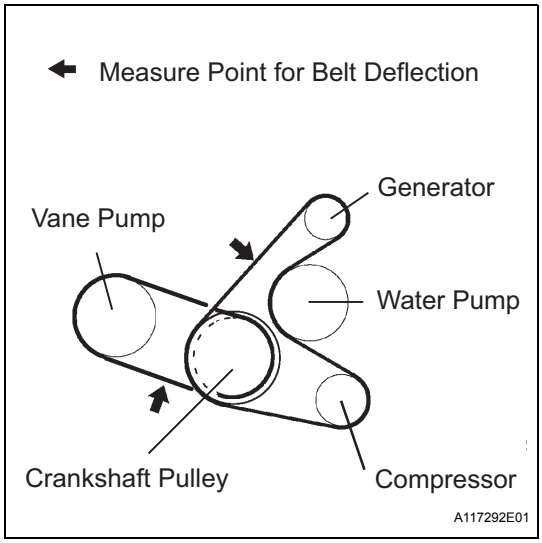
(a) Using a belt tension gauge, measure the belt tension.
Belt tension gauge:
DENSO BTG- 20 (95506-00020)
Borroughs No. BT-33-73F
Standard drive belt tension

Item	Specified Condition
Crankshaft pulley to cooler compressor or generator	New belt: 121 to 143 lbf
	Used belt: 55 to 88 lbf
Vane pump	New belt: 99 to 121 lbf
	Used belt: 55 to 77 lbf



HINT:
- After installing the drive belt, check that it fits properly in the ribbed grooves. Check with your hands to confirm that the belt has not slipped out of the groove on the bottom of the crankshaft pulley.
- A "new belt" is a belt which has been used less than 5 minutes on a running engine.
- A "used belt" is a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approximately 5 minutes and then recheck the tension.

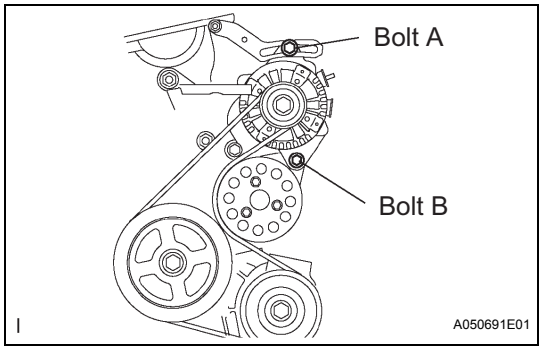
(b) Reference:
Check drive belt deflection.
(1) When not using a belt tension gauge, measure the belt deflection.
Pressing force: 98 N (10 kgf, 22 lbf)
Standard belt deflection



Item	Specified Condition
Belt (for water pump and generator)	New belt: 7.0 to 8.5 mm (0.28 to 0.33 in.)
	Used belt: 11.0 to 13.0 mm (0.43 to 0.51 in.)
Belt (for vane pump)	New belt: 8.0 to 10.0 mm (0.31 to 0.39 in.)
	Used belt: 11.0 to 13.0 mm (0.43 to 0.51 in.)

NOTICE:
- **Check the drive belt deflection at the specified point.**
- **When installing a new belt, set its tension value as specified.**
- **When inspecting a belt which has been used over 5 minutes, apply the specification of "Used Belt".**
- **When reinstalling a belt which has been used over 5 minutes, adjust its deflection and tension to the intermediate value of each specification of "Used Belt".**

- **Belt tension and deflection should be checked after 2 revolutions of engine cranking.**
- **When using a belt tension gauge, confirm the accuracy by using a master gauge first.**



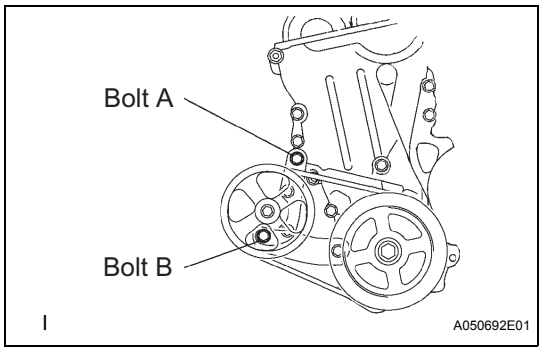
REMOVAL

1. REMOVE GENERATOR V BELT

(a) Loosen bolts A and B.

(b) Release the belt tension and remove the belt.

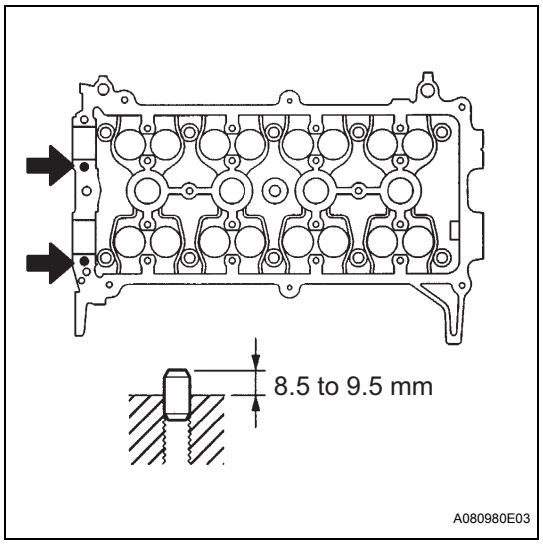
2. REMOVE ENGINE UNDER COVER RH



3. REMOVE VANE PUMP V BELT

(a) Loosen bolts A and B.

(b) Release the belt tension, and remove the belt.



REASSEMBLY

1. INSTALL CAMSHAFT BEARING CAP SETTING RING PIN

(a) Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.

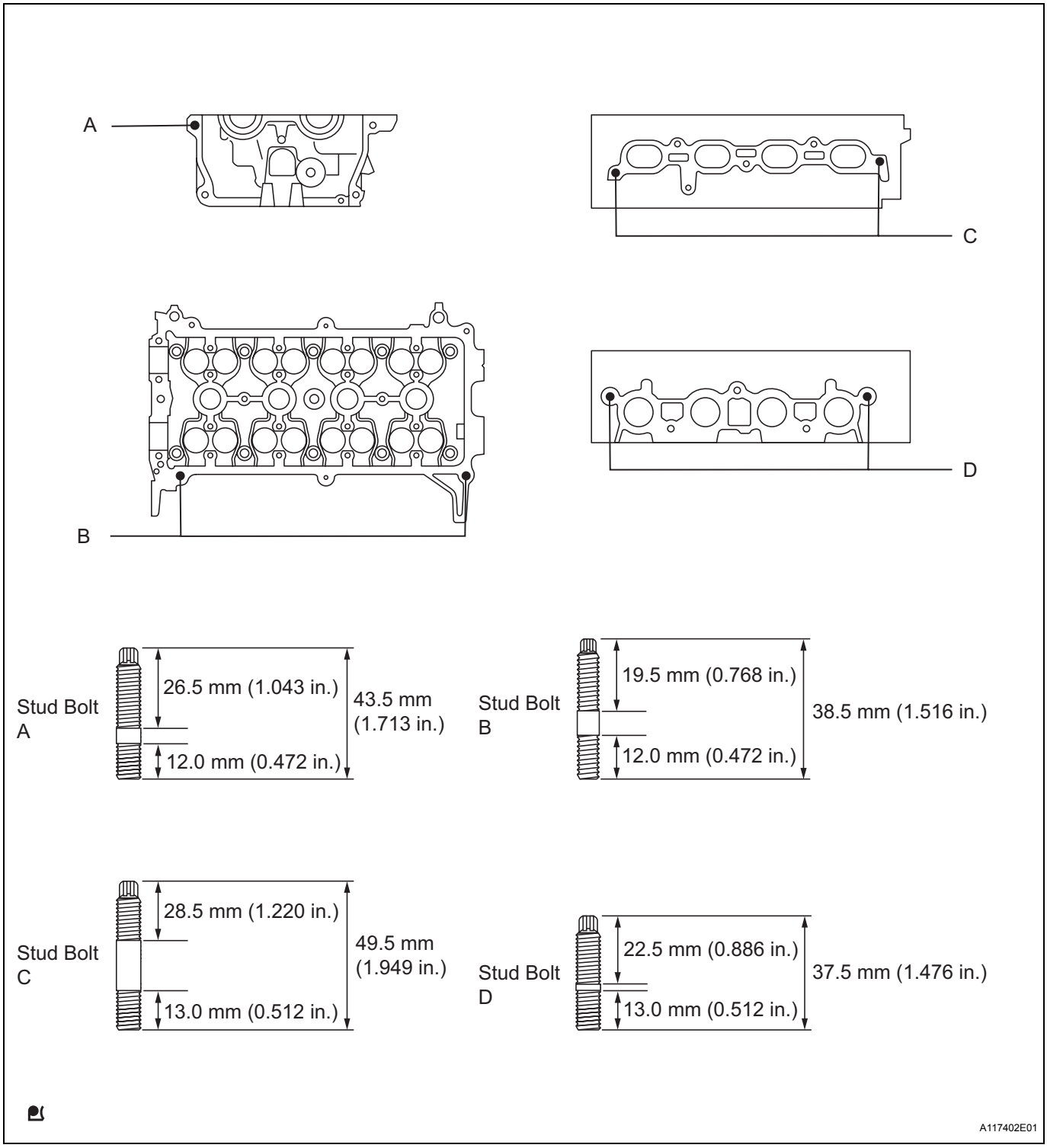
Standard protrusion height:

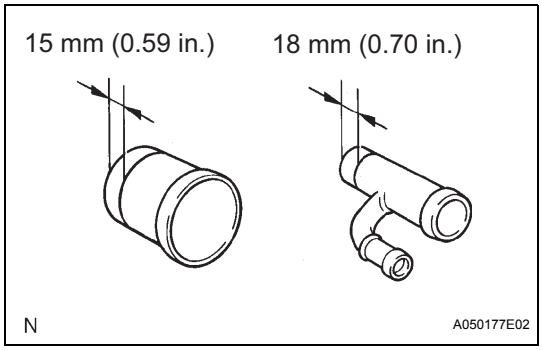
8.5 to 9.5 mm (0.335 to 0.374 in.)

2. INSTALL STUD BOLT

(a) Using E5 and E7 "torx" sockets, install the 7 stud bolts.

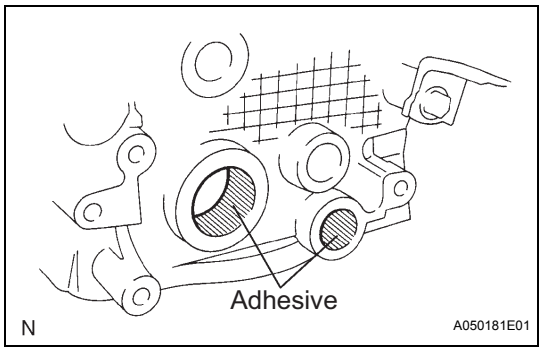
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf) for bolt A
4.0 N*m (41 kgf*cm, 35 in.*lbf) for bolt B
10 N*m (102 kgf*cm, 7.4 ft.*lbf) for bolt C
9.0 N*m (92 kgf*cm, 80 in.*lbf) for bolt D



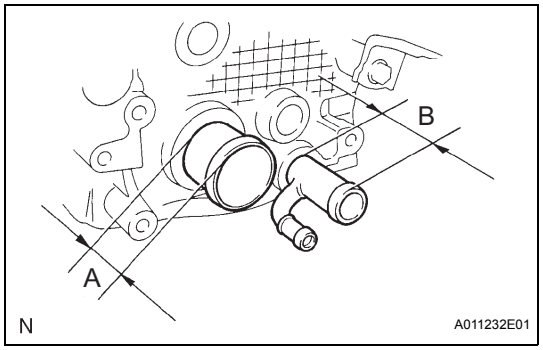


3. INSTALL UNION

(a) Mark the standard position away from the edge onto 2 new water hose unions as shown in the illustration.



(b) Apply adhesive to the water hose union hole of the cylinder head.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent



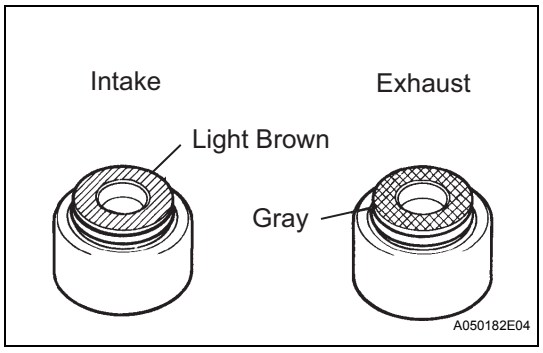
(c) Using a press, press in the water hose union until the marks come to the same level as the cylinder head surface.
Standard protrusion

Union	Specified Condition
A	29 mm (1.14 in.)
B	44 mm (1.73 in.)

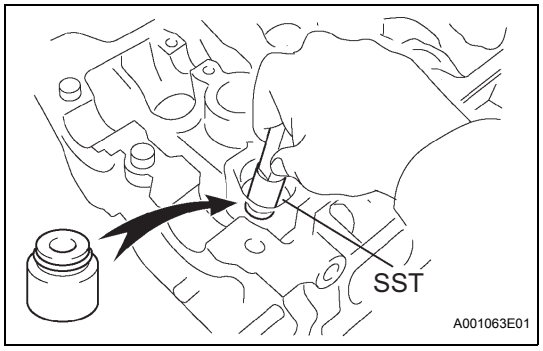
NOTICE:
- **Install the water hose union within 3 minutes of applying adhesive.**
- **Do not expose the water hose union to engine coolant for at least one hour after installation.**

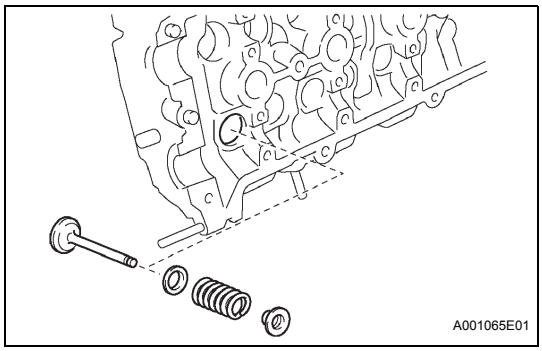
4. INSTALL VALVE STEM OIL SEAL

(a) Apply a light coat of engine oil to the valve stem.
NOTICE:
Installing the oil seals for the intake and exhaust onto the opposite valve guide bush may cause failures.
HINT:
The intake valve oil seal is light brown and the exhaust valve oil seal is gray.



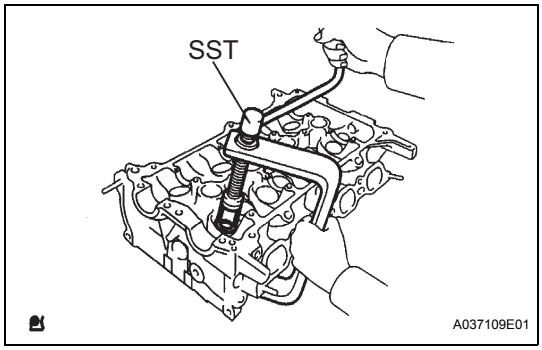
(b) Using SST, push in a new oil seal.
SST 09201-41020



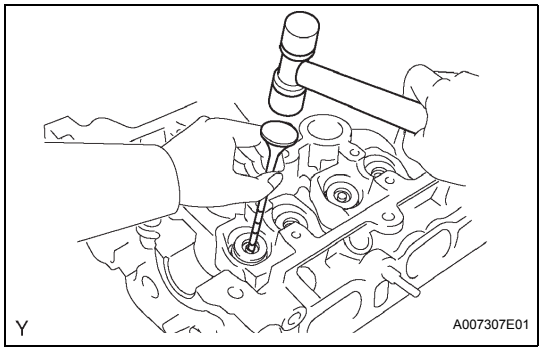


5. INSTALL INTAKE VALVE

(a) Install the valve, spring seat, valve spring and spring retainer.
NOTICE:
Install the same parts in the same combination to the original locations.



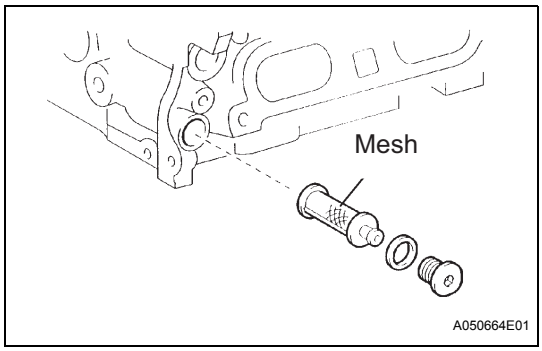
(b) Using SST, compress the valve spring and place the 2 retainer locks around the valve stem.
SST 09202-70020 (09202-00010)



(c) Using a plastic-faced hammer and the valve stem (not in use) with the tip wrapped in tape, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the valve stem tip.

6. INSTALL EXHAUST VALVE

(a) Install the valve, spring seat, valve spring, and spring retainer.
(b) Using SST, compress the valve spring and place the 2 retainer locks around the valve stem.
SST 09202-70020 (09202-00010)
(c) Using a plastic-faced hammer and the valve stem (not in use) with the tip wrapped in tape, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the valve stem tip.

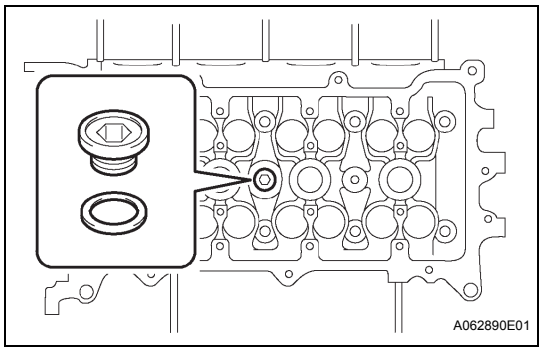


7. INSTALL OIL CONTROL VALVE FILTER

(a) Using an 8 mm hexagon wrench, install the filter with a new gasket and the plug.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

8. INSTALL VALVE LIFTER

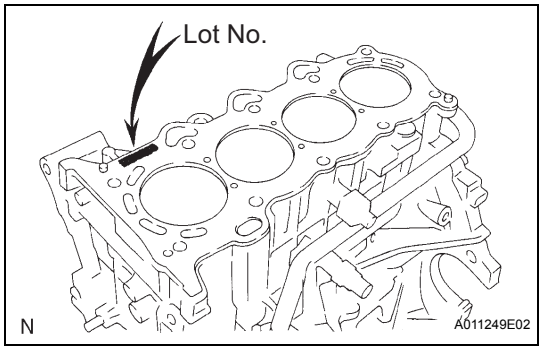
(a) Apply a light coat of engine oil to the valve lifter.
(b) Install the valve lifter.
(c) Check that the valve lifter rotates smoothly by hand.



9. INSTALL NO. 1 TAPER SCREW PLUG

(a) Using a 10 mm hexagon wrench, install the taper screw plug with a new gasket.
Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)

INSTALLATION

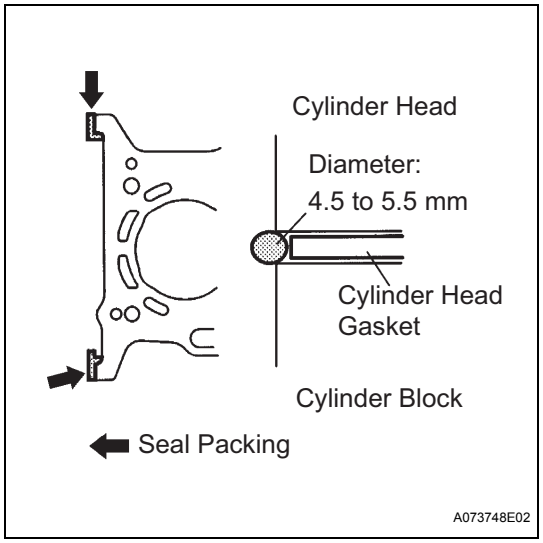


1. INSTALL CYLINDER HEAD GASKET

(a) Place a new cylinder head gasket on the cylinder block with the Lot No. stamp facing upward.
NOTICE:
- **Remove any oil from the contact surface.**
- **Be careful of the mounting orientation.**
- **Place the cylinder head on the gasket gently so as not to damage the gasket at the bottom part of the head.**

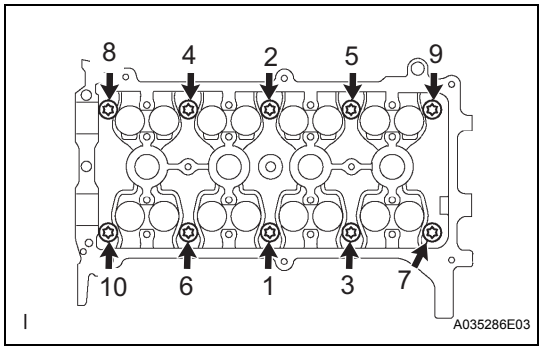
2. INSTALL CYLINDER HEAD

HINT:
The cylinder head bolts are tightened in 2 successive steps.

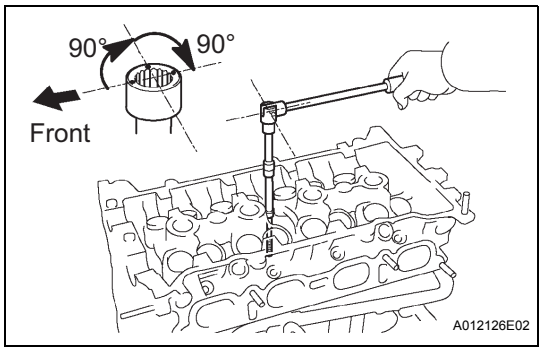


(a) Apply seal packing as shown in the illustration.
Seal packing:
Part No. 08826-00100
Standard seal diameter:
4.5 to 5.5 mm (0.177 to 0.217 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the cylinder head within 3 minutes of applying seal packing.**

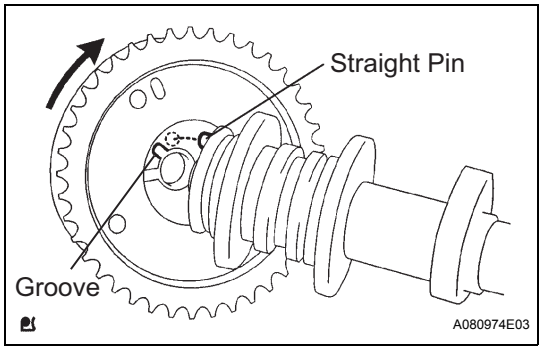
(b) Apply a light coat of engine oil to the threads of the cylinder head bolts.



(c) Using several steps, install and tighten the 10 cylinder head bolts and plate washers uniformly with an 8 mm bi-hexagon wrench in the sequence shown in the illustration.
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)

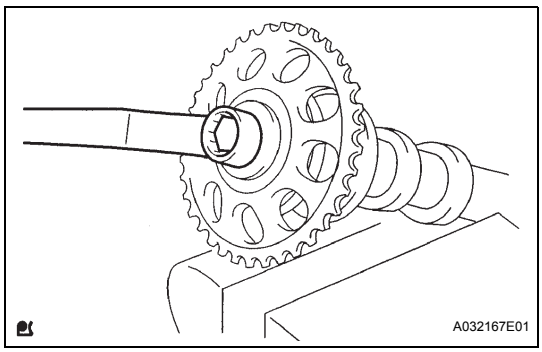


(d) Mark the front of the cylinder head bolt with paint.
(e) Retighten the cylinder head bolts by an additional 90° and then another additional 90°, as shown in the illustration.
(f) Check that the paint mark is now 180° opposite to the front.



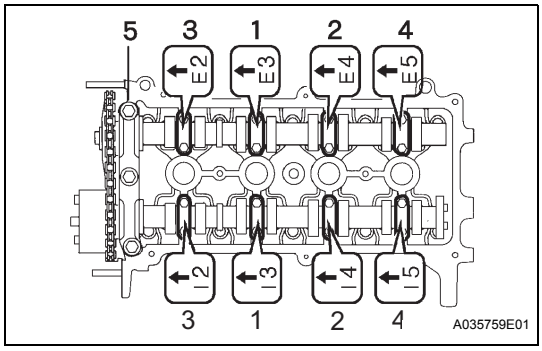
3. INSTALL CAMSHAFT TIMING GEAR

(a) Put the camshaft timing gear assembly and the camshaft together with the straight pin off the groove, as shown in the illustration.
(b) Turn the camshaft timing gear assembly clockwise while pushing it lightly towards the camshaft. Push further at the position where the pin fits into the groove.
NOTICE:
Be careful not to turn the camshaft timing gear to the retard angle (to the right).
(c) Check that there is no clearance between the gear fringe and camshaft.
(d) Tighten the flange bolt with the camshaft timing gear fixed.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)
(e) Check that the camshaft timing gear assembly can move to the retard angle (to the right) and is locked in the most retarded position.



4. INSTALL CAMSHAFT TIMING SPROCKET

(a) Clamp the camshaft in a vise.
(b) Align the knock pin hole of the camshaft timing sprocket with the knock pin of the camshaft, and install the camshaft timing sprocket.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)
NOTICE:
Be careful not to damage the camshaft.

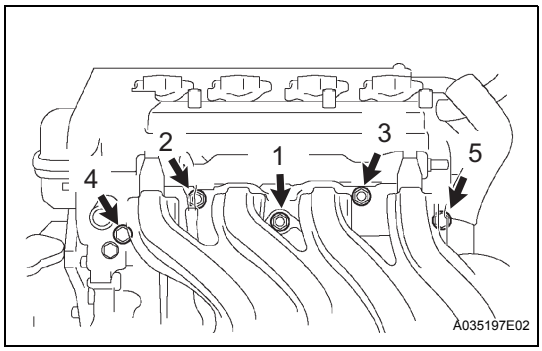


5. INSTALL CAMSHAFT

(a) Apply a light coat of engine oil to the camshaft journals.
(b) Place the camshaft on the cylinder head with the timing mark on the camshaft timing gear facing upward.
(c) Examine the front marks and numbers, and tighten the bolts in the sequence shown in the illustration.
Torque: 13 N*m (129 kgf*cm, 9 ft.*lbf)
NOTICE:
Tighten each bolt uniformly, keeping the camshaft level.

(d) Install the No. 1 bearing cap.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

6. **INSTALL FUEL INJECTOR (See page EM-121)**
7. **INSTALL FUEL DELIVERY PIPE (See page EM-121)**
8. **INSTALL CHAIN (See page EM-28)**
9. **INSTALL OIL PUMP SEAL (See page EM-106)**
10. **INSTALL TIMING CHAIN COVER (See page EM-118)**
11. **INSTALL WATER PUMP (See page EM-120)**
12. **INSTALL ENGINE MOUNTING BRACKET RH (See page EM-29)**
13. **INSTALL ENGINE MOUNTING INSULATOR RH (See page EM-30)**
14. **INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page EM-30)**
15. **INSTALL CRANKSHAFT POSITION SENSOR (See page ES-339)**
16. **INSTALL WATER PUMP PULLEY (See page EM-121)**
17. **INSTALL CRANKSHAFT PULLEY (See page EM-30)**
18. **INSTALL CYLINDER HEAD COVER (See page EM-30)**
19. **INSTALL IGNITION COIL (See page EM-31)**
20. **INSTALL NO. 2 CYLINDER HEAD COVER (See page EM-31)**
21. **INSTALL GENERATOR (See page CH-15)**
22. **INSTALL VANE PUMP V BELT (See page EM-7)**
23. **INSTALL GENERATOR V BELT (See page EM-7)**
24. **ADJUST GENERATOR V BELT (See page EM-7)**
25. **ADJUST VANE PUMP V BELT (See page EM-7)**
26. **INSPECT DRIVE BELT DEFLECTION AND TENSION (See page EM-6)**
27. **INSTALL CAMSHAFT TIMING CONTROL VALVE ASSEMBLY (See page EM-122)**
28. **CONNECT NO. 2 VENTILATION HOSE (See page EM-31)**
29. **CONNECT VENTILATION HOSE (See page EM-31)**
30. **INSTALL IGNITION COIL (See page EM-31)**
31. **INSTALL OIL DIPSTICK GUIDE**
    (a) Apply engine oil to a new O-ring and install it to the dipstick guide.
    (b) Install the dipstick guide with the bolt.
    Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

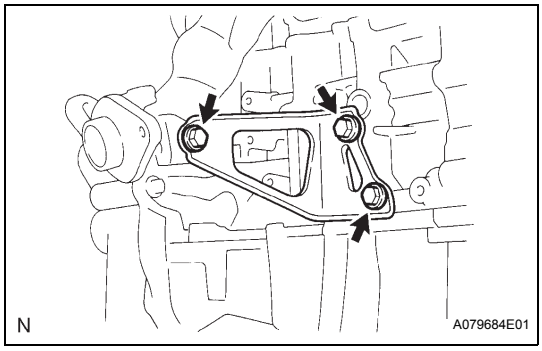


32. INSTALL INTAKE MANIFOLD

(a) Install a new gasket onto the intake manifold.

(b) Install the intake manifold with the 3 bolts and 2 nuts. Using several steps, uniformly tighten the bolts and nuts in the sequence shown in the illustration.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

33. INSTALL EXHAUST MANIFOLD (See page EM-78)

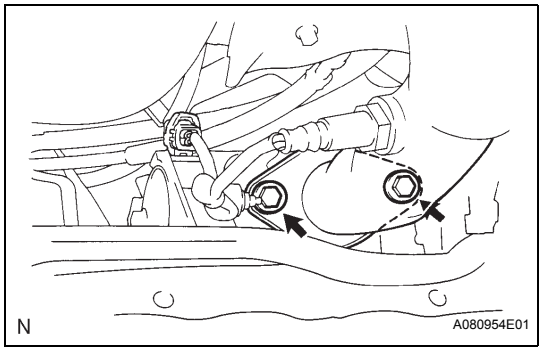


34. INSTALL MANIFOLD SUPPORT BRACKET

(a) Install the manifold support bracket with the 3 bolts.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)

35. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

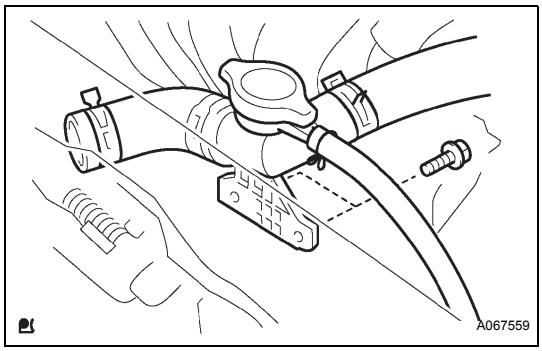
(a) Install the No. 1 exhaust manifold heat insulator with the 4 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



36. INSTALL FRONT EXHAUST PIPE

(a) Place a new gasket on the exhaust manifold.

(b) Install the 2 compression springs and 2 bolts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



37. INSTALL WATER FILLER

(a) Install the water filler with the 2 bolts.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

(b) Connect the radiator reservoir tank hose.

(c) Connect the No. 3 radiator hose.

(d) Connect the radiator inlet hose.

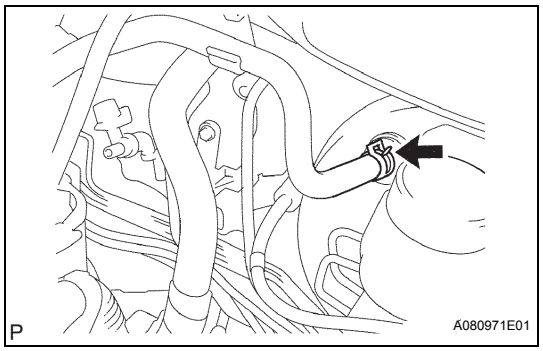
38. INSTALL NO. 1 WATER BY-PASS PIPE

(a) Install the water by-pass pipe with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

39. CONNECT RADIATOR HOSE INLET

(a) Connect the radiator hose inlet to the union.

EM



40. **CONNECT UNION TO CHECK VALVE HOSE**
    (a) Connect the union to check valve hose to the brake booster.
41. **CONNECT FUEL TUBE (See page FU-15)**
42. **INSTALL ACCELERATOR CONTROL CABLE (See page ES-348)**
43. **CONNECT ENGINE WIRE**
44. **INSTALL AIR CLEANER (See page ES-348)**
45. **INSTALL OIL PAN DRAIN PLUG**
46. **ADD ENGINE OIL (See page LU-3)**
47. **CHECK FOR ENGINE OIL LEAKS**
48. **ADD COOLANT (See page CO-5)**
49. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-7)**
50. **CHECK FOR FUEL LEAKS (See page FU-8)**
51. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
52. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

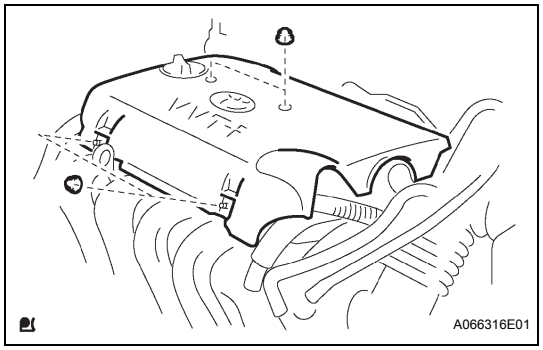
EM

VALVE CLEARANCE

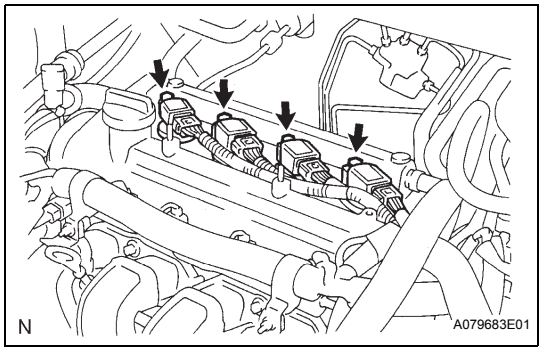
ADJUSTMENT

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

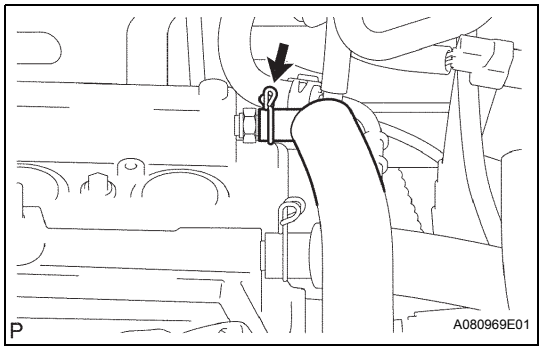
2. **REMOVE NO. 2 CYLINDER HEAD COVER**
   (a) Remove the 4 nuts and cylinder head cover.



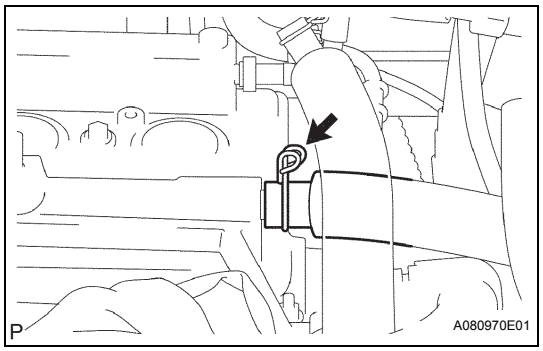
3. **REMOVE IGNITION COIL**
   (a) Remove the 4 bolts and pull out the 4 ignition coils.



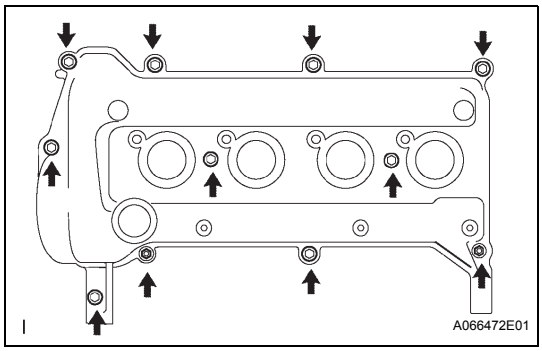
4. **DISCONNECT VENTILATION HOSE**
   (a) Disconnect the ventilation hose from the cylinder head cover.



5. **DISCONNECT NO. 2 VENTILATION HOSE**
   (a) Disconnect the ventilation hose from the cylinder head cover.



EM



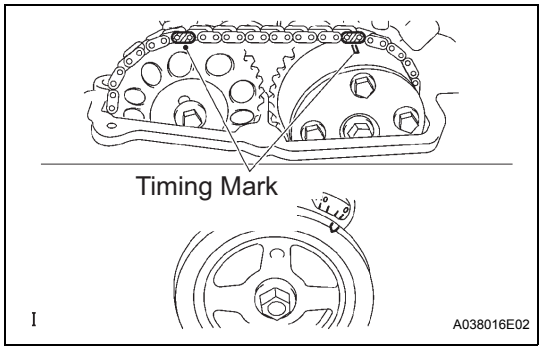
6. REMOVE CYLINDER HEAD COVER

(a) Remove the 9 bolts, 2 nuts and cylinder head cover.

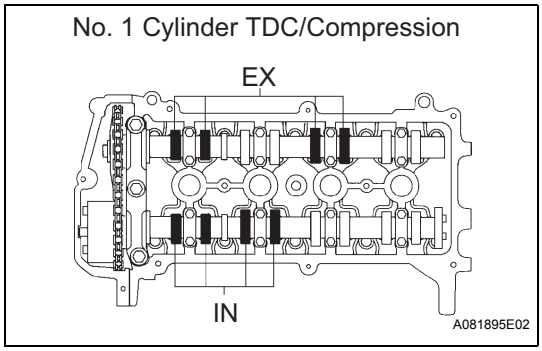
7. REMOVE ENGINE UNDER COVER RH

8. INSPECT VALVE CLEARANCE

HINT:
Inspect and adjust the valve clearance when the engine is cold.



(a) Set the No. 1 cylinder to TDC/compression.
  (1) Turn the crankshaft pulley until its timing notch and the timing mark 0 of the chain cover are aligned.
  (2) Check that both timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.
  If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.

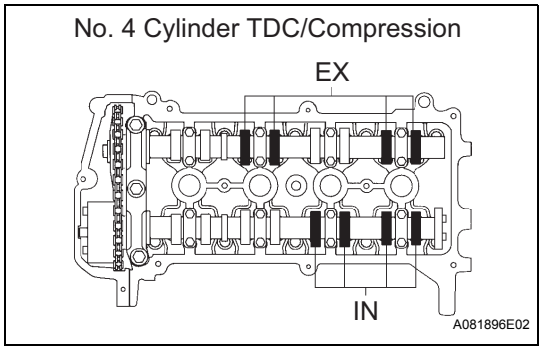


(b) Check the valves indicated in the illustration.
  (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
  Standard valve clearance (Cold)

Item	Specified Condition
Intake	0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust	0.25 to 0.35 mm (0.010 to 0.014 in.)

  (2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

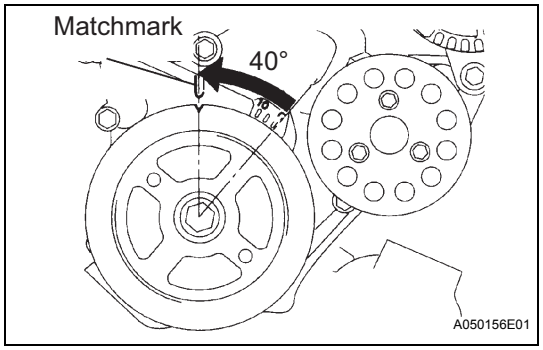
(c) Turn the crankshaft 1 complete revolution until its timing notch and the timing mark 0 of the chain cover are aligned.



(d) Check the valves indicated in the illustration.
  (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
  Standard valve clearance (Cold)

Item	Specified Condition
Intake	0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust	0.25 to 0.35 mm (0.010 to 0.014 in.)

  (2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

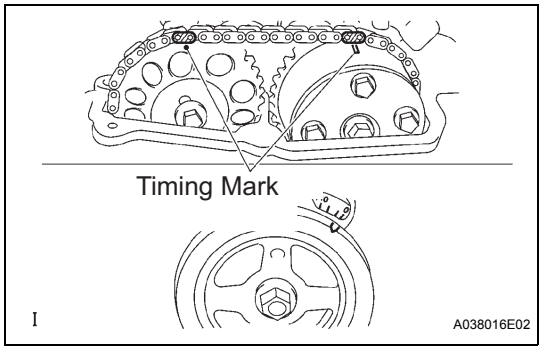


9. ADJUST VALVE CLEARANCE

(a) Rotate the crankshaft pulley.

NOTICE:

When rotating the camshaft with the timing chain removed, rotate the crankshaft damper counterclockwise 40° from the TDC and align its timing notch with the matchmark of the timing chain cover to prevent the pistons from coming into contact with the valves.

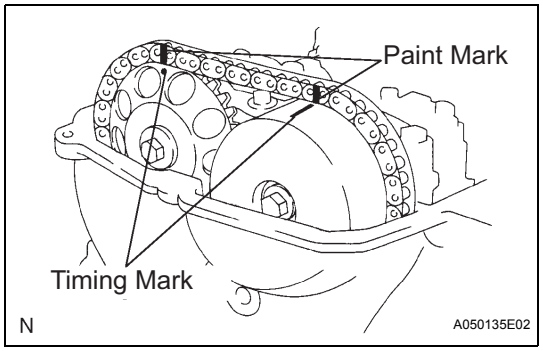


(b) Set the No. 1 cylinder to the TDC/compression.

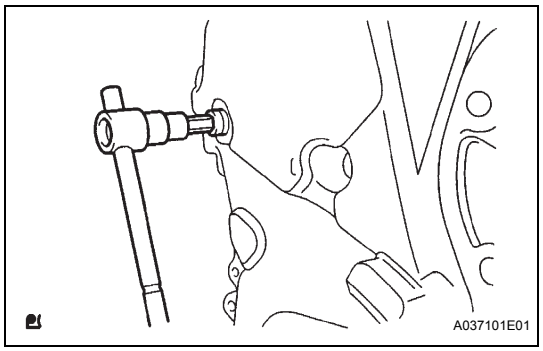
(1) Turn the crankshaft pulley until its timing notch and timing mark 0 of the chain cover are aligned.

(2) Check that both timing marks on the camshaft timing sprocket and valve timing controller assembly are facing upward as shown in the illustration.

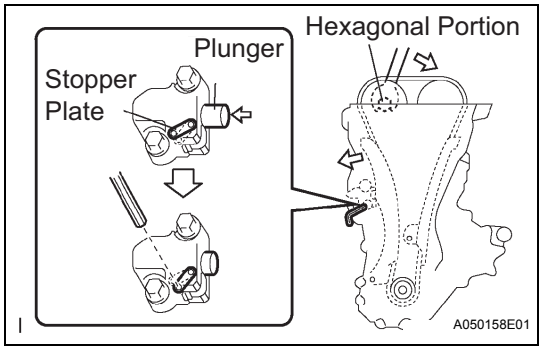
If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.



(c) Put paint marks on the timing chain where the timing marks of the camshaft timing sprocket and the camshaft timing gear are located.



(d) Using an 8 mm hexagon wrench, remove the screw plug.



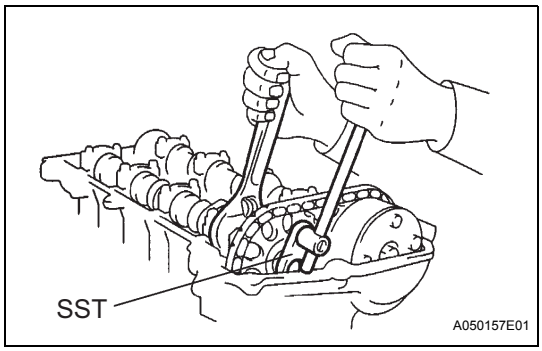
(e) Insert a screwdriver into the service hole of the chain tensioner to hold the stopper plate of the chain tensioner at an upward position.

(f) Using a wrench, rotate the No. 2 camshaft clockwise to push in the plunger of the chain tensioner.

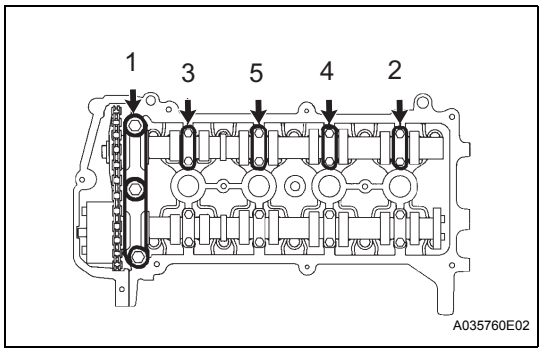
EM

(g) Remove the screwdriver from the service hole, and then align the hole of the stopper plate with the service hole and insert a 2 to 3 mm (0.08 to 0.12 in.) diameter bar into the holes to hold the stopper plate.
HINT:
- Fix the stopper plate in place using the bar while rotating the camshaft right and left slightly.
- Hold the bar with tape so that the bar does not come off.

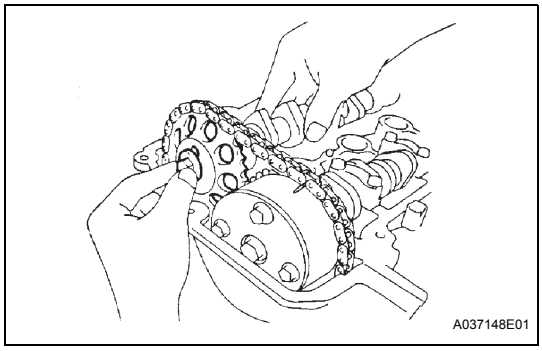
(h) Using SST, hold the camshaft with a wrench on the hexagonal lobe, and remove the bolt.
SST 09023-38400



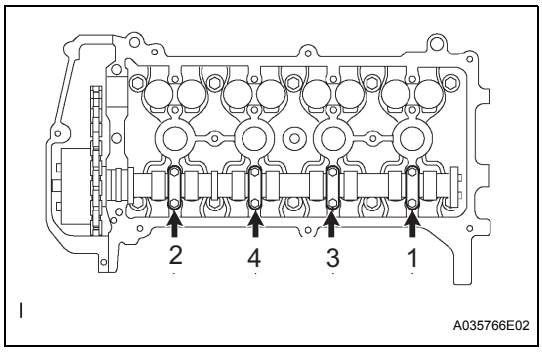
(i) Using several steps, uniformly loosen and remove the 11 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearing caps.
NOTICE:
Loosen each bolt uniformly, keeping the camshaft level.

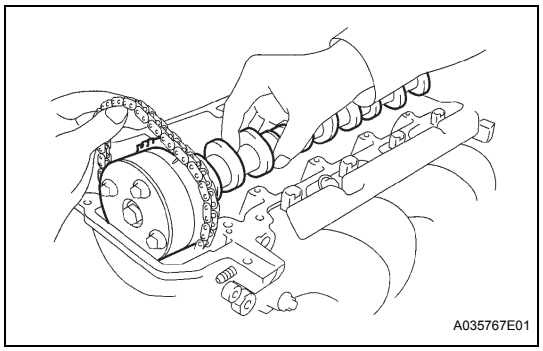


(j) Remove the flange bolt with the No. 2 camshaft lifted up. Then detach the No. 2 camshaft and the camshaft timing sprocket.

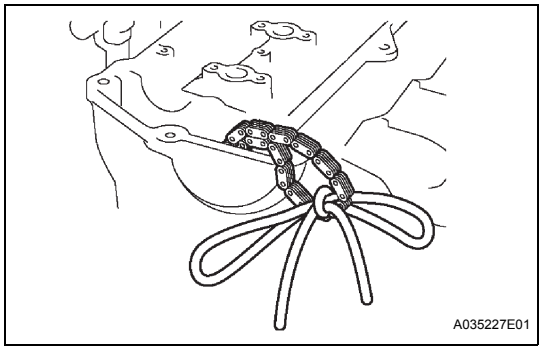


(k) Using several steps, uniformly loosen and remove the 8 bearing cap bolts in the sequence shown in the illustration. Then remove the 4 bearing caps.
NOTICE:
Loosen each bolt uniformly, keeping the camshaft level.

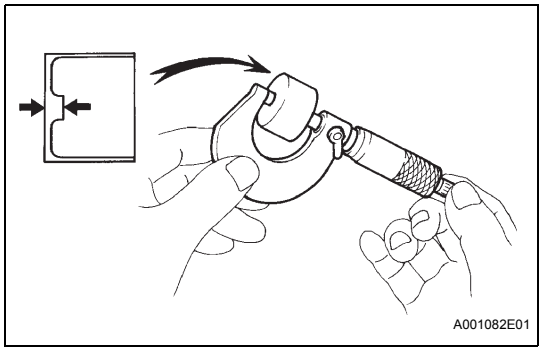




(l) Hold the timing chain by hand, and remove the camshaft and the camshaft timing gear assembly.



(m) Tie the timing chain with a string as shown in the illustration.
NOTICE:
Be careful not to drop anything inside the timing chain cover.



(n) Remove the valve lifters.
(o) Using a micrometer, measure the thickness of the removed lifter.
(p) Calculate the thickness of a new lifter so that the valve clearance comes within the specified value.

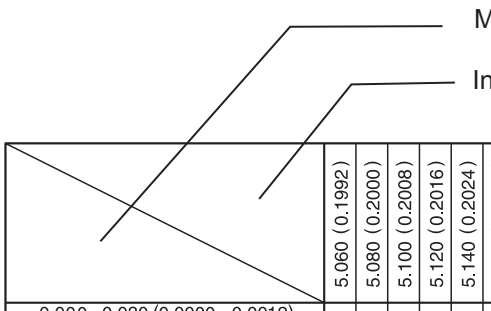
A	New lifter thickness
B	Used lifter thickness
C	Measured valve clearance

New lifter thickness

Item	Thickness
Intake	**A = B + (C - 0.20 mm (0.008 in.))**
Exhaust	**A = B + (C - 0.30 mm (0.012 in.))**

(q) Select a new lifter with the thickness as close to the calculated values as possible.
EXAMPLE: (Intake)
Measured valve clearance = 0.40 mm (0.0158 in.)
0.40 mm (0.0158 in.) - 0.20 mm (0.0079 in.) = 0.20 mm (0.0079 in.)
(Measured - Specification = Excess clearance)
Used lifter measurement = 5.25 mm (0.2067 in.)
0.20 mm (0.0079 in.) + 5.25 mm (0.2067 in.) = 5.45 mm (0.2146 in.)
(Excess clearance + Used lifter = Ideal new lifter)
Closest new lifter = 5.45 mm (0.2146 in.)
Select No. 46 lifter (5.46 mm (0.2150 in.))
HINT:
- Lifters are available in 35 sizes in increments of 0.020 mm (0.0008 in.), from 5.060 mm (0.1992 in.) to 5.740 mm (0.2260 in.).
- Refer to the New Lifter Thickness table below.

(1) Valve lifter selection chart (intake)



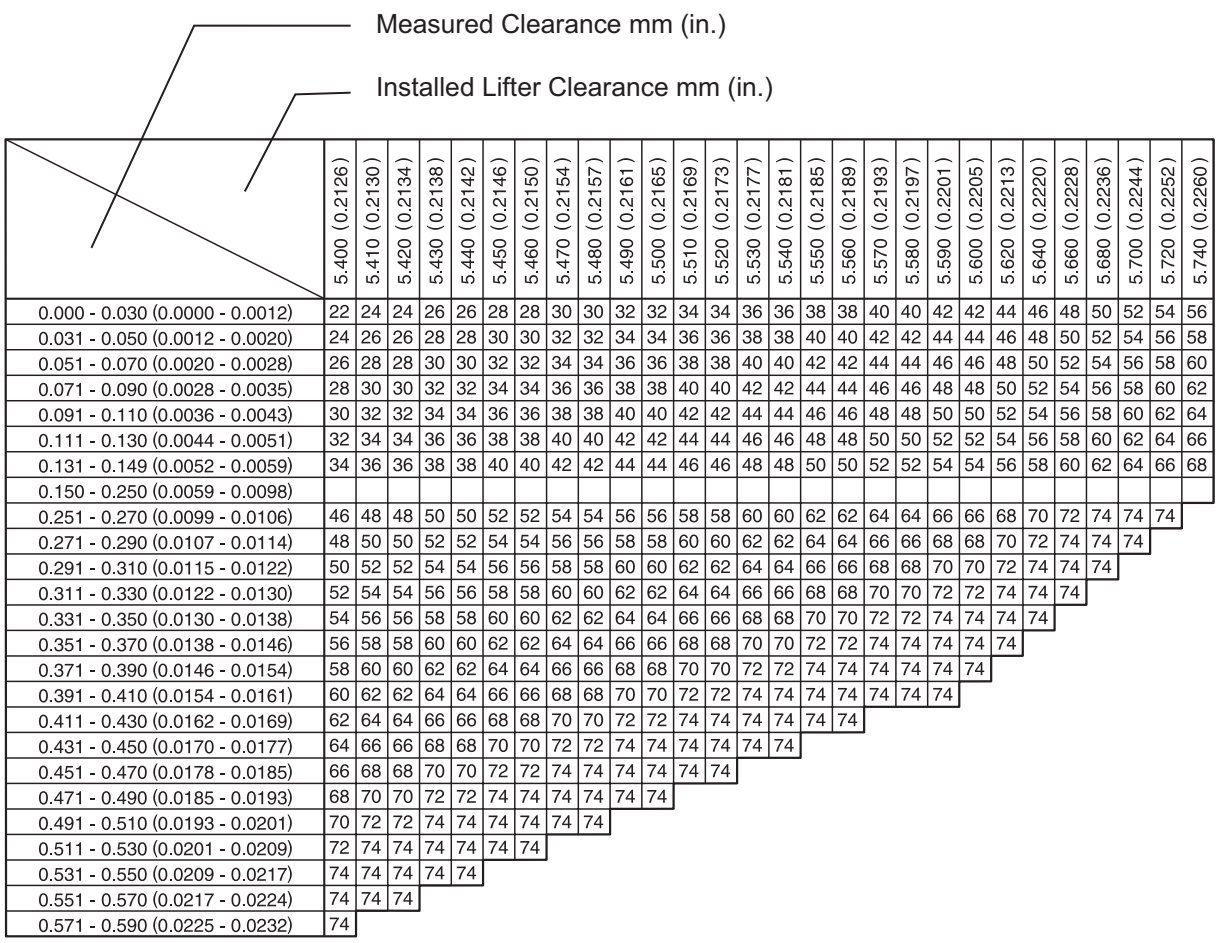
	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)
0.000 - 0.030 (0.0000 - 0.0012)											06	06	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22
0.031 - 0.050 (0.0012 - 0.0020)								06	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24
0.051 - 0.070 (0.0020 - 0.0028)							06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26
0.071 - 0.090 (0.0028 - 0.0035)						06	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28
0.091 - 0.110 (0.0036 - 0.0043)					06	06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30
0.111 - 0.130 (0.0044 - 0.0051)				06	06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32
0.131 - 0.149 (0.0052 - 0.0059)			06	06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34
0.150 - 0.250 (0.0059 - 0.0098)																											
0.251 - 0.270 (0.0099 - 0.0106)	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46
0.271 - 0.290 (0.0107 - 0.0114)	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48
0.291 - 0.310 (0.0115 - 0.0122)	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50
0.311 - 0.330 (0.0122 - 0.0130)	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52
0.331 - 0.350 (0.0130 - 0.0138)	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54
0.351 - 0.370 (0.0138 - 0.0146)	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56
0.371 - 0.390 (0.0146 - 0.0154)	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58
0.391 - 0.410 (0.0154 - 0.0161)	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60
0.411 - 0.430 (0.0162 - 0.0169)	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62
0.431 - 0.450 (0.0170 - 0.0177)	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64
0.451 - 0.470 (0.0178 - 0.0185)	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66
0.471 - 0.490 (0.0185 - 0.0193)	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68
0.491 - 0.510 (0.0193 - 0.0201)	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70
0.511 - 0.530 (0.0201 - 0.0209)	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72
0.531 - 0.550 (0.0209 - 0.0217)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74
0.551 - 0.570 (0.0217 - 0.0224)	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74
0.571 - 0.590 (0.0225 - 0.0232)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74
0.591 - 0.610 (0.0233 - 0.0240)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	
0.611 - 0.630 (0.0241 - 0.0248)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74			
0.631 - 0.650 (0.0248 - 0.0256)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74					
0.651 - 0.670 (0.0256 - 0.0264)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74	74	74	74	74							
0.671 - 0.690 (0.0264 - 0.0272)	54	56	58	60	62	64	66	68	70	70	72	72	74	74	74	74	74	74									
0.691 - 0.710 (0.0272 - 0.0280)	56	58	60	62	64	66	68	70	72	72	74	74	74	74	74	74											
0.711 - 0.730 (0.0280 - 0.0287)	58	60	62	64	66	68	70	72	74	74	74	74	74	74													
0.731 - 0.750 (0.0288 - 0.0295)	60	62	64	66	68	70	72	74	74	74	74	74															
0.751 - 0.770 (0.0296 - 0.0303)	62	64	66	68	70	72	74	74	74	74																	
0.771 - 0.790 (0.0304 - 0.0311)	64	66	68	70	72	74	74	74																			
0.791 - 0.810 (0.0311 - 0.0319)	66	68	70	72	74	74	74																				
0.811 - 0.830 (0.0319 - 0.0327)	68	70	72	74	74	74																					
0.831 - 0.850 (0.0327 - 0.0335)	70	72	74	74	74																						
0.851 - 0.870 (0.0335 - 0.0343)	72	74	74	74																							
0.871 - 0.890 (0.0343 - 0.0350)	74	74	74																								
0.891 - 0.910 (0.0351 - 0.0358)	74	74																									
0.911 - 0.930 (0.0359 - 0.0366)	74																										

EM

T

A116733E01

(2) Valve lifter selection chart (intake) (continued).



Measured Clearance mm (in.) \ Installed Lifter Clearance mm (in.)	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	5.590 (0.2201)	5.600 (0.2205)	5.620 (0.2213)	5.640 (0.2220)	5.660 (0.2228)	5.680 (0.2236)	5.700 (0.2244)	5.720 (0.2252)	5.740 (0.2260)
0.000 - 0.030 (0.0000 - 0.0012)	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56
0.031 - 0.050 (0.0012 - 0.0020)	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58
0.051 - 0.070 (0.0020 - 0.0028)	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60
0.071 - 0.090 (0.0028 - 0.0035)	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62
0.091 - 0.110 (0.0036 - 0.0043)	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64
0.111 - 0.130 (0.0044 - 0.0051)	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66
0.131 - 0.149 (0.0052 - 0.0059)	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68
0.150 - 0.250 (0.0059 - 0.0098)																												
0.251 - 0.270 (0.0099 - 0.0106)	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	70	72	74	74	74	
0.271 - 0.290 (0.0107 - 0.0114)	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74	74	74		
0.291 - 0.310 (0.0115 - 0.0122)	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	74	74	74			
0.311 - 0.330 (0.0122 - 0.0130)	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74				
0.331 - 0.350 (0.0130 - 0.0138)	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74					
0.351 - 0.370 (0.0138 - 0.0146)	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74						
0.371 - 0.390 (0.0146 - 0.0154)	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74							
0.391 - 0.410 (0.0154 - 0.0161)	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74								
0.411 - 0.430 (0.0162 - 0.0169)	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74											
0.431 - 0.450 (0.0170 - 0.0177)	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74													
0.451 - 0.470 (0.0178 - 0.0185)	66	68	68	70	70	72	72	74	74	74	74	74	74															
0.471 - 0.490 (0.0185 - 0.0193)	68	70	70	72	72	74	74	74	74	74	74																	
0.491 - 0.510 (0.0193 - 0.0201)	70	72	72	74	74	74	74	74	74																			
0.511 - 0.530 (0.0201 - 0.0209)	72	74	74	74	74	74	74																					
0.531 - 0.550 (0.0209 - 0.0217)	74	74	74	74	74																							
0.551 - 0.570 (0.0217 - 0.0224)	74	74	74																									
0.571 - 0.590 (0.0225 - 0.0232)	74																											

T A116734E01

New lifter thickness

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
06	5.060 mm (0.1992 in.)	30	5.300 mm (0.2087 in.)	54	5.540 mm (0.2181 in.)
08	5.080 mm (0.2000 in.)	32	5.320 mm (0.2094 in.)	56	5.560 mm (0.2189 in.)

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
10	5.100 mm (0.2008 in.)	34	5.340 mm (0.2102 in.)	58	5.580 mm (0.2197 in.)
12	5.120 mm (0.2016 in.)	36	5.360 mm (0.2110 in.)	60	5.600 mm (0.2205 in.)
14	5.140 mm (0.2024 in.)	38	5.380 mm (0.2118 in.)	62	5.620 mm (0.2213 in.)
16	5.160 mm (0.2031 in.)	40	5.400 mm (0.2126 in.)	64	5.640 mm (0.2220 in.)
18	5.180 mm (0.2039 in.)	42	5.420 mm (0.2134 in.)	66	5.660 mm (0.2228 in.)
20	5.200 mm (0.2047 in.)	44	5.440 mm (0.2142 in.)	68	5.680 mm (0.2236 in.)
22	5.220 mm (0.2055 in.)	46	5.460 mm (0.2150 in.)	70	5.700 mm (0.2244 in.)
24	5.240 mm (0.2063 in.)	48	5.480 mm (0.2157 in.)	72	5.720 mm (0.2252)
26	5.260 mm (0.2071 in.)	50	5.500 mm (0.2165 in.)	74	5.740 mm (0.2260)
28	5.280 mm (0.2079 in.)	52	5.520 mm (0.2173 in.)	-	-

Standard intake valve clearance (Cold):
0.15 to 0.25 mm (0.006 to 0.010 in.)

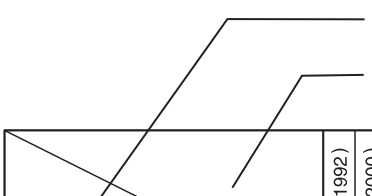
EM

EXAMPLE:

The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0158 in.).

Replace the 5.250 mm (0.2067 in.) lifter with a new No. 46 lifter.

(3) Valve lifter selection chart (exhaust).



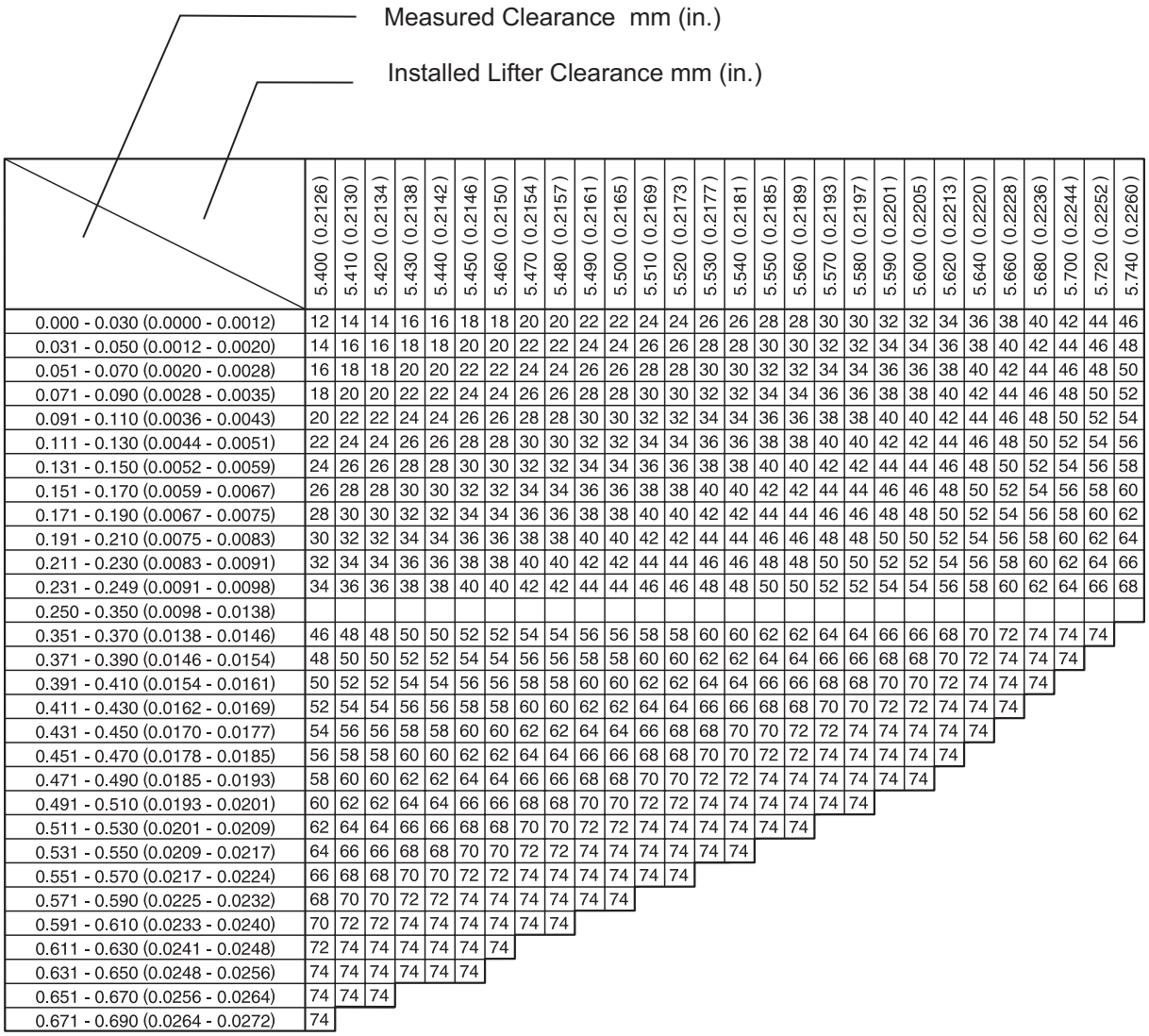
	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)
																			06	06	06	06	08	08	10	10	12
0.031 - 0.050 (0.0012 - 0.0020)																06	06	06	06	06	08	08	10	10	12	12	14
0.051 - 0.070 (0.0020 - 0.0028)														06	06	06	06	06	08	08	10	10	12	12	14	14	16
0.071 - 0.090 (0.0028 - 0.0035)												06	06	06	06	06	08	08	10	10	12	12	14	14	16	16	18
0.091 - 0.110 (0.0036 - 0.0043)											06	06	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20
0.111 - 0.130 (0.0044 - 0.0051)									06	06	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22
0.131 - 0.150 (0.0052 - 0.0059)								06	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24
0.151 - 0.170 (0.0059 - 0.0067)						06	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26
0.171 - 0.190 (0.0067 - 0.0075)					06	06	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28
0.191 - 0.210 (0.0075 - 0.0083)				06	06	06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30
0.211 - 0.230 (0.0083 - 0.0091)			06	06	06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32
0.231 - 0.249 (0.0091 - 0.0098)		06	06	06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34
0.250 - 0.350 (0.0098 - 0.0138)																											
0.351 - 0.370 (0.0138 - 0.0146)	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46
0.371 - 0.390 (0.0146 - 0.0154)	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48
0.391 - 0.410 (0.0154 - 0.0161)	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50
0.411 - 0.430 (0.0162 - 0.0169)	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52
0.431 - 0.450 (0.0170 - 0.0177)	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54
0.451 - 0.470 (0.0178 - 0.0185)	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56
0.471 - 0.490 (0.0185 - 0.0193)	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58
0.491 - 0.510 (0.0193 - 0.0201)	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60
0.511 - 0.530 (0.0201 - 0.0209)	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62
0.531 - 0.550 (0.0209 - 0.0217)	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64
0.551 - 0.570 (0.0217 - 0.0224)	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66
0.571 - 0.590 (0.0225 - 0.0232)	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68
0.591 - 0.610 (0.0233 - 0.0240)	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70
0.611 - 0.630 (0.0241 - 0.0248)	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72
0.631 - 0.650 (0.0248 - 0.0256)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74
0.651 - 0.670 (0.0256 - 0.0264)	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74
0.671 - 0.690 (0.0264 - 0.0272)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74
0.691 - 0.710 (0.0272 - 0.0280)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	
0.711 - 0.730 (0.0280 - 0.0287)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74			
0.731 - 0.750 (0.0288 - 0.0295)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74					
0.751 - 0.770 (0.0296 - 0.0303)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74	74	74	74	74							
0.771 - 0.790 (0.0304 - 0.0311)	54	56	58	60	62	64	66	68	70	70	72	72	74	74	74	74	74	74									
0.791 - 0.810 (0.0311 - 0.0319)	56	58	60	62	64	66	68	70	72	72	74	74	74	74	74	74											
0.811 - 0.830 (0.0319 - 0.0327)	58	60	62	64	66	68	70	72	74	74	74	74	74	74													
0.831 - 0.850 (0.0327 - 0.0335)	60	62	64	66	68	70	72	74	74	74	74	74															
0.851 - 0.870 (0.0335 - 0.0343)	62	64	66	68	70	72	74	74	74	74																	
0.871 - 0.890 (0.0343 - 0.0350)	64	66	68	70	72	74	74	74																			
0.891 - 0.910 (0.0351 - 0.0358)	66	68	70	72	74	74	74																				
0.911 - 0.930 (0.0359 - 0.0366)	68	70	72	74	74	74																					
0.931 - 0.950 (0.0367 - 0.0374)	70	72	74	74	74																						
0.951 - 0.970 (0.0374 - 0.0382)	72	74	74	74																							
0.971 - 0.990 (0.0382 - 0.0390)	74	74	74																								
0.991 - 1.010 (0.0390 - 0.0398)	74	74																									
1.011 - 1.030 (0.0398 - 0.0406)	74																										

EM

T

A116735E01

(4) Valve selection chart (exhaust) (continued).



	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	5.590 (0.2201)	5.600 (0.2205)	5.620 (0.2213)	5.640 (0.2220)	5.660 (0.2228)	5.680 (0.2236)	5.700 (0.2244)	5.720 (0.2252)	5.740 (0.2260)
0.000 - 0.030 (0.0000 - 0.0012)	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	36	38	40	42	44	46
0.031 - 0.050 (0.0012 - 0.0020)	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	38	40	42	44	46	48
0.051 - 0.070 (0.0020 - 0.0028)	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	40	42	44	46	48	50
0.071 - 0.090 (0.0028 - 0.0035)	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	42	44	46	48	50	52
0.091 - 0.110 (0.0036 - 0.0043)	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	44	46	48	50	52	54
0.111 - 0.130 (0.0044 - 0.0051)	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56
0.131 - 0.150 (0.0052 - 0.0059)	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58
0.151 - 0.170 (0.0059 - 0.0067)	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60
0.171 - 0.190 (0.0067 - 0.0075)	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62
0.191 - 0.210 (0.0075 - 0.0083)	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64
0.211 - 0.230 (0.0083 - 0.0091)	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66
0.231 - 0.249 (0.0091 - 0.0098)	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68
0.250 - 0.350 (0.0098 - 0.0138)																												
0.351 - 0.370 (0.0138 - 0.0146)	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	70	72	74	74	74	
0.371 - 0.390 (0.0146 - 0.0154)	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74	74	74		
0.391 - 0.410 (0.0154 - 0.0161)	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	74	74	74			
0.411 - 0.430 (0.0162 - 0.0169)	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74				
0.431 - 0.450 (0.0170 - 0.0177)	54	56	56	58	58	60	60	62	62	64	64	66	68	68	70	70	72	72	74	74	74	74	74					
0.451 - 0.470 (0.0178 - 0.0185)	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74						
0.471 - 0.490 (0.0185 - 0.0193)	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74							
0.491 - 0.510 (0.0193 - 0.0201)	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74									
0.511 - 0.530 (0.0201 - 0.0209)	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74											
0.531 - 0.550 (0.0209 - 0.0217)	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74													
0.551 - 0.570 (0.0217 - 0.0224)	66	68	68	70	70	72	72	74	74	74	74	74	74															
0.571 - 0.590 (0.0225 - 0.0232)	68	70	70	72	72	74	74	74	74	74	74																	
0.591 - 0.610 (0.0233 - 0.0240)	70	72	72	74	74	74	74	74	74																			
0.611 - 0.630 (0.0241 - 0.0248)	72	74	74	74	74	74	74																					
0.631 - 0.650 (0.0248 - 0.0256)	74	74	74	74	74	74																						
0.651 - 0.670 (0.0256 - 0.0264)	74	74	74																									
0.671 - 0.690 (0.0264 - 0.0272)	74																											

T

A116736E01

New lifter thickness

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
06	**5.060 mm (0.1992 in.)**	**30**	**5.300 mm (0.2087 in.)**	**54**	**5.540 mm (0.2181 in.)**
08	**5.080 mm (0.2000 in.)**	**32**	**5.320 mm (0.2094 in.)**	**56**	**5.560 mm (0.2189 in.)**

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
10	5.100 mm (0.2008 in.)	34	5.340 mm (0.2102 in.)	58	5.580 mm (0.2197 in.)
12	5.120 mm (0.2016 in.)	36	5.360 mm (0.2110 in.)	60	5.600 mm (0.2205 in.)
14	5.140 mm (0.2024 in.)	38	5.380 mm (0.2118 in.)	62	5.620 mm (0.2213 in.)
16	5.160 mm (0.2031 in.)	40	5.400 mm (0.2126 in.)	64	5.640 mm (0.2220 in.)
18	5.180 mm (0.2039 in.)	42	5.420 mm (0.2134 in.)	66	5.660 mm (0.2228 in.)
20	5.200 mm (0.2047 in.)	44	5.440 mm (0.2142 in.)	68	5.680 mm (0.2236 in.)
22	5.220 mm (0.2055 in.)	46	5.460 mm (0.2150 in.)	70	5.700 mm (0.2244 in.)
24	5.240 mm (0.2063 in.)	48	5.480 mm (0.2157 in.)	72	5.720 mm (0.2252 in.)
26	5.260 mm (0.2071 in.)	50	5.500 mm (0.2165 in.)	74	5.740 mm (0.2260 in.)
28	5.280 mm (0.2079 in.)	52	5.520 mm (0.2173 in.)	-	-

Standard exhaust valve clearance (Cold):
0.25 to 0.35 mm (0.010 to 0.014 in.)

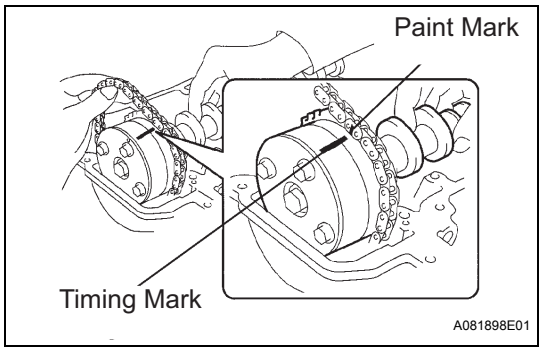
EXAMPLE:

The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.440 mm (0.0173 in.).

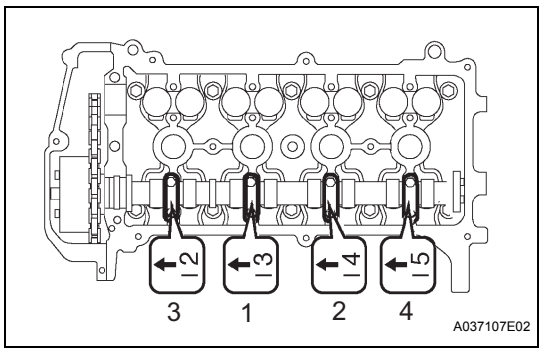
Replace the 5.340 mm (0.2102 in.) lifter with a new No. 48 lifter.

(r) Reinstall the valve lifters.

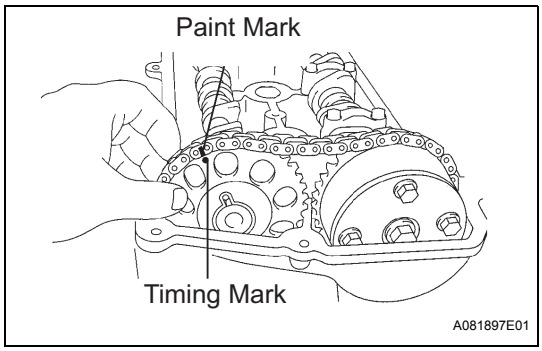
(s) Apply a light coat of engine oil to the camshaft journals.



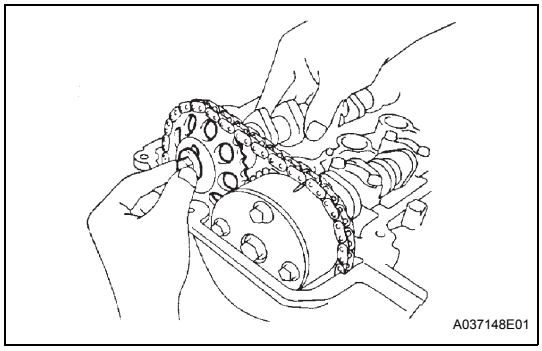
(t) Install the timing chain onto the camshaft timing gear with the paint mark and the timing mark aligned as shown in the illustration.



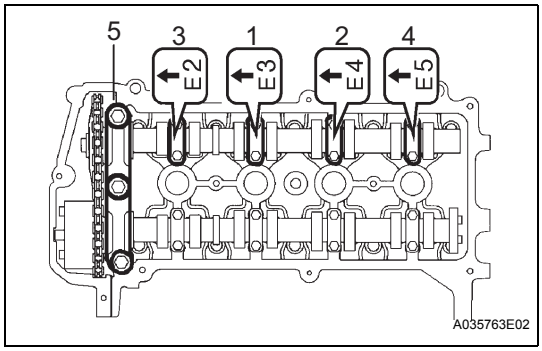
(u) Examine the front marks and numbers, and tighten the bolts in the sequence shown in the illustration.
Torque: 13 N*m (129 kgf*cm, 9 ft.*lbf)
NOTICE:
Tighten each bolt uniformly, keeping the camshaft level.



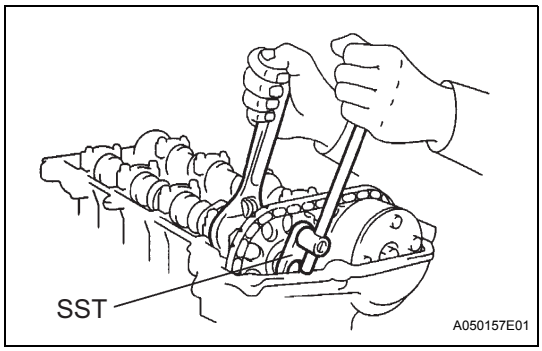
(v) Hold the timing chain, and align the timing mark on the camshaft timing sprocket with the paint mark of the timing chain.



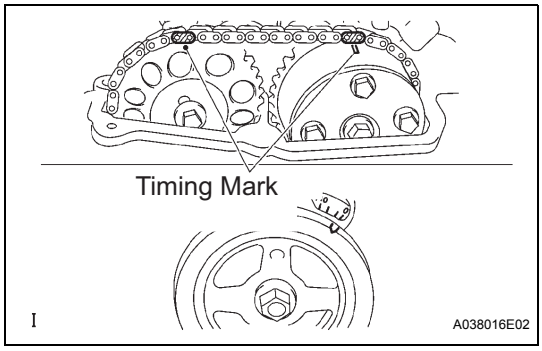
(w) Align the alignment pin hole on the camshaft timing sprocket with the alignment pin of the camshaft, and install the sprocket into the camshaft.
(x) Temporarily install the timing sprocket bolt.



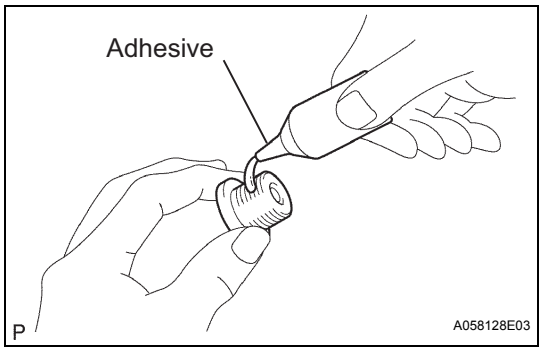
(y) Examine the front marks and numbers, and tighten the bolts in the sequence shown in the illustration.
Torque: 13 N*m (133 kgf*cm, 9 ft.*lbf)
NOTICE:
Tighten each bolt uniformly, keeping the camshaft level.
(z) Install the No. 1 bearing cap.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)



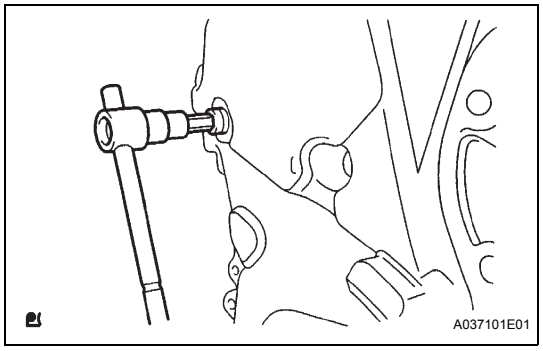
(aa) Using SST, hold the camshaft with a wrench on the hexagon lobe, and install the bolt.
SST 09023-38400
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)
(ab) Remove the bar from the timing chain tensioner.



(ac) Turn the crankshaft pulley until its timing notch and the timing mark 0 of the chain cover are aligned.
(ad) Check that all the pairs of the timing marks are aligned.

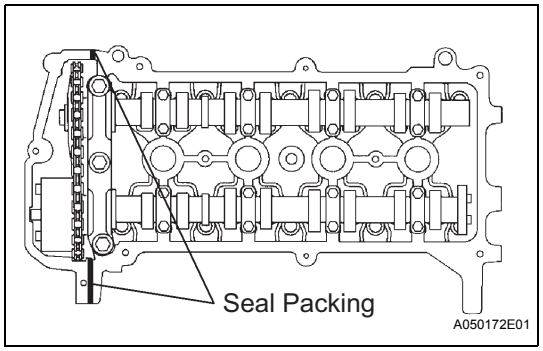


(ae) Apply seal packing to 2 or 3 threads of the screw plug end.
Seal packing:
Part No. 08833-00070 or equivalent



(af) Using an 8 mm hexagon wrench, install the screw plug.
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

EM

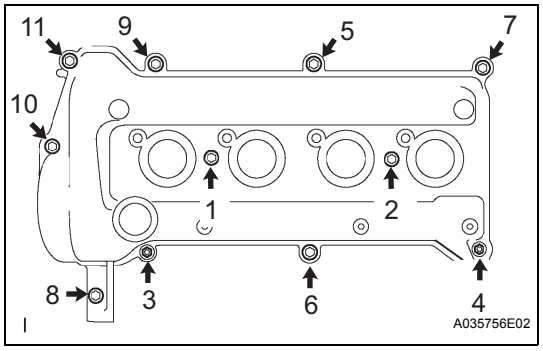


10. INSTALL CYLINDER HEAD COVER

(a) Apply seal packing to the 2 locations shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes of applying seal packing.**
- **Do not start the engine for at least 2 hours after installation.**

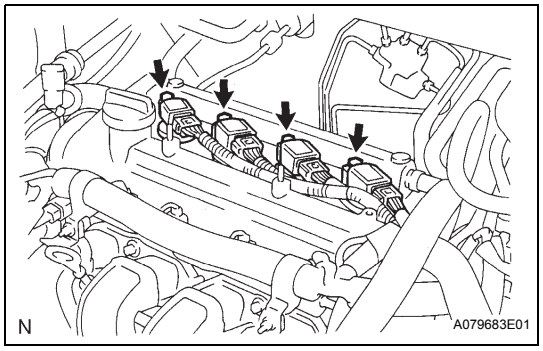
(b) Install the cylinder head cover with the 9 bolts, 2 seal washers and 2 nuts.

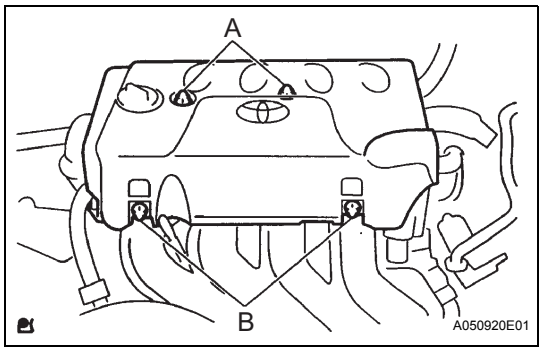
(c) Using several steps, uniformly tighten the bolts and nuts in the sequence shown in the illustration.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



11. INSTALL IGNITION COIL

(a) Install the 4 ignition coils with the 4 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)





12. INSTALL NO. 2 CYLINDER HEAD COVER

(a) First tighten the nuts labeled A, and then tighten nuts labeled B.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)

13. INSPECT ENGINE OIL LEAKS

14. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

15. PERFORM INITIALIZATION

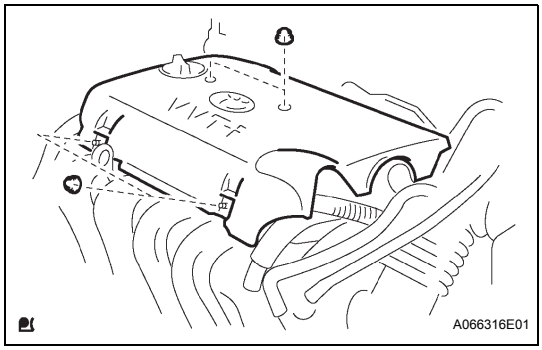
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

EM

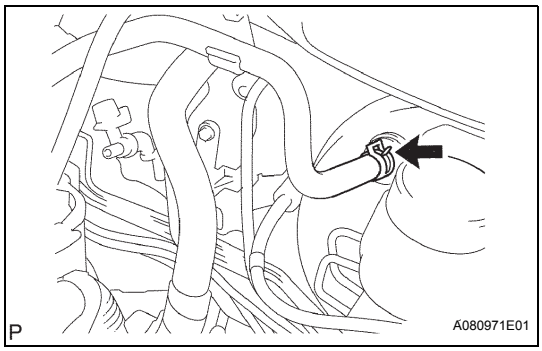
EM

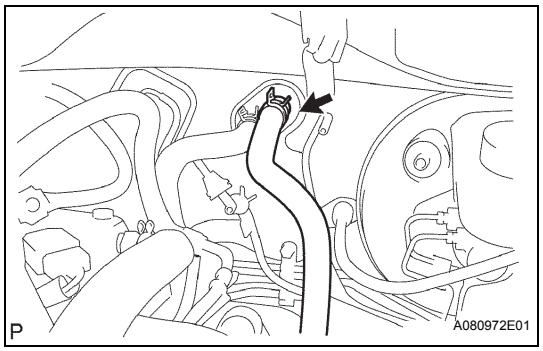
REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE (See page FU-11)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **DRAIN ENGINE COOLANT (See page CO-5)**
6. **REMOVE FRONT WHEEL**
7. **REMOVE NO. 2 CYLINDER HEAD COVER**
   (a) Remove the 4 nuts and No. 2 cylinder head cover.



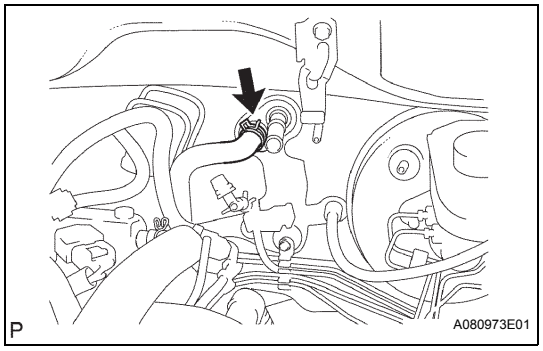
8. **REMOVE BATTERY**
9. **REMOVE AIR CLEANER (See page ES-346)**
10. **DISCONNECT FUEL TUBE (See page FU-12)**
11. **DISCONNECT ACCELERATOR CONTROL CABLE (See page ES-346)**
12. **REMOVE RADIATOR (See page CO-19)**
13. **DISCONNECT TRANSMISSION CONTROL CABLE (for Manual Transaxle) (See page MX-21)**
14. **DISCONNECT TRANSMISSION CONTROL CABLE (for Automatic Transaxle) (See page AX-134)**
15. **DISCONNECT CLUTCH RELEASE CYLINDER (for Manual Transaxle) (See page CL-13)**
16. **DISCONNECT UNION TO CHECK VALVE HOSE**
    (a) Disconnect the union to check valve hose for the brake booster.





17. DISCONNECT HEATER WATER INLET HOSE

(a) Disconnect the heater water inlet hose from the air conditioner tube.



18. DISCONNECT HEATER WATER OUTLET HOSE

(a) Disconnect the heater water outlet hose from the air conditioner tube.

19. DISCONNECT ENGINE WIRE

(a) Remove the glove compartment door.
(b) Disconnect the engine wire harness from the ECM and junction block.
(c) Pull out the engine wire.
(d) Disconnect the engine wire from the engine room junction block.
(e) Remove the body ground.

20. REMOVE GENERATOR V BELT (See page EM-7)

21. REMOVE COOLER COMPRESSOR (See page AC-80)

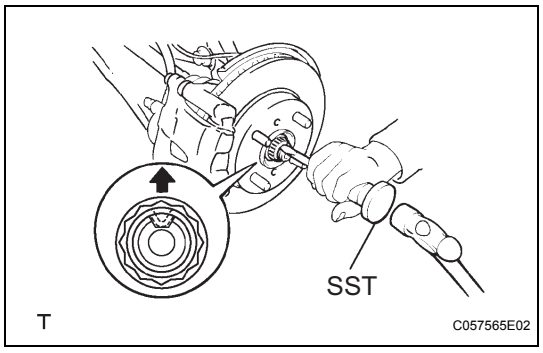
22. REMOVE FLOOR PANEL BRACE FRONT (See page EX-3)

23. REMOVE EXHAUST PIPE FRONT (See page EX-3)

24. DISCONNECT STEERING INTERMEDIATE SHAFT (See page SR-8)

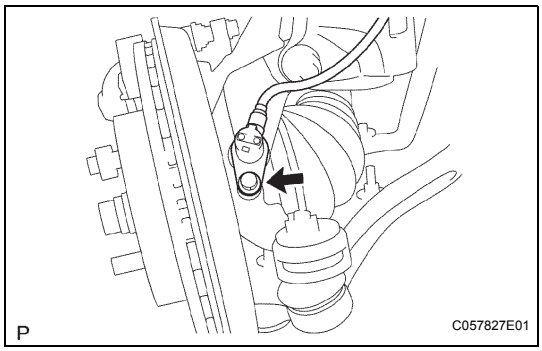
25. REMOVE FRONT AXLE HUB LH NUT

(a) Remove the clip and nut.



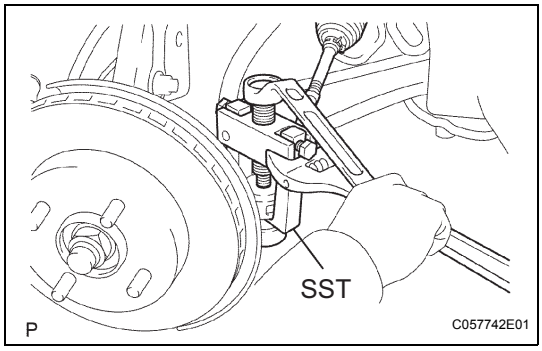
(b) Using SST and a hammer, unstake the lock nut.
SST 09930-00010
NOTICE:
- **When removing the nut, unstake the lock nut completely.**
- **Do not damage the threads of the drive shaft.**
- **Do not use SST with the tip sharpened.**
- **Set SST to the groove with the flat face facing upward.**

(c) Using a 30 mm socket wrench, remove the lock nut.
HINT:
Perform the same procedure as above on the opposite side.



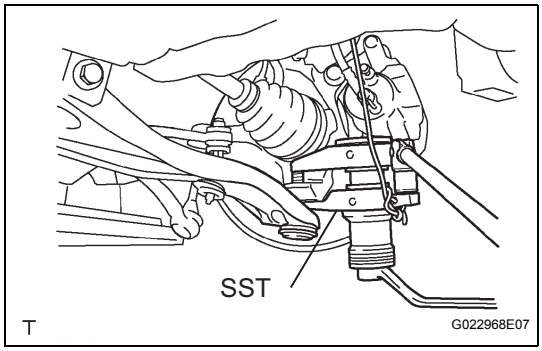
26. DISCONNECT SPEED SENSOR FRONT LH (w/ ABS)

(a) Remove the bolt and disconnect the speed sensor from the steering knuckle.
HINT:
Perform the same procedure as above on the opposite side.



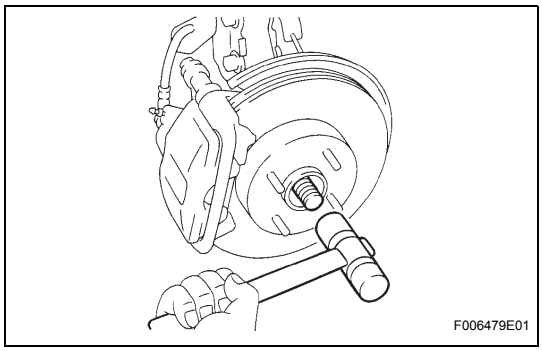
27. DISCONNECT TIE ROD END LH

(a) Using SST, disconnect the tie rod end from the steering knuckle.
SST 09628-62011
NOTICE:
Do not damage the dust cover of the ball joint.
HINT:
Perform the same procedure as above on the opposite side.



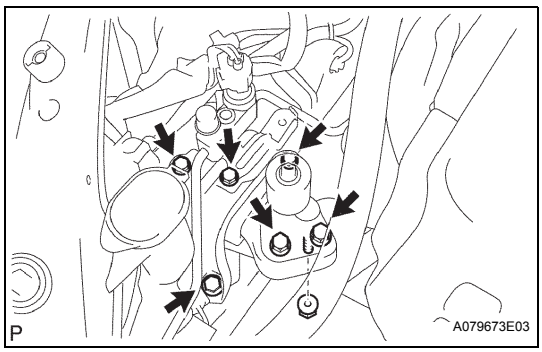
28. DISCONNECT FRONT SUSPENSION ARM LOWER LH

(a) Using SST, disconnect the front suspension arm lower from the steering knuckle.
SST 09628-00011
HINT:
Perform the same procedure as above on the opposite side.



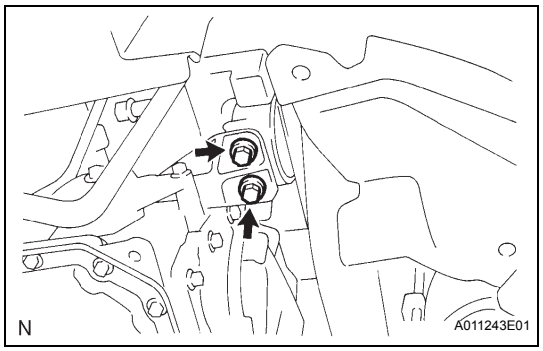
29. DISCONNECT FRONT DRIVE SHAFT LH

(a) Using a plastic-faced hammer, detach the drive shaft from the axle hub by tapping the drive shaft.
HINT:
Perform the same procedure as above on the opposite side.

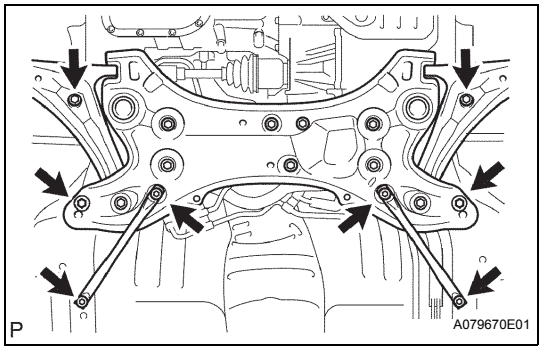


30. REMOVE ENGINE AND TRANSAXLE ASSEMBLY

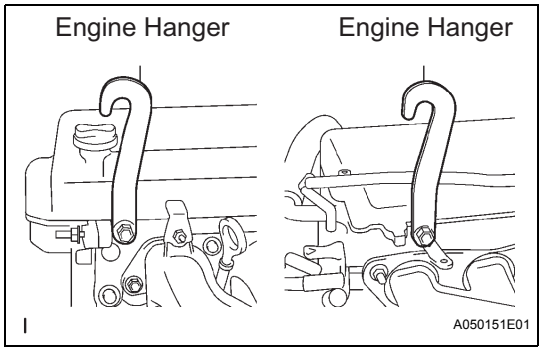
(a) Set the engine lifter.
(b) Remove the bolt which is used to fix the liquid tube to the engine mounting insulator RH.
(c) Remove the 5 bolts, nut and engine mounting insulator RH.



(d) Remove the 2 bolts and detach the engine mounting bracket from the engine mounting insulator LH.



(e) Remove the engine together with the transaxle.
(1) Remove the 8 bolts shown in the illustration.
(2) Carefully remove the engine assembly from the vehicle.



(f) Install the 2 engine hangers as shown in the illustration.
Part No.

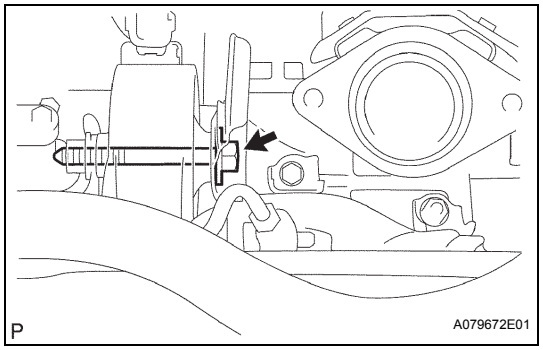
Item	Part
No. 1 engine hanger	12281-21010
Bolt	91642-81025

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

(g) Attach the engine sling device and hang the engine with the chain block.

31. REMOVE VANE PUMP V BELT (See page EM-7)

32. REMOVE VANE PUMP
(a) Disconnect the power steering oil pressure sensor harness.
(b) Remove the 2 bolts and vane pump assembly.



33. REMOVE FRONT SUSPENSION CROSSMEMBER
(a) Remove the through bolt.
(b) Separate the engine and the transaxle assembly from the suspension crossmember.

34. REMOVE STARTER (See page ST-8)

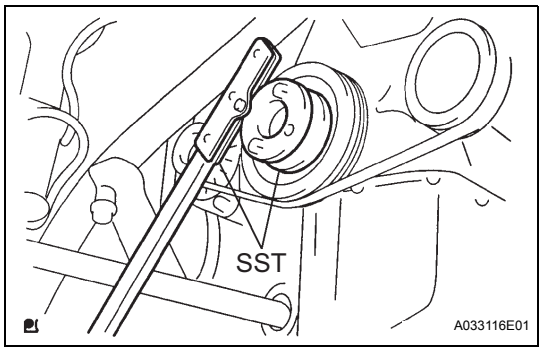
35. REMOVE GENERATOR (See page CH-9)

36. REMOVE MANUAL TRANSAXLE (for Manual Transaxle) (See page MX-23)

37. REMOVE AUTOMATIC TRANSAXLE (for Automatic Transaxle) (See page AX-137)

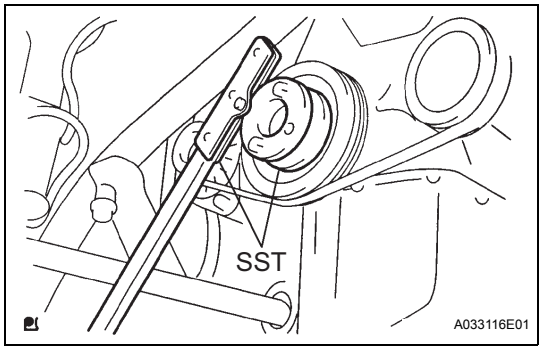
38. REMOVE CLUTCH COVER (for Manual Transaxle) (See page CL-16)

39. REMOVE CLUTCH DISC (for Manual Transaxle)



40. REMOVE FLYWHEEL (for Manual Transaxle)

(a) Hold the crankshaft pulley with SST, and then remove the 6 bolts and flywheel.
SST 09213-58012 (91111-50845), 09330-00021

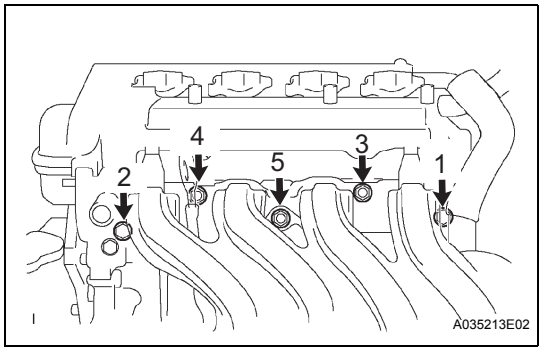


41. REMOVE DRIVE PLATE (for Automatic Transaxle)

(a) Hold the crankshaft pulley with SST, and then remove the 6 bolts and drive plate.
SST 09213-58012 (91111-50845), 09330-00021

42. REMOVE VENTILATION HOSE (See page EM-25)

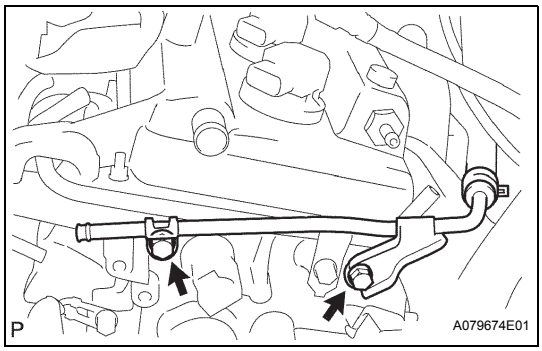
43. REMOVE NO. 2 VENTILATION HOSE (See page EM-25)



44. REMOVE INTAKE MANIFOLD

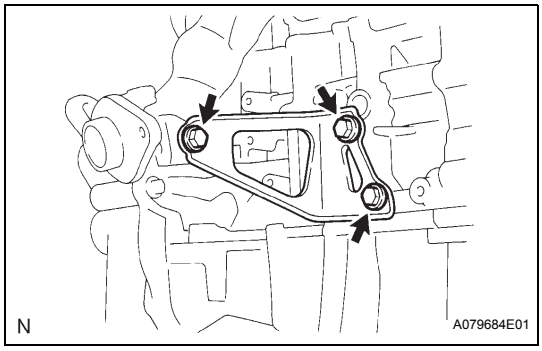
(a) Using several steps, remove the 3 bolts and 2 nuts in the sequence shown in the illustration. Then remove the intake manifold.

(b) Remove the gasket from the intake manifold.



45. REMOVE BOOSTER VACUUM TUBE

(a) Remove the 2 bolts and booster vacuum tube.

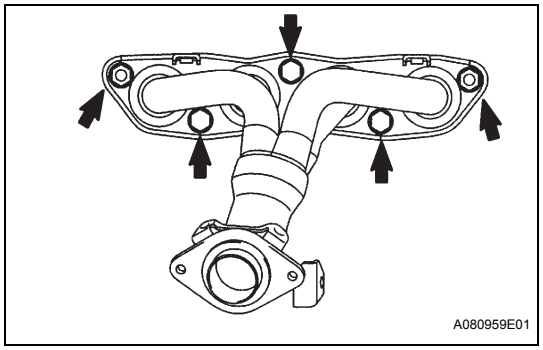


46. REMOVE MANIFOLD SUPPORT BRACKET

(a) Remove the 3 bolts and manifold support bracket.

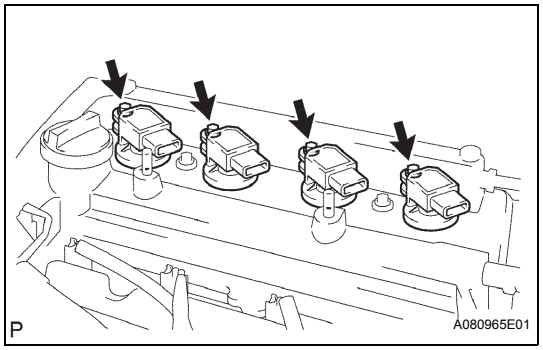
47. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

(a) Remove the 4 bolts and exhaust manifold heat insulator.



48. REMOVE EXHAUST MANIFOLD

(a) Remove the 3 bolts, 2 nuts and exhaust manifold.



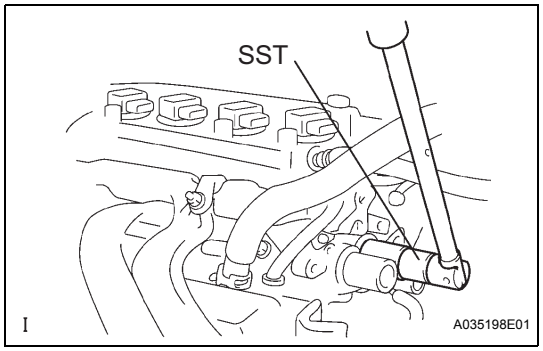
49. REMOVE IGNITION COIL

(a) Remove the 4 bolts and pull out the 4 ignition coils.

50. REMOVE NO. 1 WATER BY-PASS PIPE

(a) Remove the 2 nuts and 2 bolts, and then remove the water by-pass pipe.

EM



51. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

(a) Using SST, remove the sensor.
SST 09817-33190

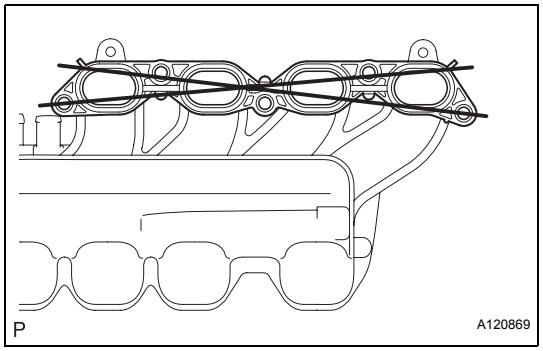
52. REMOVE KNOCK SENSOR

(a) Remove the bolt and sensor.

53. REMOVE ENGINE OIL PRESSURE SWITCH

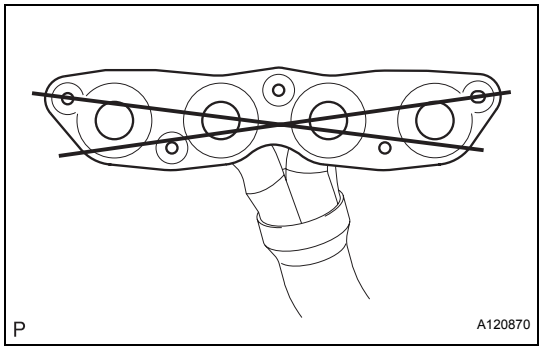
(a) Using SST, remove the switch.
SST 09268-46021

INSPECTION



1. INSPECT INTAKE MANIFOLD

(a) Using a precision straightedge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.10 mm (0.004 in.)
If the warpage is greater than the maximum, replace the manifold.

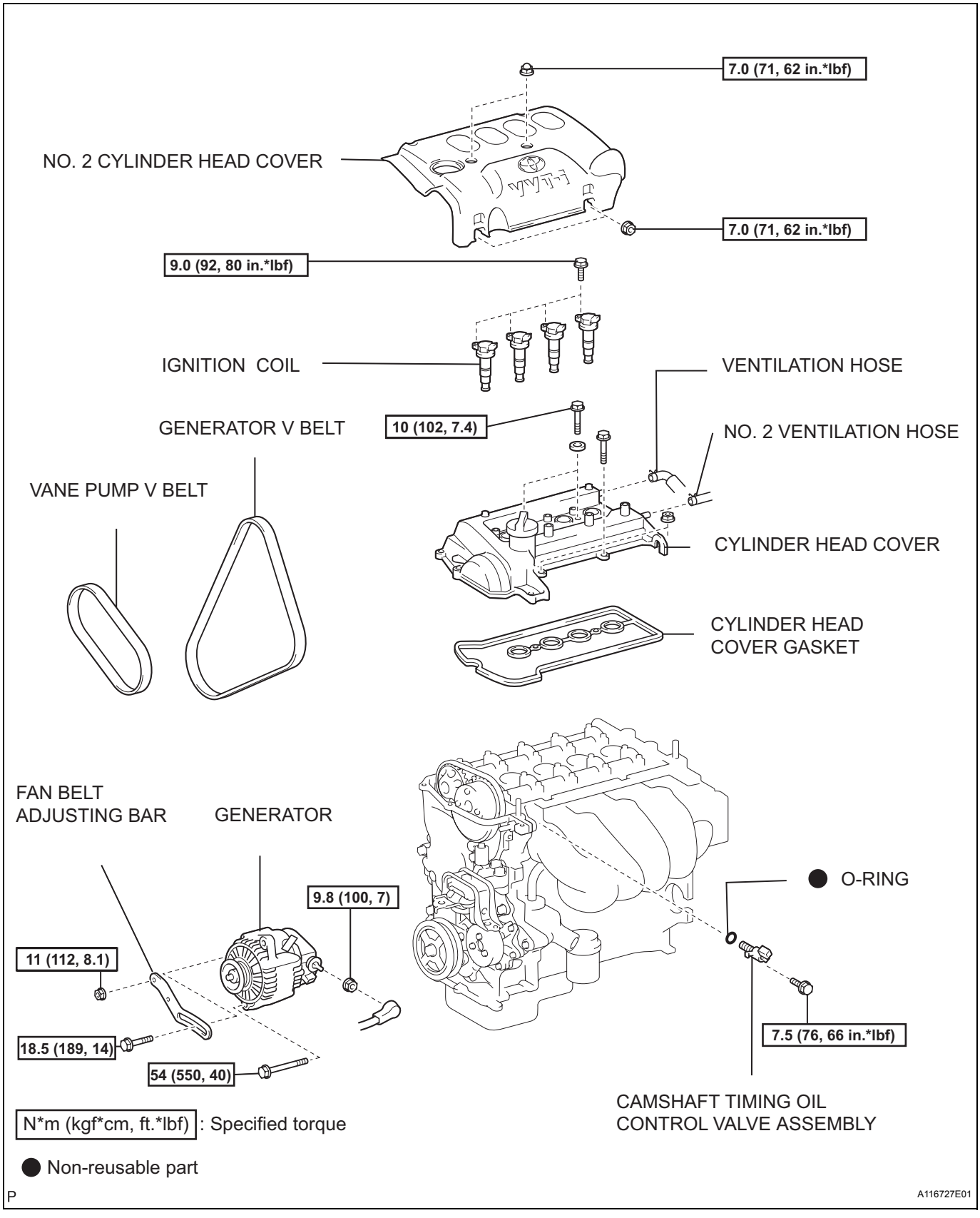


2. INSPECT EXHAUST MANIFOLD

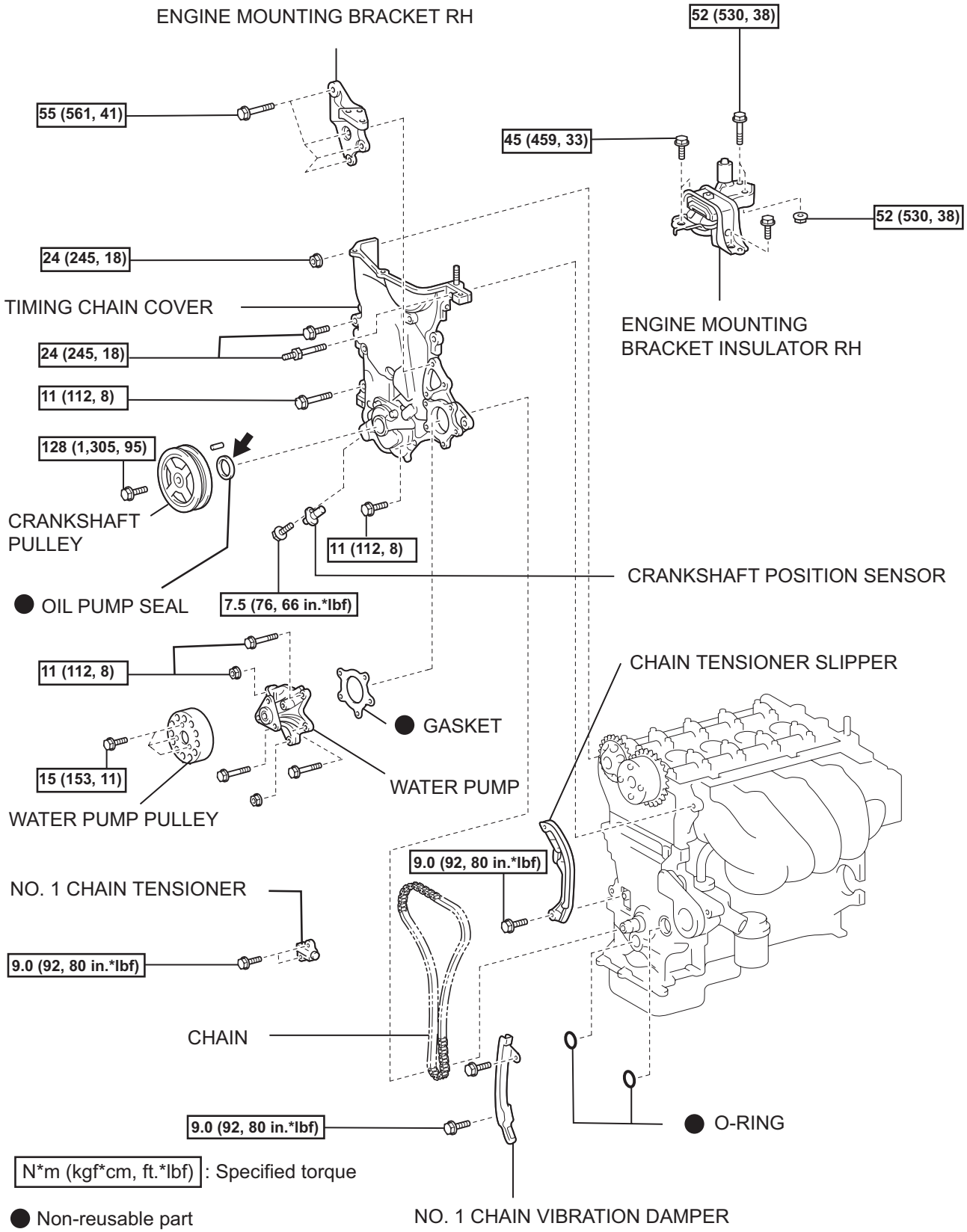
(a) Using a precision straightedge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.70 mm (0.028 in.)
If the warpage is greater than the maximum, replace the manifold.

TIMING CHAIN

COMPONENTS

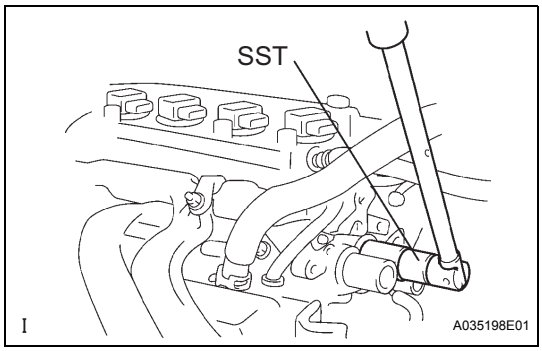


EM

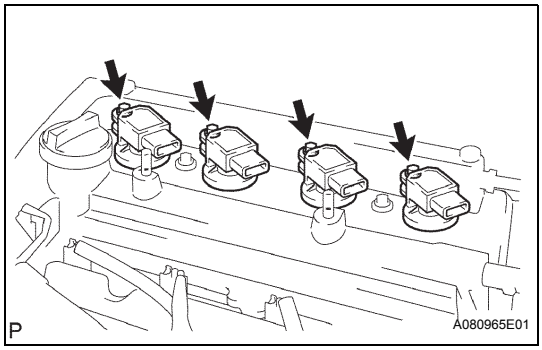

ENGINE MOUNTING BRACKET RH
55 (561, 41)
52 (530, 38)
45 (459, 33)
52 (530, 38)
ENGINE MOUNTING BRACKET INSULATOR RH
24 (245, 18)
TIMING CHAIN COVER
24 (245, 18)
11 (112, 8)
128 (1,305, 95)
CRANKSHAFT PULLEY
OIL PUMP SEAL
7.5 (76, 66 in.*lbf)
11 (112, 8)
CRANKSHAFT POSITION SENSOR
11 (112, 8)
GASKET
15 (153, 11)
WATER PUMP
WATER PUMP PULLEY
CHAIN TENSIONER SLIPPER
9.0 (92, 80 in.*lbf)
NO. 1 CHAIN TENSIONER
9.0 (92, 80 in.*lbf)
CHAIN
O-RING
9.0 (92, 80 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Apply MP grease
NO. 1 CHAIN VIBRATION DAMPER
P
A116728E01

INSTALLATION

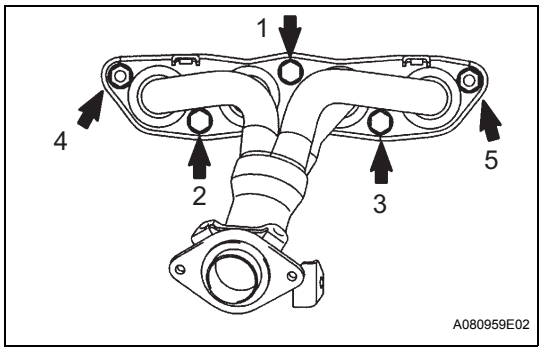
1. **INSTALL OIL PRESSURE SWITCH (See page LU-1)**
2. **INSTALL KNOCK SENSOR (See page ES-358)**
3. **INSTALL ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Install a new gasket onto the sensor.
   (b) Using SST, install the temperature sensor in place.
   SST 09817-33190
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



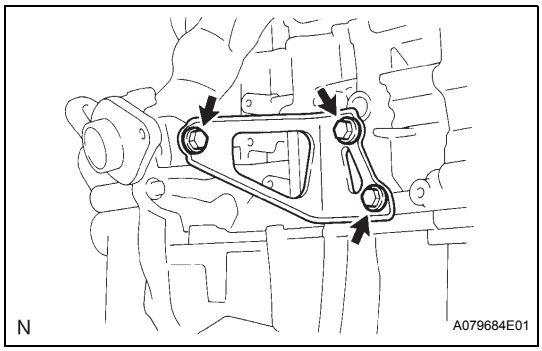
4. **INSTALL NO. 1 WATER BY-PASS PIPE**
   (a) Install a new gasket and the water by-pass pipe with the 2 bolts and 2 nuts.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
5. **INSTALL IGNITION COIL**
   (a) Install the 4 ignition coils with the 4 bolts.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

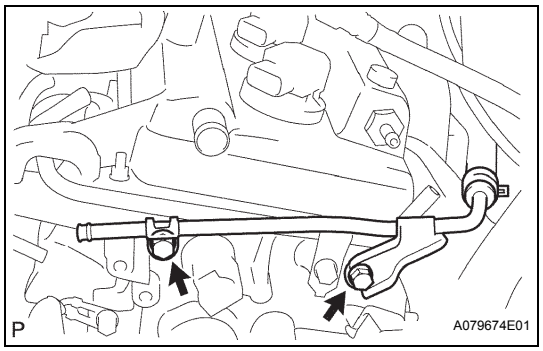


6. **INSTALL EXHAUST MANIFOLD**
   (a) Using several steps, install a new exhaust manifold gasket and the exhaust manifold with the 3 bolts and 2 nuts in the sequence shown in the illustration.
   Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)
7. **INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR**
   (a) Install the exhaust manifold heat insulator with the 4 bolts.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



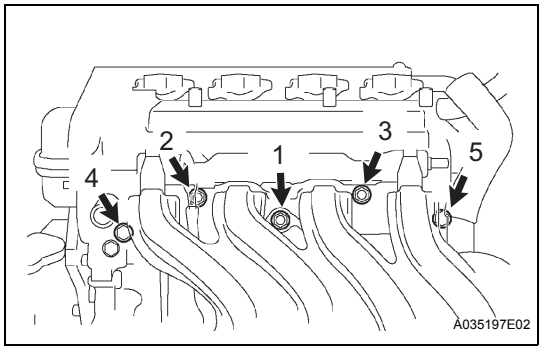
8. **INSTALL MANIFOLD SUPPORT BRACKET**
   (a) Install the manifold support bracket with the 3 bolts.
   Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)





9. INSTALL BOOSTER VACUUM TUBE

(a) Install the booster vacuum tube with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

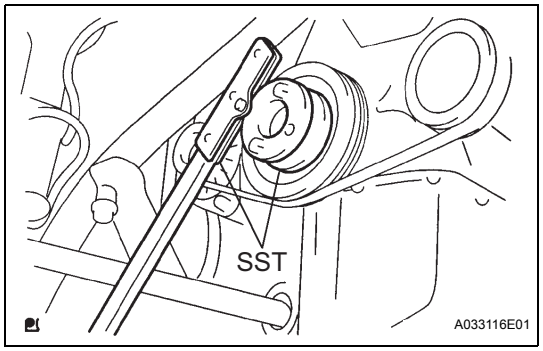


10. INSTALL INTAKE MANIFOLD

(a) Install a new gasket onto the intake manifold.
(b) Install the intake manifold with the 3 bolts and 2 nuts. Using several steps, uniformly tighten the bolts and nuts in the sequence shown in the illustration.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

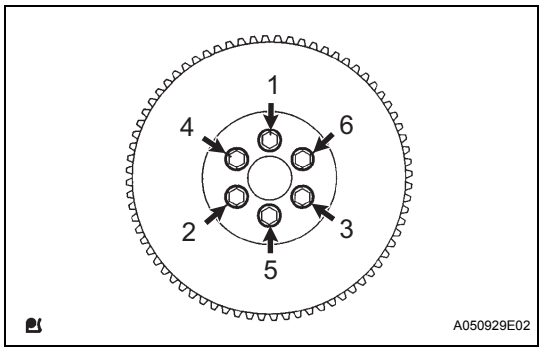
11. CONNECT NO. 2 VENTILATION HOSE (See page EM-31)

12. CONNECT VENTILATION HOSE (See page EM-31)

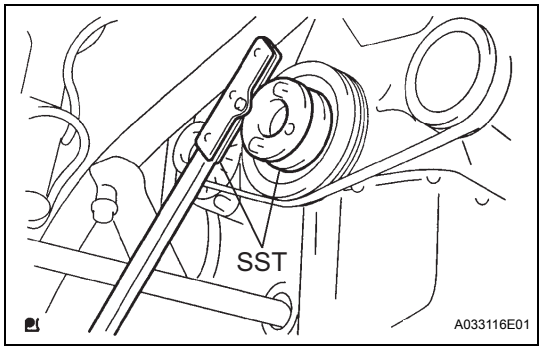


13. INSTALL DRIVE PLATE (for Automatic Transaxle)

(a) Hold the crankshaft pulley with SST.
SST 09213-58012 (91111-50845), 09330-00021



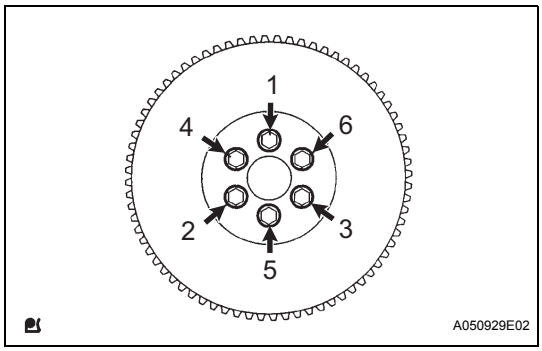
(b) Install the drive plate.
(1) Clean the bolt and bolt hole.
(2) Apply adhesive to the bolts.
Adhesive:
Part No. 0933-00070, THREE BOND or equivalent
(3) Using several steps, uniformly install and tighten the 6 bolts in the sequence shown in the illustration.
Torque: 88 N*m (900 kgf*cm, 65 ft.*lbf)



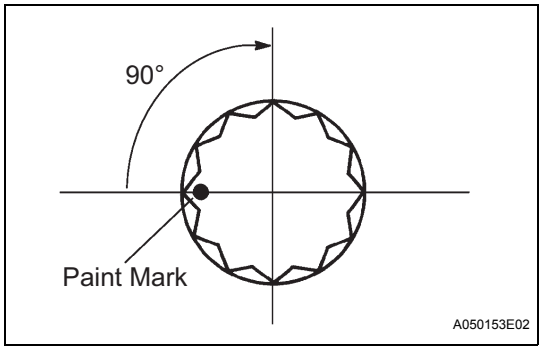
14. INSTALL FLYWHEEL (for Manual Transaxle)

(a) Hold the crankshaft pulley with SST.
SST 09213-58012 (91111-50845), 09330-00021
(b) Install the flywheel.
(1) Clean the bolt hole.
(2) Apply adhesive to the bolts.
Adhesive:
Part No. 0933-00070, THREE BOND or equivalent

EM



(3) Using several steps, uniformly install and tighten the 6 bolts in the sequence shown in the illustration.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
NOTICE:
Do not reuse the flywheel bolt. It may cause breakage of the flywheel bolt.



(4) Mark the flywheel bolt with paint.
(5) Retighten the flywheel bolts by an additional 90°.
(6) Check that the paint mark is at a 90° position from the original location.

15. INSTALL CLUTCH DISC (for Manual Transaxle) (See page CL-18)

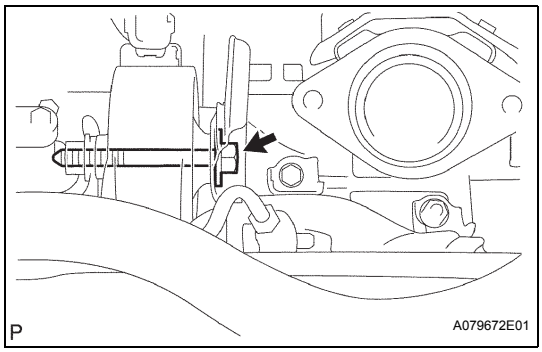
16. INSTALL CLUTCH COVER (for Manual Transaxle) (See page CL-18)

17. INSTALL MANUAL TRANSAXLE (for Manual Transaxle) (See page MX-23)

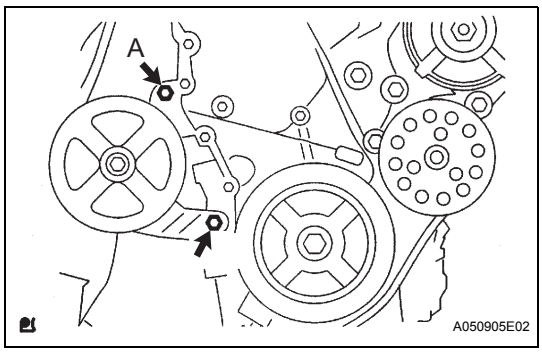
18. INSTALL AUTOMATIC TRANSAXLE (for Automatic Transaxle) (See page AX-141)

19. INSTALL GENERATOR (See page CH-15)

20. INSTALL STARTER (See page ST-14)



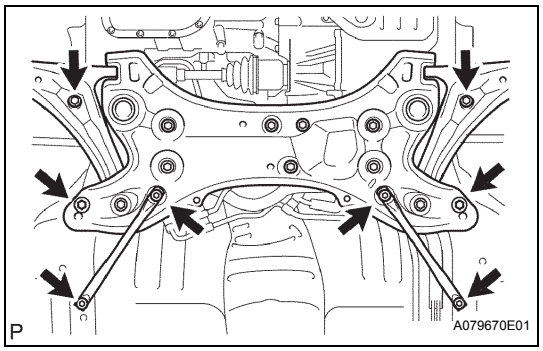
21. INSTALL FRONT SUSPENSION CROSSMEMBER
(a) Fasten the bolt to secure the engine and transaxle assembly to the suspension crossmember.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



22. INSTALL VANE PUMP
(a) Install the vane pump assembly with the 2 bolts.
Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)
HINT:
Temporarily tighten bolt A so that the V belt can be adjusted in a later step.

23. INSTALL VANE PUMP V BELT
(a) Temporarily install the V belt on each pulley.

24. ADJUST VANE PUMP V BELT (See page EM-7)

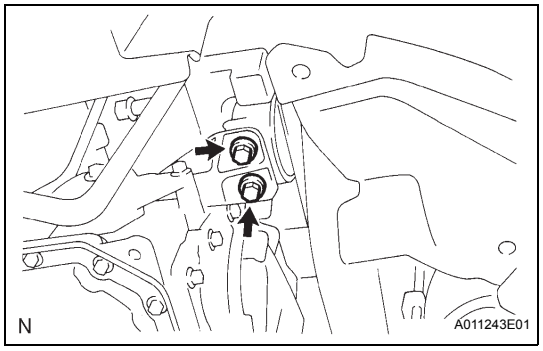


25. INSTALL ENGINE AND TRANSAXLE ASSEMBLY

(a) Set the engine together with the transaxle on the engine lifter.

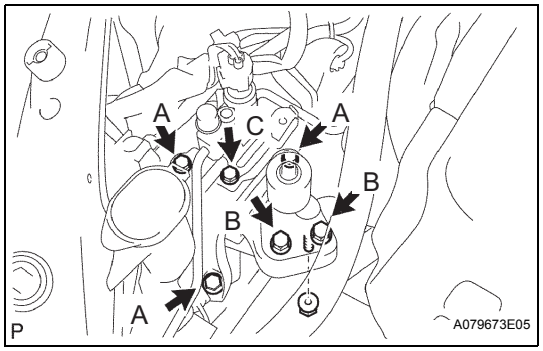
(b) Install the engine together with the transaxle onto the engine compartment.

(c) Temporarily install the suspension crossmember with the 8 bolts.



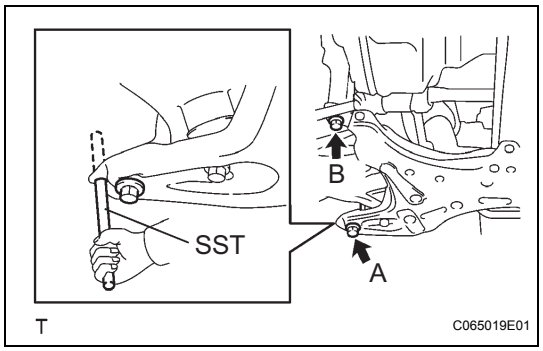
(d) Install the engine mounting bracket LH onto the engine mounting insulator LH with the 2 bolts.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

EM



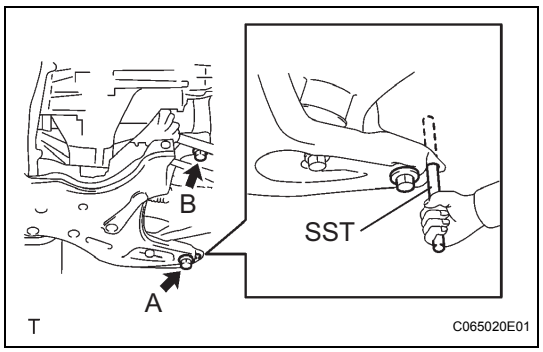
(e) Install the engine mounting insulator RH with the 5 bolts and nut.
Torque: 45 N*m (459 kgf*cm, 33 ft.*lbf) for bolt A
52 N*m (530 kgf*cm, 38 ft.*lbf) for bolt B
52 N*m (530 kgf*cm, 38 ft.*lbf) for nut

(f) Install the liquid tube with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 7.2 in.*lbf) for bolt C



(g) Insert SST to the positioning holes on the right-hand crossmember and on the right-hand of the vehicle.
SST 09670-00010

(h) Temporarily tighten bolt A, and then tighten bolt B.



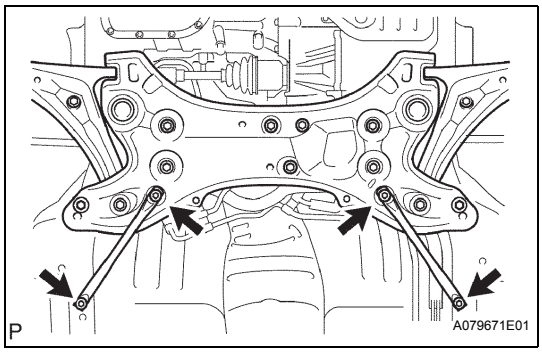
(i) Insert SST into the positioning holes on the left-hand crossmember and on the left-hand of the vehicle.
SST 09670-00010

(j) Temporarily tighten bolt A, and then tighten bolt B.

(k) Insert SST into the positioning holes on the right-hand crossmember and the right-hand of the vehicle, and then tighten the bolts to the specified torque.
SST 09670-00010

Torque: 116 N*m (1,183 kgf*cm, 86 ft.*lbf) for bolt A
70 N*m (714 kgf*cm, 52 ft.*lbf) for bolt B

(l) Insert SST into the positioning holes on the left-hand crossmember and the left-hand of the vehicle, and then tighten the bolts to the specified torque.
SST 09670-00010
Torque: 116 N*m (1,183 kgf*cm, 86 ft.*lbf) for bolt A
70 N*m (714 kgf*cm, 52 ft.*lbf) for bolt B



(m) Tighten the 4 bolts shown in the illustration.
Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)

26. INSTALL FRONT SUSPENSION ARM LOWER LH

(a) Install the front suspension arm lower to the steering knuckle with the nut.
Torque: 98 N*m (999 kgf*cm, 72 ft.*lbf)

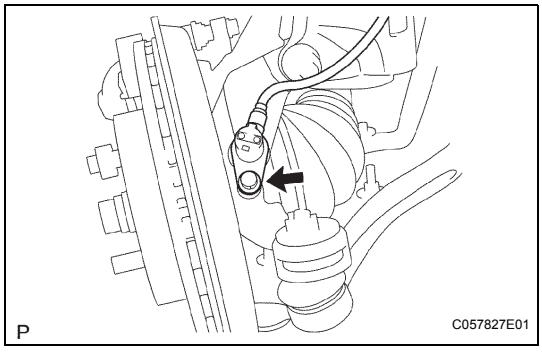
(b) Install a new clip.
HINT:
Perform the same procedure as above on the opposite side.

27. INSTALL TIE ROD END LH

(a) Connect the tie rod end to the steering knuckle with the nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

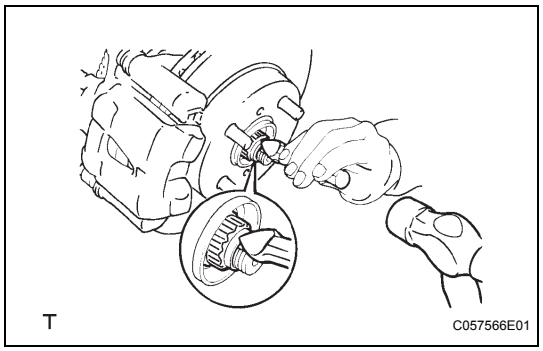
(b) Install a new cotter pin.
NOTICE:
- **Be careful of the threads and taper portions of the tie rod end to prevent contact with oils.**
- **After tightening the castle nut, turn it clockwise less than 60° to align the pin holes for the cotter pin.**

HINT:
Perform the same procedure as above on the opposite side.

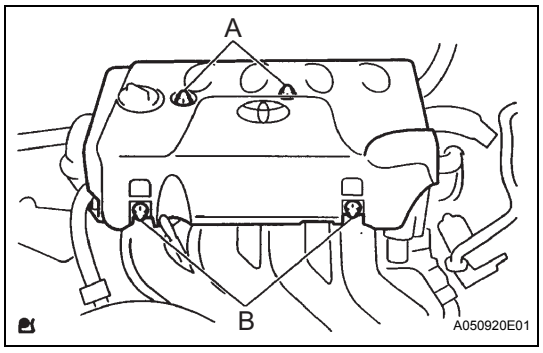


28. CONNECT SPEED SENSOR FRONT LH (w/ ABS)

(a) Install the speed sensor with the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
HINT:
Perform the same procedure as above on the opposite side.



29. **INSTALL FRONT AXLE HUB LH NUT**
    (a) Using a 30 mm socket wrench, install the new hub nut.
    Torque: 216 N*m (2,203 kgf*cm, 160 ft.*lbf)
    (b) Using a chisel and hammer, stake the hub nut.
    HINT:
    Perform the same procedure as above on the opposite side.
30. **INSTALL STEERING INTERMEDIATE SHAFT (See page SR-12)**
31. **INSTALL EXHAUST PIPE FRONT (See page EX-5)**
32. **INSTALL FLOOR PANEL BRACE FRONT (See page EX-5)**
33. **INSTALL COOLER COMPRESSOR (See page AC-81)**
34. **INSTALL GENERATOR V BELT**
    (a) Temporarily install the V belt on each pulley.
35. **ADJUST GENERATOR V BELT (See page EM-7)**
36. **INSTALL RADIATOR (See page CO-19)**
37. **INSTALL CLUTCH RELEASE CYLINDER (for Automatic Transaxle) (See page CL-14)**
38. **CONNECT TRANSMISSION CONTROL CABLE (for Automatic Transaxle) (See page AX-144)**
39. **CONNECT TRANSMISSION CONTROL CABLE (for Manual Transaxle) (See page MX-25)**
40. **CONNECT FUEL TUBE (See page FU-15)**
41. **INSTALL AIR CLEANER (See page ES-348)**
42. **INSTALL BATTERY**



43. **INSTALL NO. 2 CYLINDER HEAD COVER**
    (a) First tighten the nuts labeled A, and then tighten the nuts labeled B.
    Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)
44. **ADD ENGINE OIL (See page LU-3)**
45. **ADD ENGINE COOLANT (See page CO-5)**
46. **CHECK FOR ENGINE OIL LEAKS**
47. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-7)**
48. **CHECK FOR FUEL LEAKAGE (See page FU-8)**
49. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    Inspect and adjust wheel alignment (see page SP-2).
50. **INSPECT IGNITION TIMING (See page EM-1)**
51. **INSPECT ENGINE IDLE SPEED (See page EM-2)**
52. **INSPECT CO/HC (See page EM-3)**

EM

53. INSPECT ABS SPEED SENSOR SIGNAL

54. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

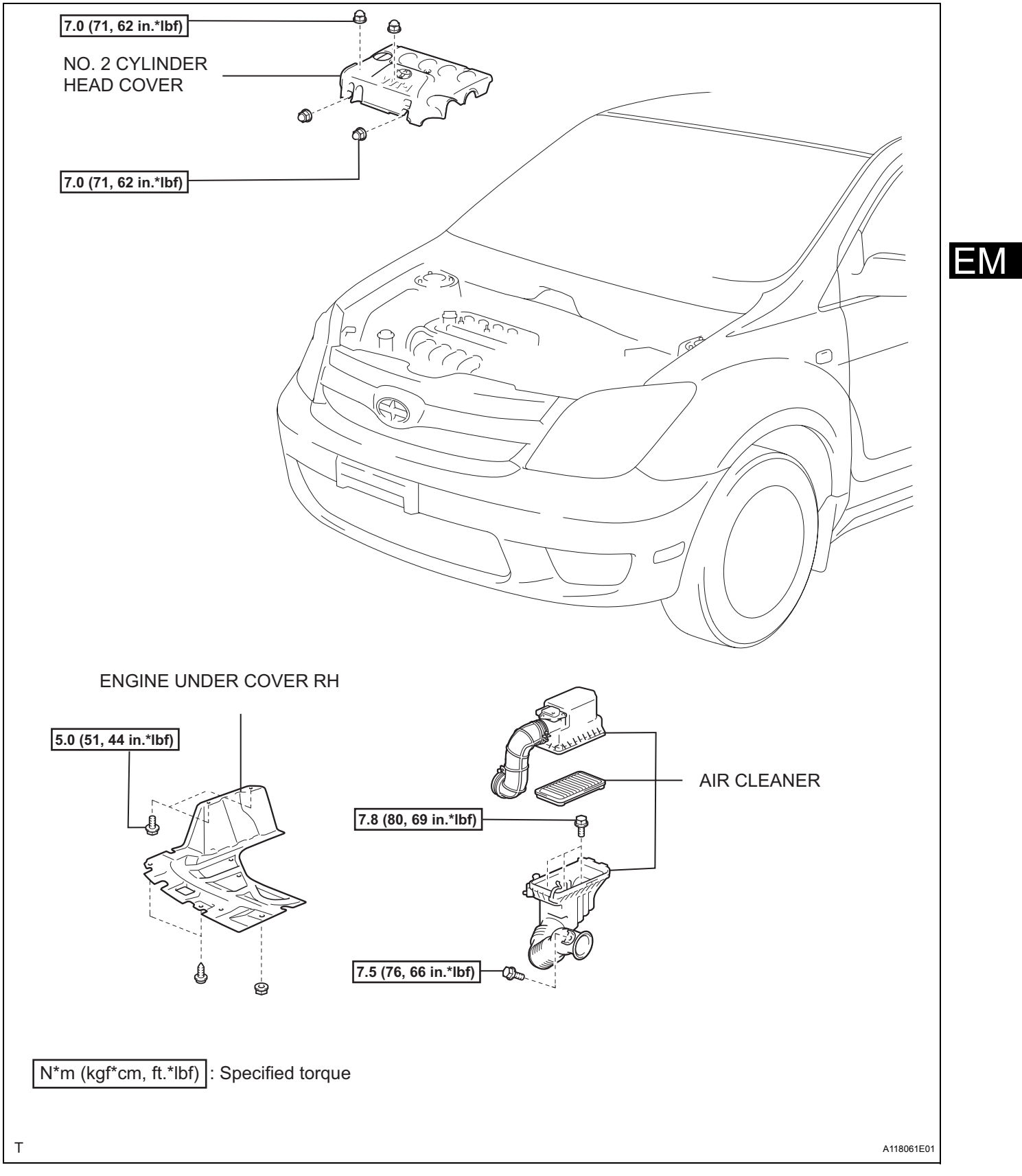
55. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

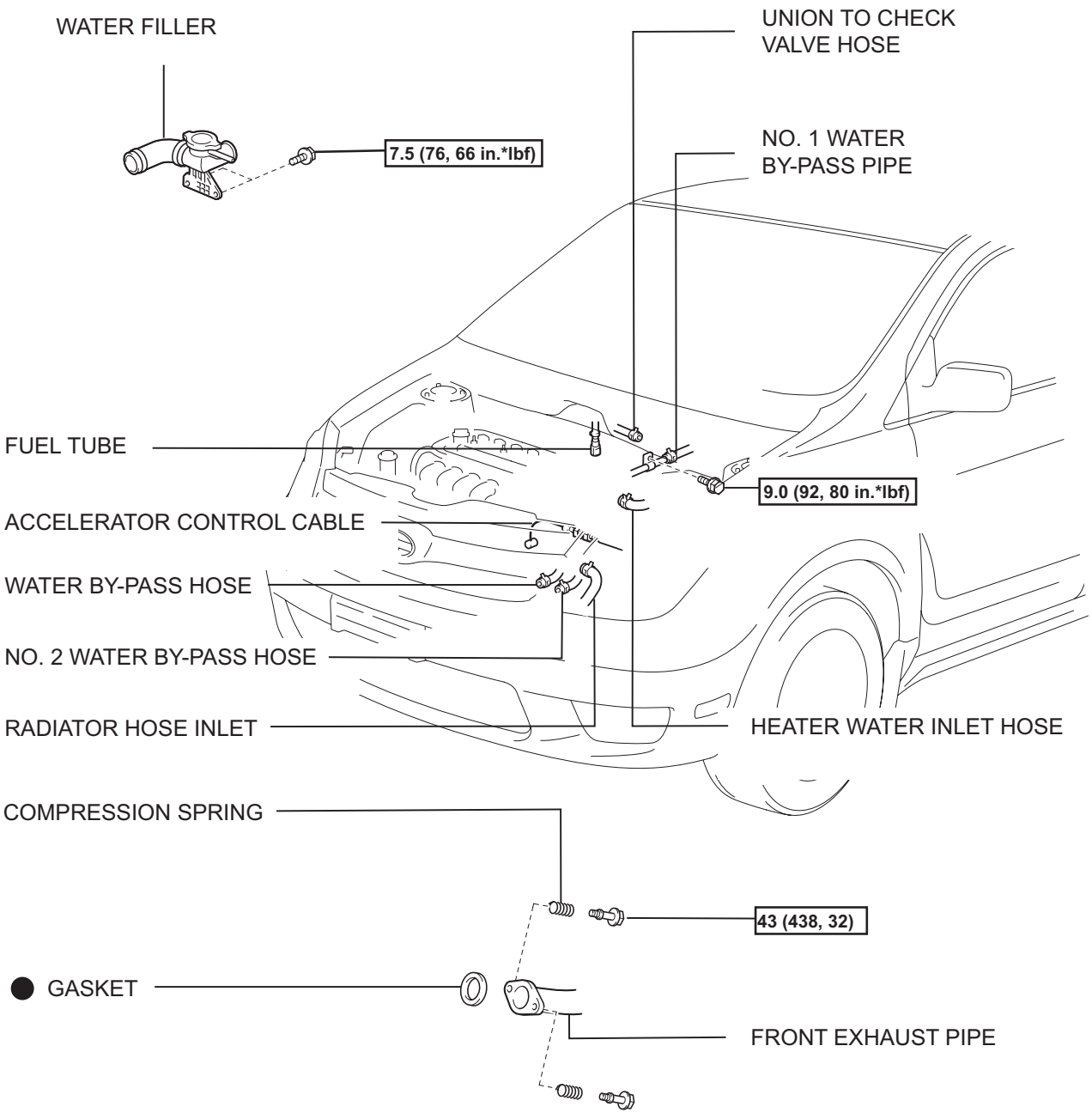
CYLINDER HEAD

COMPONENTS



EM

EM

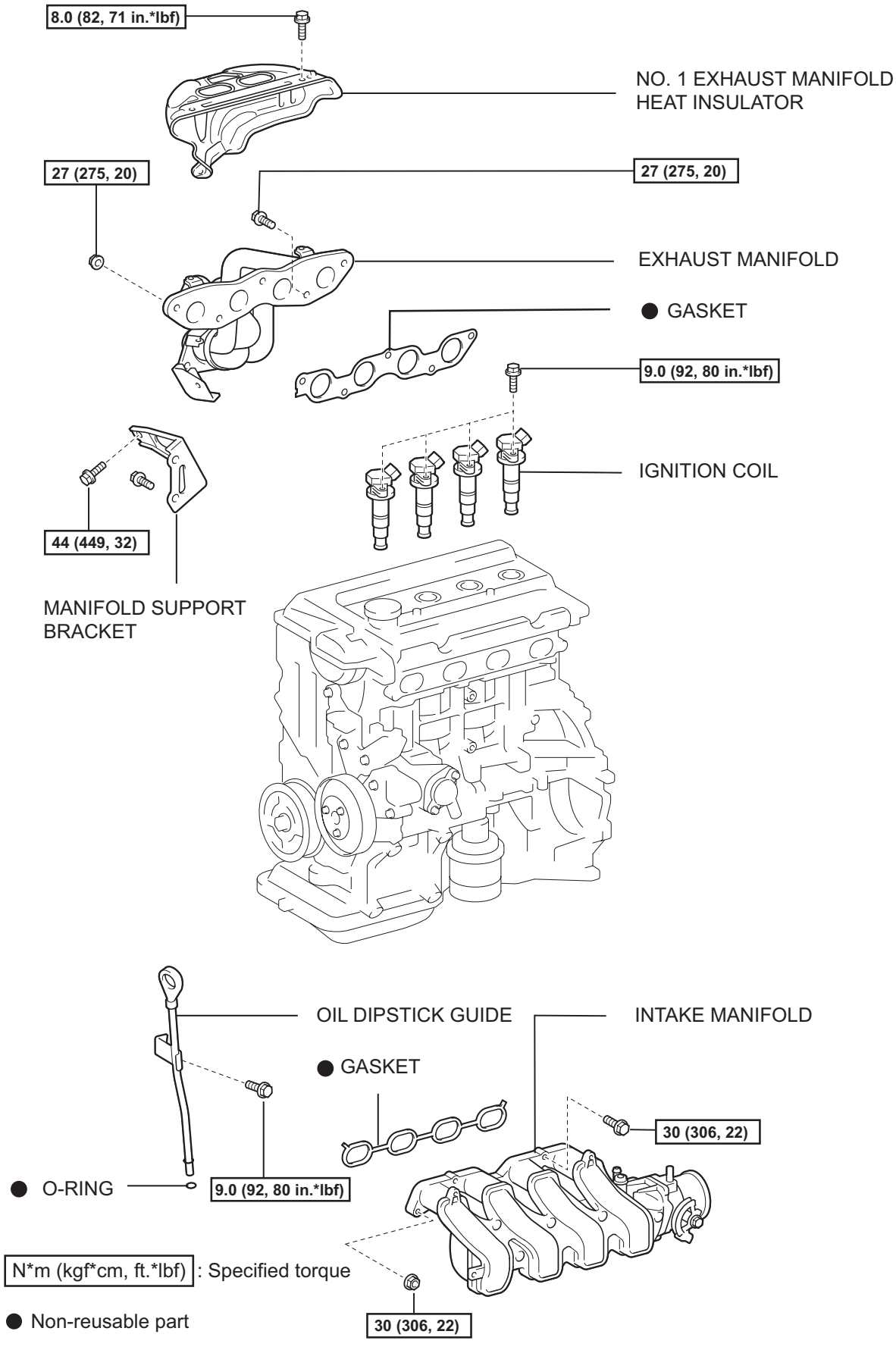


N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

T

A118048E01

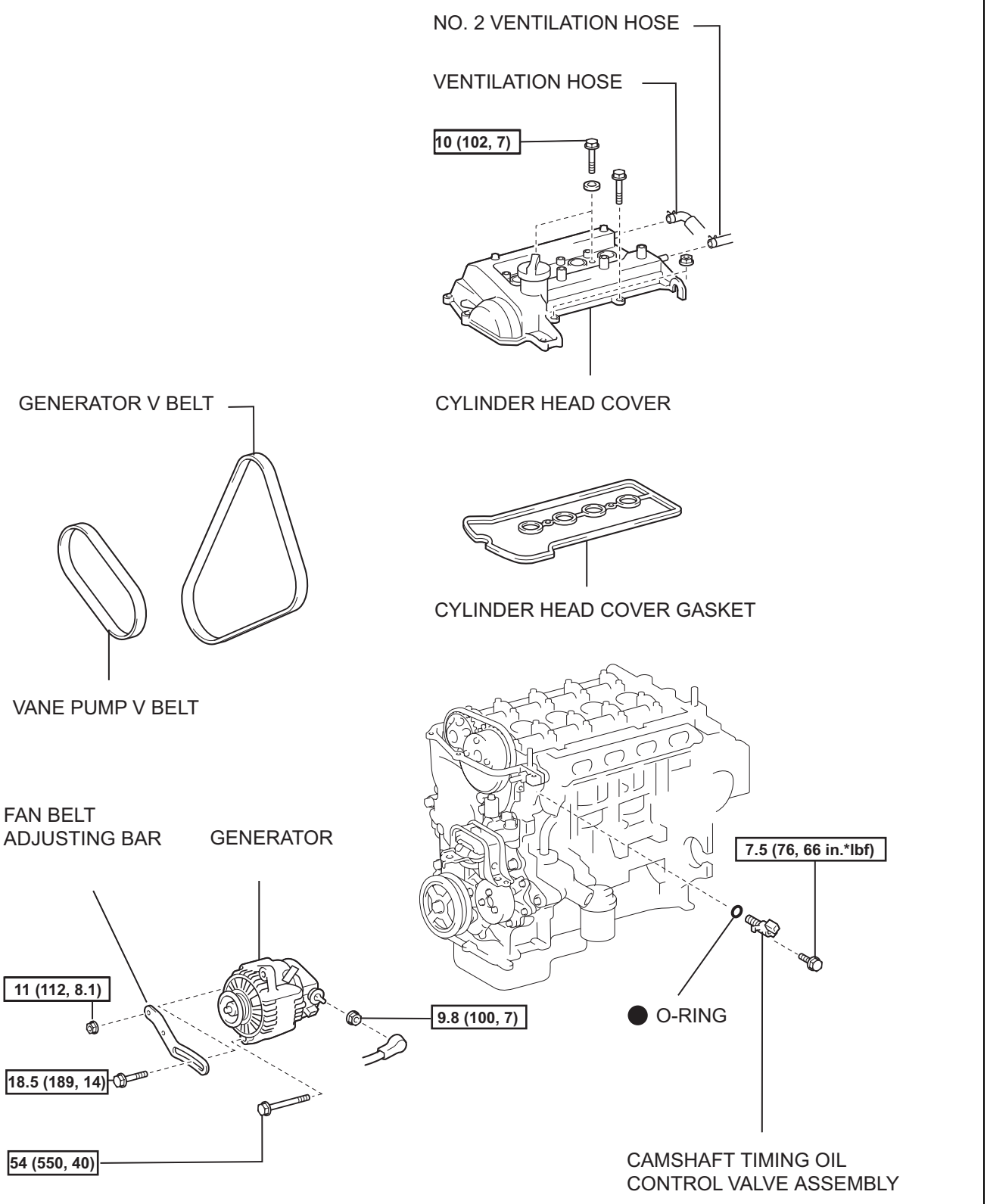


EM

P

A118046E01

EM

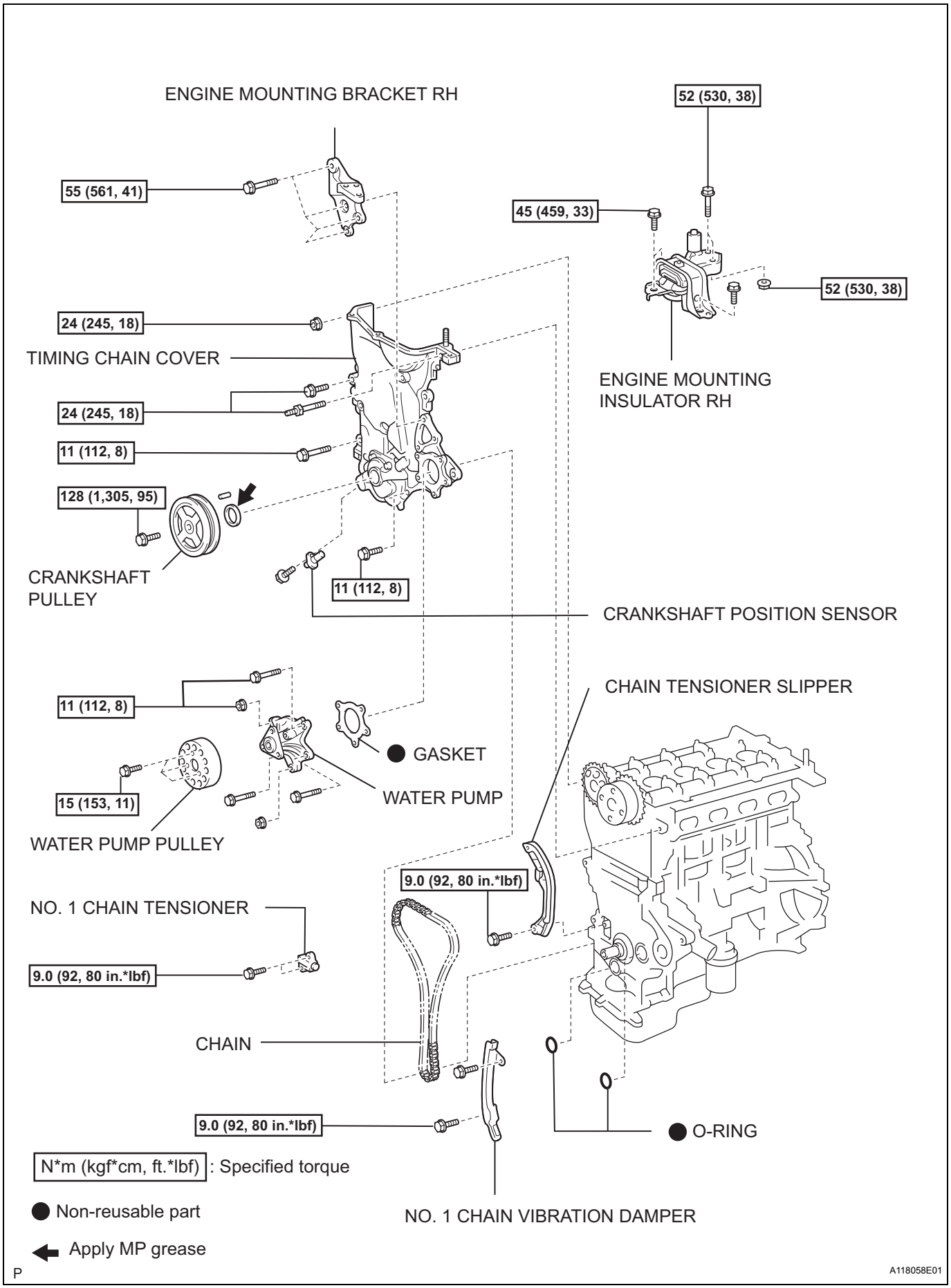


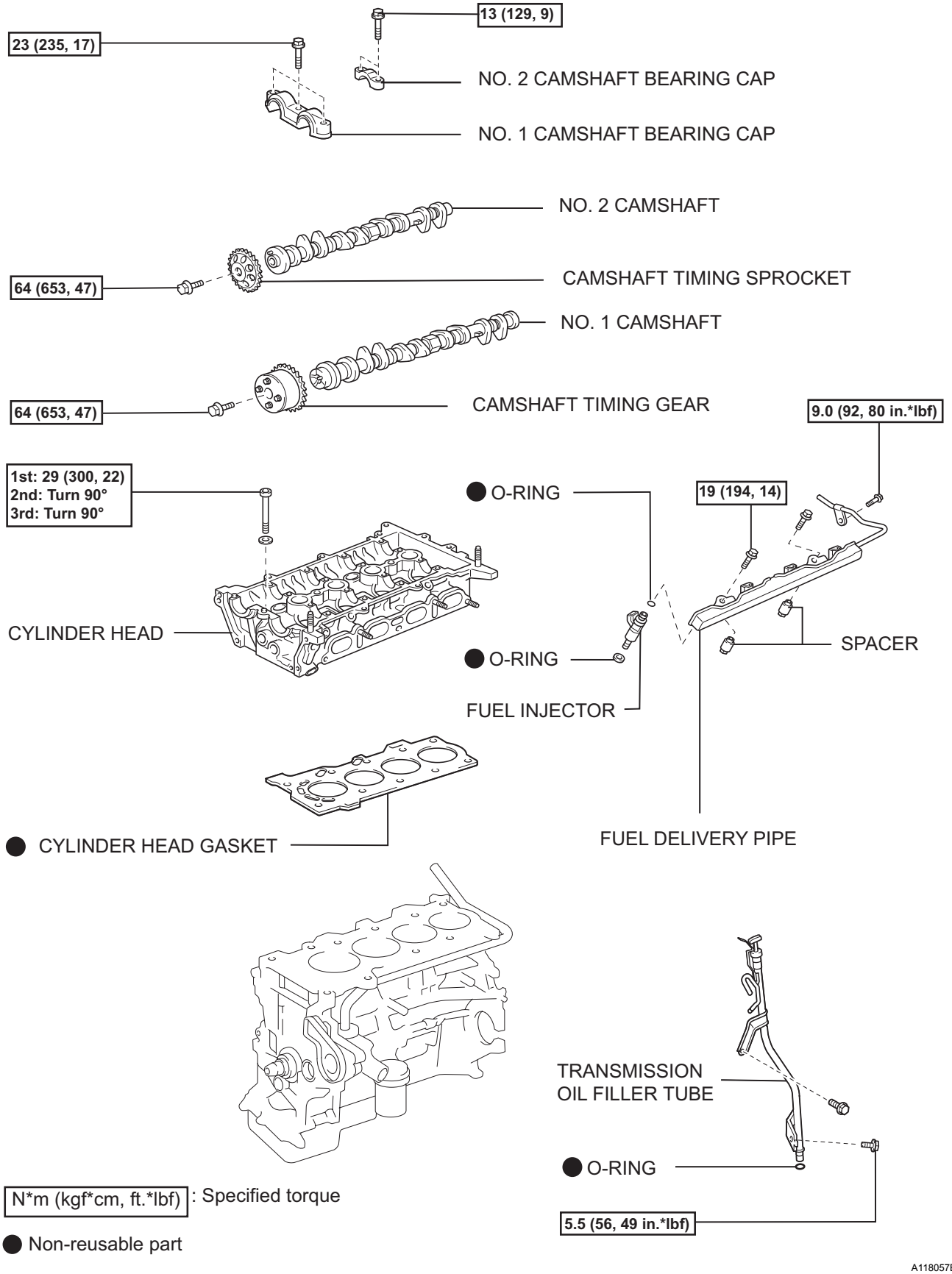
N*m (kgf*cm, ft.*lbf) : Specified torque

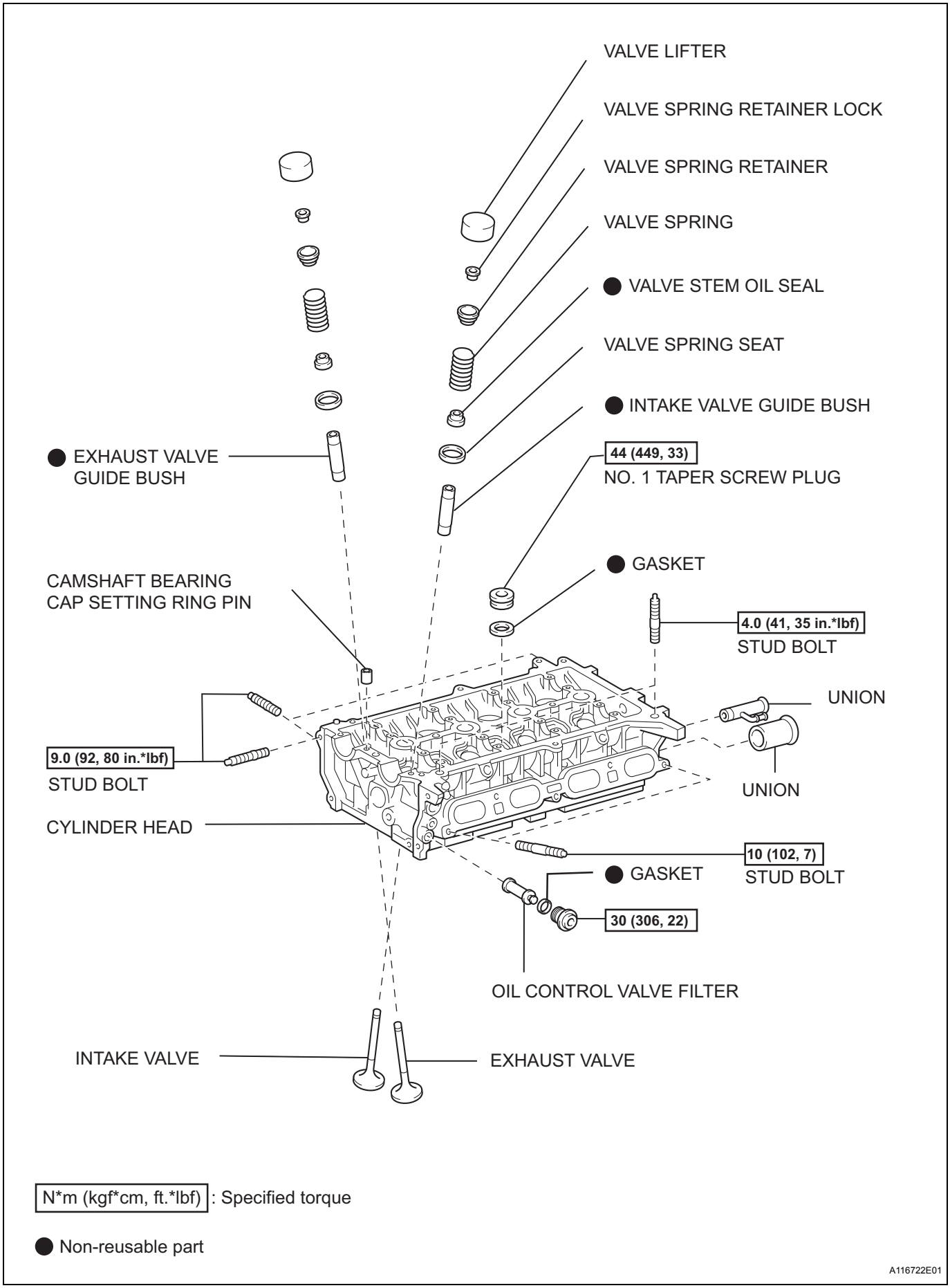
● Non-reusable part

P

A118060E01


ENGINE MOUNTING BRACKET RH
52 (530, 38)
55 (561, 41)
45 (459, 33)
52 (530, 38)
24 (245, 18)
TIMING CHAIN COVER
ENGINE MOUNTING INSULATOR RH
24 (245, 18)
11 (112, 8)
128 (1,305, 95)
CRANKSHAFT PULLEY
11 (112, 8)
CRANKSHAFT POSITION SENSOR
CHAIN TENSIONER SLIPPER
11 (112, 8)
GASKET
15 (153, 11)
WATER PUMP
WATER PUMP PULLEY
9.0 (92, 80 in.*lbf)
NO. 1 CHAIN TENSIONER
9.0 (92, 80 in.*lbf)
CHAIN
9.0 (92, 80 in.*lbf)
O-RING
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Apply MP grease
NO. 1 CHAIN VIBRATION DAMPER
P
A118058E01


13 (129, 9)
23 (235, 17)
NO. 2 CAMSHAFT BEARING CAP
NO. 1 CAMSHAFT BEARING CAP
NO. 2 CAMSHAFT
64 (653, 47)
CAMSHAFT TIMING SPROCKET
NO. 1 CAMSHAFT
64 (653, 47)
CAMSHAFT TIMING GEAR
9.0 (92, 80 in.*lbf)
1st: 29 (300, 22)
2nd: Turn 90°
3rd: Turn 90°
O-RING
19 (194, 14)
CYLINDER HEAD
O-RING
SPACER
FUEL INJECTOR
CYLINDER HEAD GASKET
FUEL DELIVERY PIPE
TRANSMISSION
OIL FILLER TUBE
O-RING
5.5 (56, 49 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
A118057E01



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

A116722E01

EM

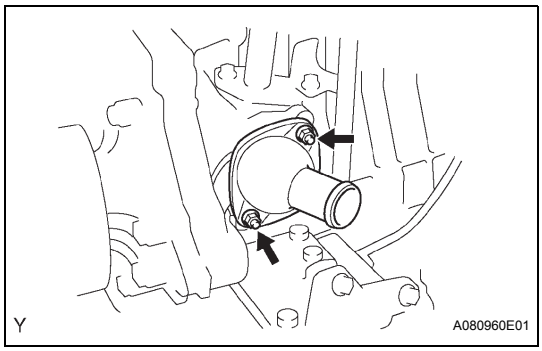
DISASSEMBLY

1. REMOVE SPARK PLUG

(a) Using a 16 mm plug wrench, remove the 4 spark plugs.

2. REMOVE THERMOSTAT

(a) Remove the 2 nuts and water inlet.
(b) Remove the thermostat.
(c) Remove the gasket from the thermostat.

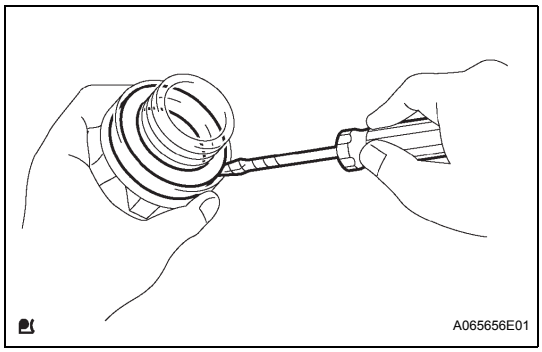


3. REMOVE OIL FILLER CAP

(a) Remove the oil filler cap from the cylinder head cover.

4. REMOVE OIL FILLER CAP GASKET

(a) Using a screwdriver, remove the gasket from the oil filler cap.
HINT:
Tape the screwdriver tip before use.

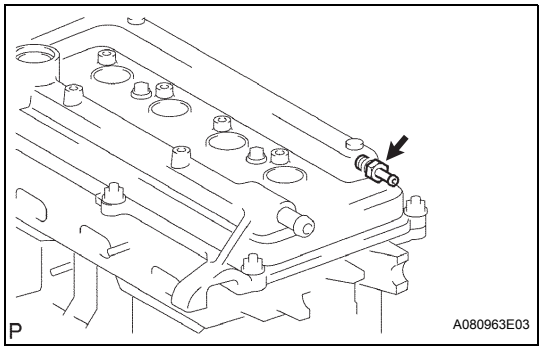


5. REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the bolt and crankshaft position sensor.

6. REMOVE VENTILATION VALVE

(a) Remove the ventilation valve from the cylinder head cover.

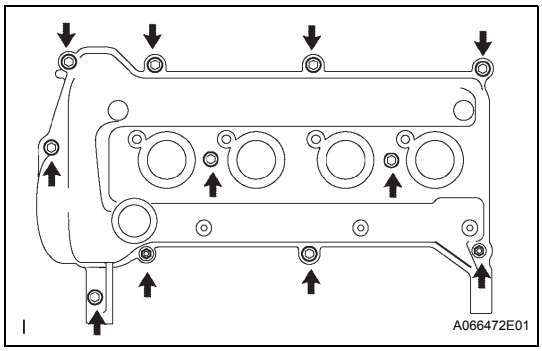


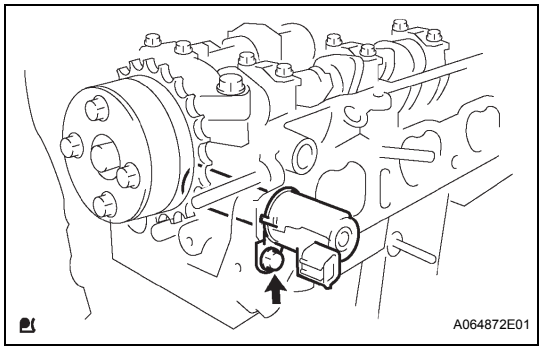
7. REMOVE CYLINDER HEAD COVER

(a) Remove the 9 bolts, 2 nuts and cylinder head cover.

8. REMOVE CYLINDER HEAD COVER GASKET

(a) Remove the gasket from the cylinder head cover.



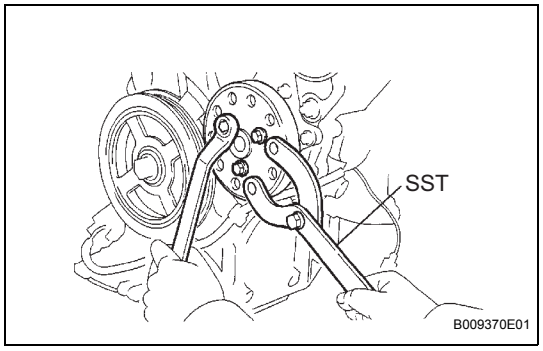


9. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Remove the bolt and oil control valve.

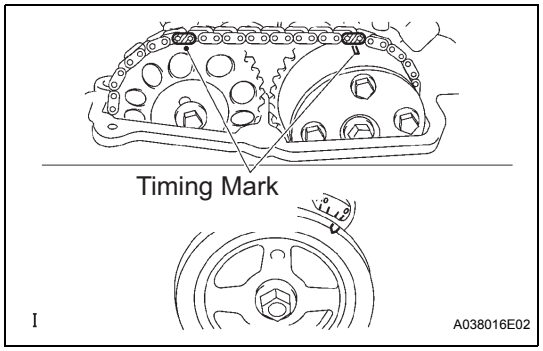
10. REMOVE OIL DIPSTICK GUIDE

(a) Remove the bolt and dipstick guide.



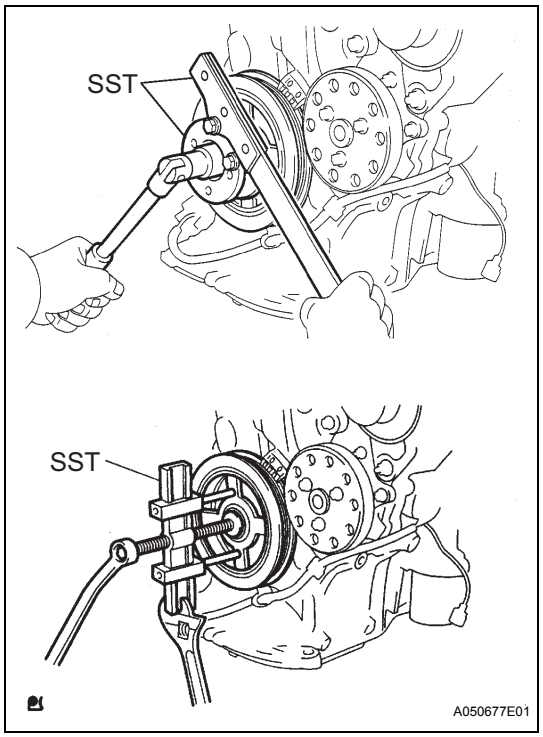
11. REMOVE WATER PUMP PULLEY

(a) Using SST, hold the pump pulley and remove the 3 bolts and pump pulley.
SST 09960-10010 (09962-01000, 09963-00600)

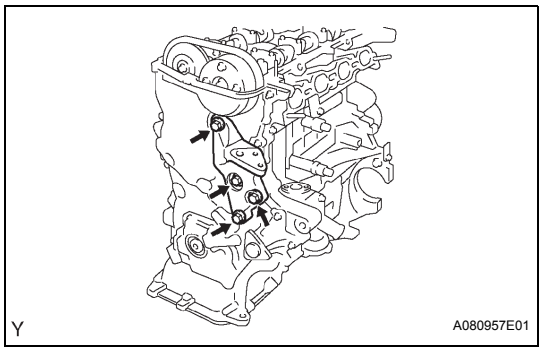


12. REMOVE CRANKSHAFT PULLEY

(a) Set the No. 1 cylinder to TDC/compression.
(1) Turn the crankshaft pulley until its timing notch and the timing mark 0 of the chain cover are aligned.
(2) Check that both timing marks on the camshaft timing sprocket and the camshaft timing gear are facing upward as shown in the illustration. If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.

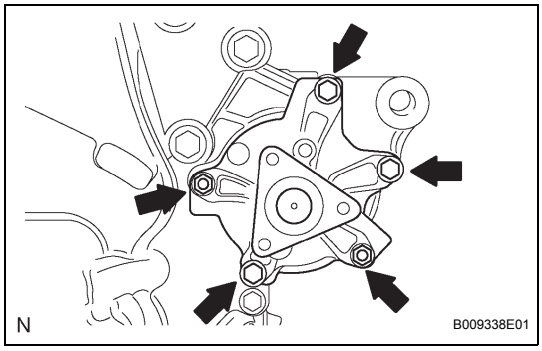


(b) Using SST, remove the pulley bolt.
SST 09213-58012 (91111-50845), 09330-00021
If necessary, remove the pulley with SST.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)



13. REMOVE ENGINE MOUNTING BRACKET RH

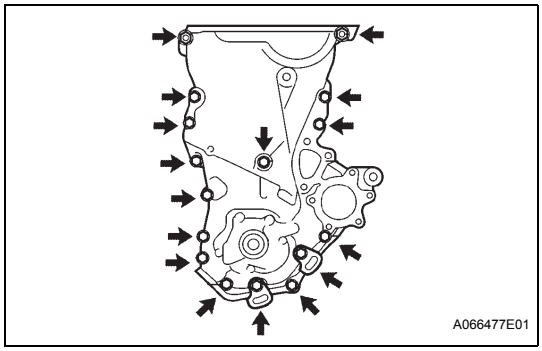
(a) Remove the 4 bolts and engine mounting bracket RH.



14. REMOVE WATER PUMP

(a) Remove the 3 bolts and 2 nuts.

(b) Remove the water pump and gasket.



15. REMOVE TIMING CHAIN COVER

(a) Remove the 15 bolts and nut.

(b) Using a screwdriver with the tip wrapped in tape, remove the chain cover by prying between the cylinder head and cylinder block.

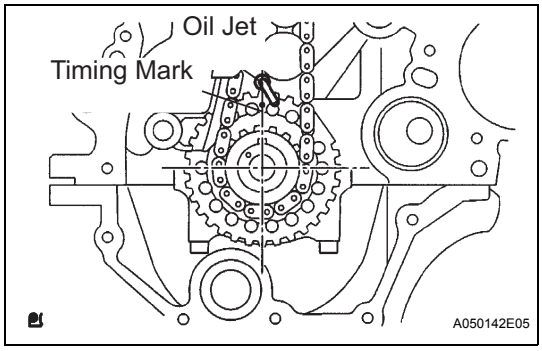
NOTICE:

Be careful not to damage the contact surfaces of the chain cover, the cylinder head and the cylinder block.

(c) Remove the 2 O-rings from the cylinder block and No. 1 oil pan.

(d) Using an 8 mm hexagon wrench, remove the screw plug from the oil pump.

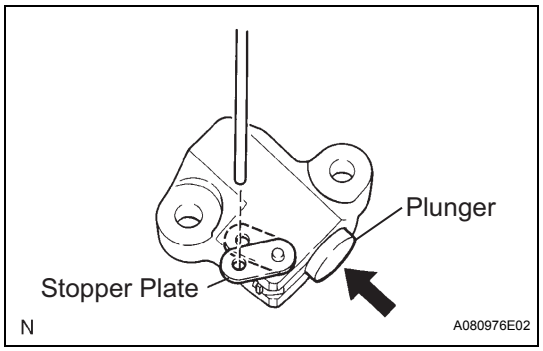
16. REMOVE OIL PUMP SEAL (See page EM-106)



17. REMOVE NO. 1 CHAIN TENSIONER

NOTICE:

- **When rotating the camshaft with the timing chain removed, rotate the crankshaft counterclockwise 40° from the TDC and align the oil jet hole with the paint mark to prevent the pistons from coming into contact with the valves.**
- **Do not rotate the crankshaft with the chain tensioner removed.**



(a) While rotating the stopper plate of the chain tensioner upward with a screwdriver, push in the plunger of the tensioner as shown in the illustration.
(b) While rotating the stopper plate of the tensioner downward, insert a 2.5 mm (0.098 in.) diameter bar into the holes of the stopper plate and the tensioner to hold the stopper plate.
(c) Remove the 2 bolts and chain tensioner.

18. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the bolt and chain tensioner slipper.

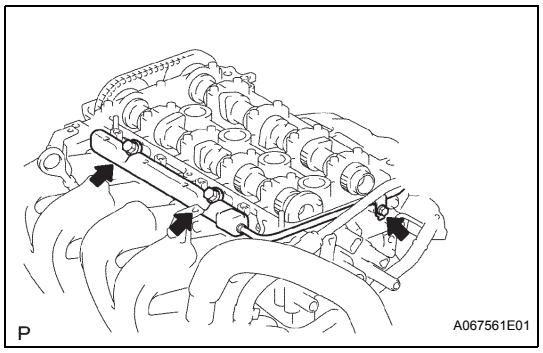
19. REMOVE NO. 1 CHAIN VIBRATION DAMPER

(a) Remove the 2 bolts and chain vibration damper.

20. REMOVE CHAIN

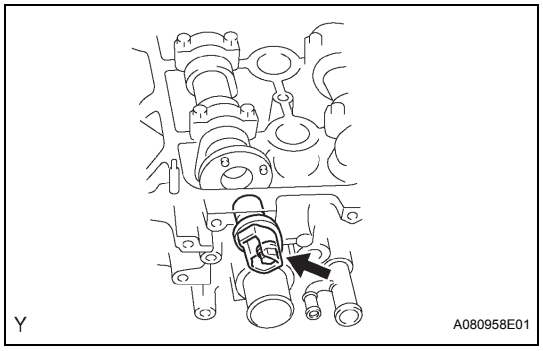
21. REMOVE FUEL DELIVERY PIPE

(a) Remove the 3 bolts and fuel delivery pipe together with the 4 fuel injectors.



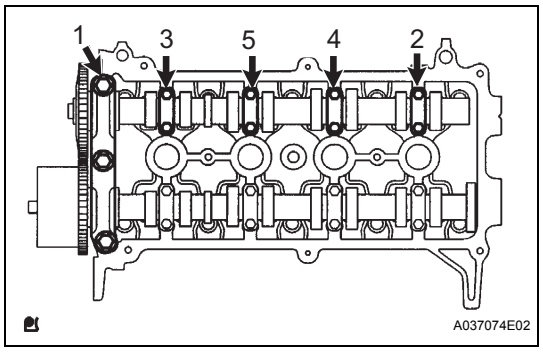
22. REMOVE FUEL INJECTOR

(a) Pull out the 4 injectors from the delivery pipe.



23. REMOVE CAMSHAFT POSITION SENSOR

(a) Remove the bolt and camshaft position sensor.

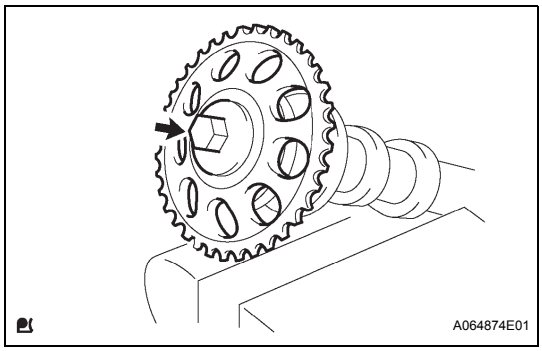


24. REMOVE NO. 2 CAMSHAFT

(a) Using several steps, uniformly loosen and remove the 11 bearing cap bolts in the sequence shown in the illustration, and then remove the 5 bearing caps and No. 2 camshaft.

NOTICE:

Loosen each bolt uniformly, keeping the camshaft level.



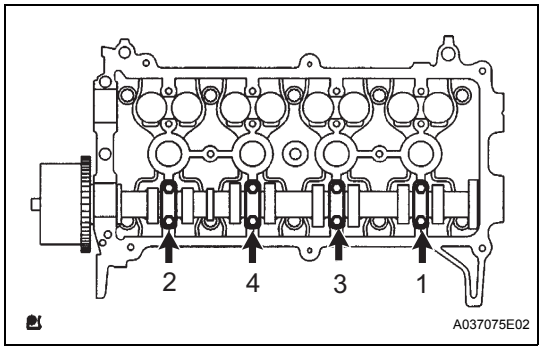
25. REMOVE CAMSHAFT TIMING SPROCKET

(a) Clamp the camshaft in a vise.

(b) Remove the flange bolt and camshaft timing sprocket.

NOTICE:

Be careful not to damage the camshaft.

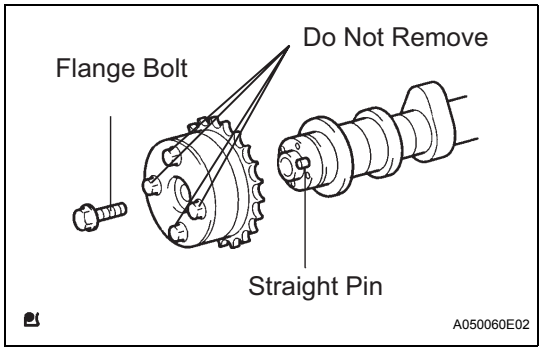


26. REMOVE CAMSHAFT

(a) Using several steps, uniformly loosen and remove the 8 bearing cap bolts in the sequence shown in the illustration, and then remove the 4 bearing caps and camshaft.

NOTICE:

Loosen each bolt uniformly, keeping the camshaft level.



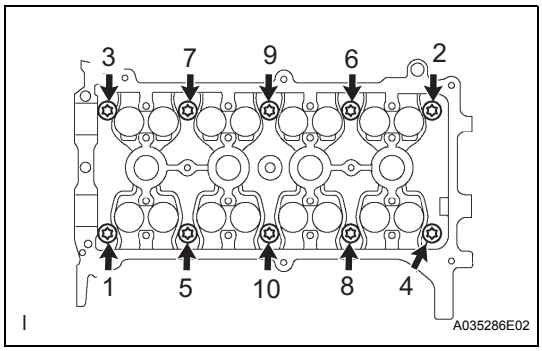
27. REMOVE CAMSHAFT TIMING GEAR

(a) Turn the valve timing controller assembly at the most advanced angle (see page EM-50).

(b) Remove the flange bolt and camshaft timing gear.

NOTICE:

- **Be careful not to remove the other 4 bolts.**
- **If reusing the camshaft timing gear, unlock the lock pin inside the camshaft timing gear first.**



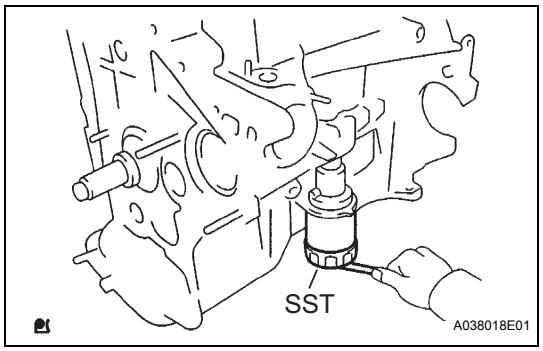
28. REMOVE CYLINDER HEAD

(a) Using several steps, uniformly loosen and remove the 10 cylinder head bolts with an 8 mm bi-hexagon wrench in the sequence shown in the illustration. Remove the 10 cylinder head bolts and plate washers.

NOTICE:

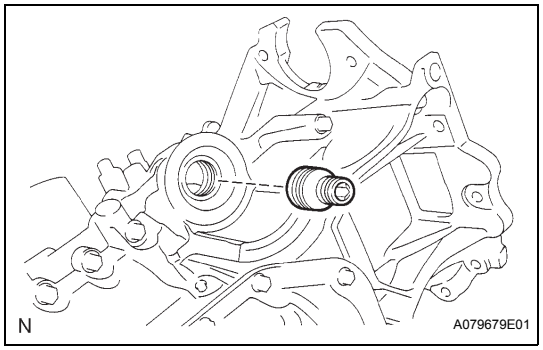
- **Be careful not to drop washers into the cylinder head.**
- **Head warpage or cracking could result from removing bolts in the incorrect order.**

29. REMOVE CYLINDER HEAD GASKET



30. REMOVE OIL FILTER

(a) Using SST, remove the oil filter.
SST 09228-06501

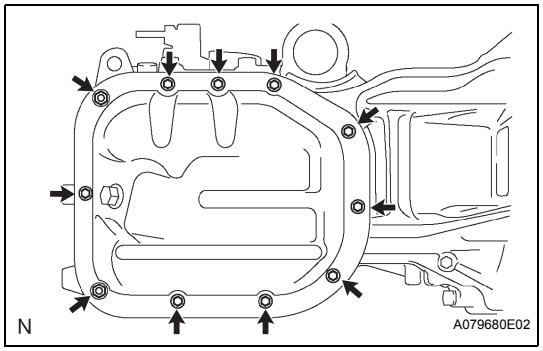


31. REMOVE OIL FILTER UNION

(a) Using a 12 mm hexagon wrench, remove the oil filter union.

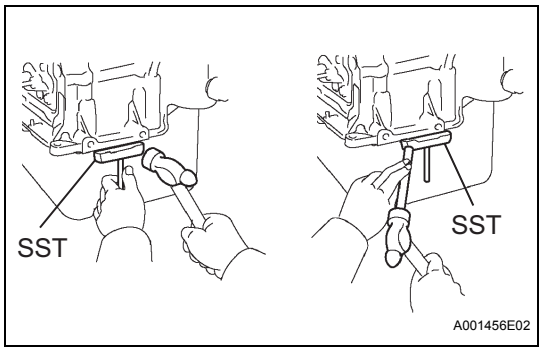
32. REMOVE ENGINE REAR OIL SEAL (See page EM-107)

EM



33. REMOVE NO. 2 OIL PAN

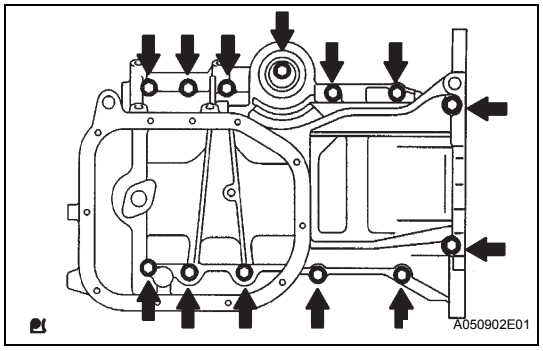
(a) Remove the oil pan drain plug and gasket.
(b) Remove the 9 bolts and 2 nuts.



(c) Insert the blade of SST between the oil pan and No. 2 oil pan, cut off the applied sealer and remove the No. 2 oil pan.
SST 09032-00100
NOTICE:
Be careful not to damage the oil pan and No. 2 oil pan.

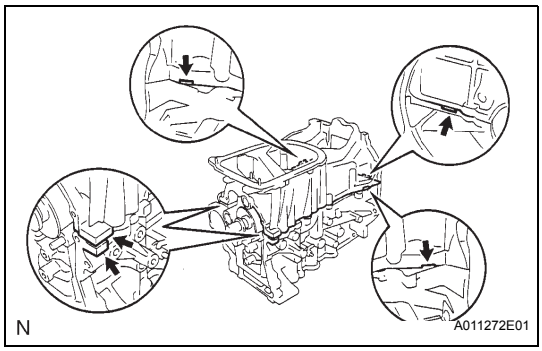
34. REMOVE OIL STRAINER

(a) Remove the bolt and 2 nuts.
(b) Remove the oil strainer and gasket.

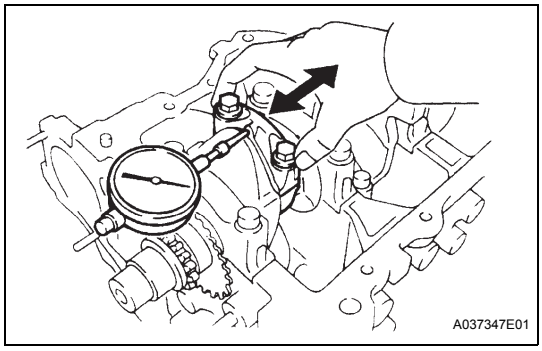


35. REMOVE OIL PAN

(a) Loosen and remove the 13 bolts uniformly in several steps.



(b) Using a screwdriver, remove the oil pan by prying between the cylinder block and oil pan.
NOTICE:
Be careful not to damage the contact surfaces of the oil pan and cylinder block.
(c) Remove the 2 O-rings from the cylinder block.
(d) Remove the 4 stud bolts.

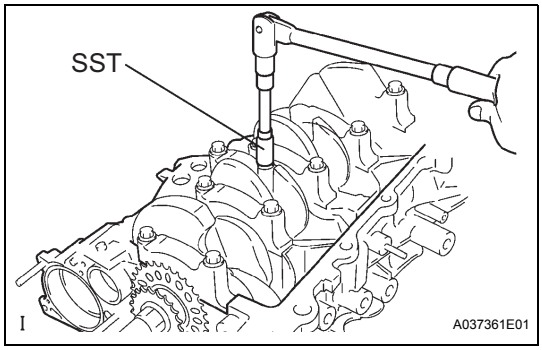


36. INSPECT CONNECTING ROD THRUST CLEARANCE

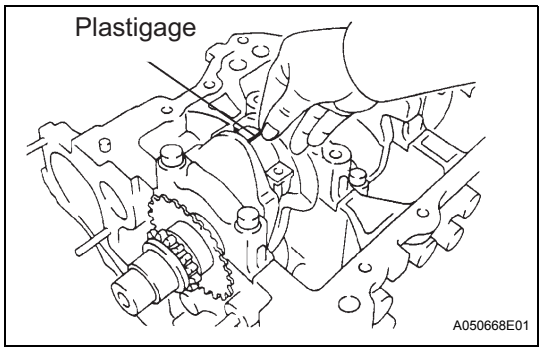
(a) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.
Standard thrust clearance:
0.16 to 0.36 mm (0.0063 to 0.0142 in.)
Maximum thrust clearance:
0.36 mm (0.0142 in.)
If the thrust clearance is greater than the maximum, replace the connecting rod.

37. INSPECT CONNECTING ROD OIL CLEARANCE

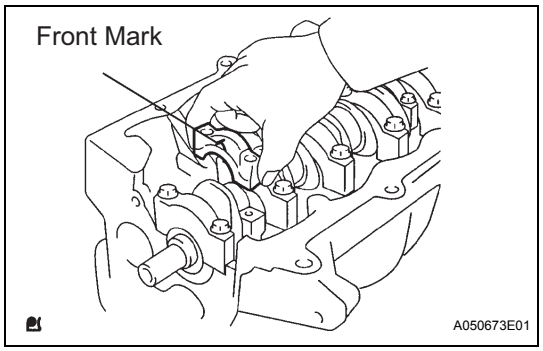
(a) Check that the matchmarks on the connecting rod and cap are aligned to ensure the correct reassembly.



(b) Using SST, remove the 2 connecting rod cap bolts.
SST 09205-16010
(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.
(d) Clean the crank pin and bearing.
(e) Check the crank pin and bearing for pitting and scratches.

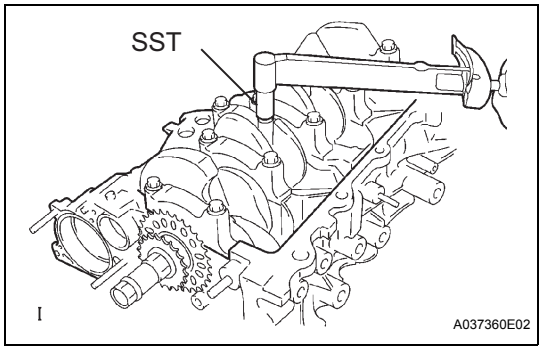


(f) Lay a strip of Plastigage across the crank pin.

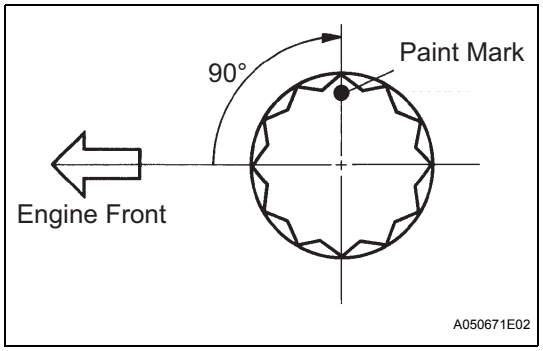


(g) Match together the connecting rod and cap in the correct combination. Then install the cap onto the connecting rod, making sure that the front mark on the cap is correctly oriented.

(h) Apply a light coat of engine oil to the threads of the connecting rod cap bolts.



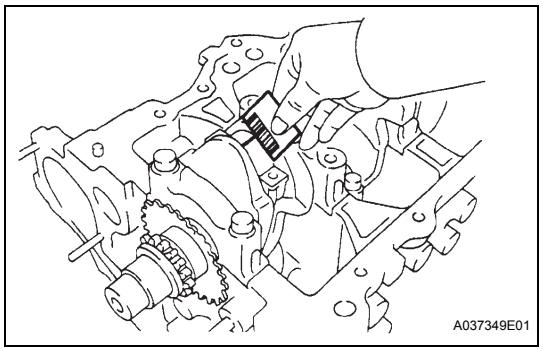
(i) Using SST, tighten the bolts in several steps by the specified torque.
SST 09205-16010
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)
NOTICE:
Do not turn the crankshaft.



(j) Mark the front of the connecting cap bolts with paint.

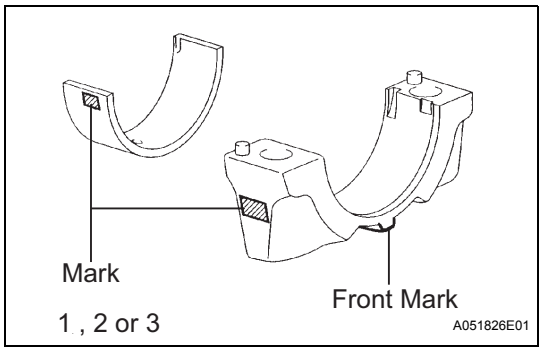
(k) Retighten the cap bolts by 90° as shown in the illustration.
NOTICE:
Do not turn the crankshaft.

(l) Remove the 2 bolts, connecting rod cap and lower bearing.



(m) Measure the Plastigage at its widest point.
Standard oil clearance:
0.016 to 0.040 mm (0.0006 to 0.0016 in.)
Maximum oil clearance:
0.06 mm (0.0024 in.)
NOTICE:
Completely remove the Plastigage.

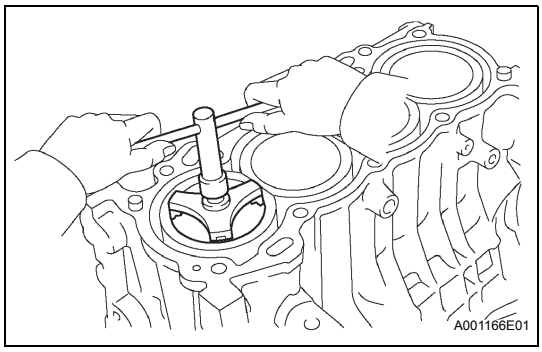
EM



(n) If the oil clearance is greater than the maximum, select and replace the bearing. If necessary, use an undersized bearing.

Reference

Number Mark	Connecting Rod External Diameter	Center Bearing Thickness	Oil Clearance
1	43.000 to 43.008 mm (1.6929 to 1.6932 in.)	1.491 to 1.494 mm (0.0587 to 0.0588 in.)	0.012 to 0.034 mm (0.0005 to 0.0013 in.)
2	43.008 to 43.016 mm (1.6932 to 1.6935 in.)	1.494 to 1.497 mm (0.0588 to 0.0589 in.)	0.014 to 0.036 mm (0.0006 to 0.0014 in.)
3	43.016 to 43.024 mm (1.6935 to 1.6939 in.)	1.497 to 1.500 mm (0.0589 to 0.0591 in.)	0.016 to 0.038 mm (0.0006 to 0.0015 in.)
U/S 0.25	43.000 to 43.024 mm (1.6929 to 1.6939 in.)	1.608 to 1.614 mm (0.0633 to 0.0635 in.)	0.016 to 0.040 mm (0.0006 to 0.0016 in.)

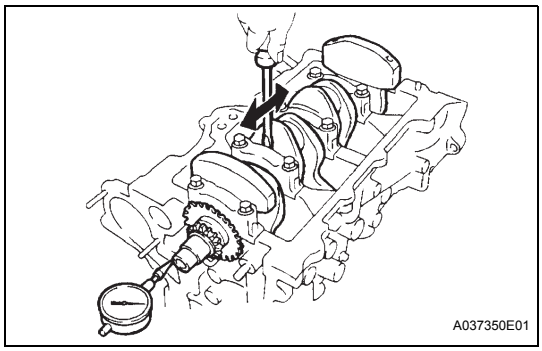


38. REMOVE PISTON WITH CONNECTING ROD

(a) Using a ridge reamer, remove all carbon from the top of the cylinder.

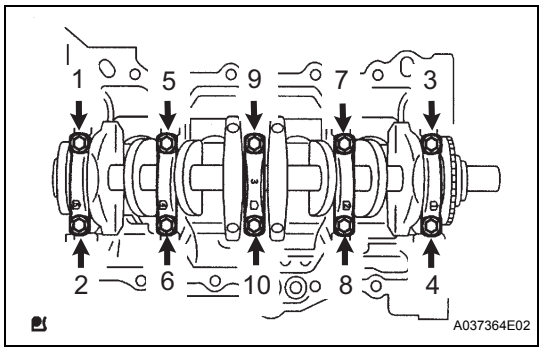
(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.
HINT:
- Keep the bearing, connecting rod and cap together.
- Keep the piston and the connecting rod assemblies in the correct order so that they can be returned to the original locations when re-assembling.

39. REMOVE CONNECTING ROD BEARING



40. INSPECT CRANKSHAFT THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.
Standard thrust clearance:
0.09 to 0.19 mm (0.0035 to 0.0075 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)
If the thrust clearance is greater than the maximum, replace the thrust washers as a set. Check the crankshaft and block for wear, and repair or replace if necessary.
HINT:
Thrust washer thickness: 2.43 to 2.48 mm (0.0957 to 0.0976 in.)

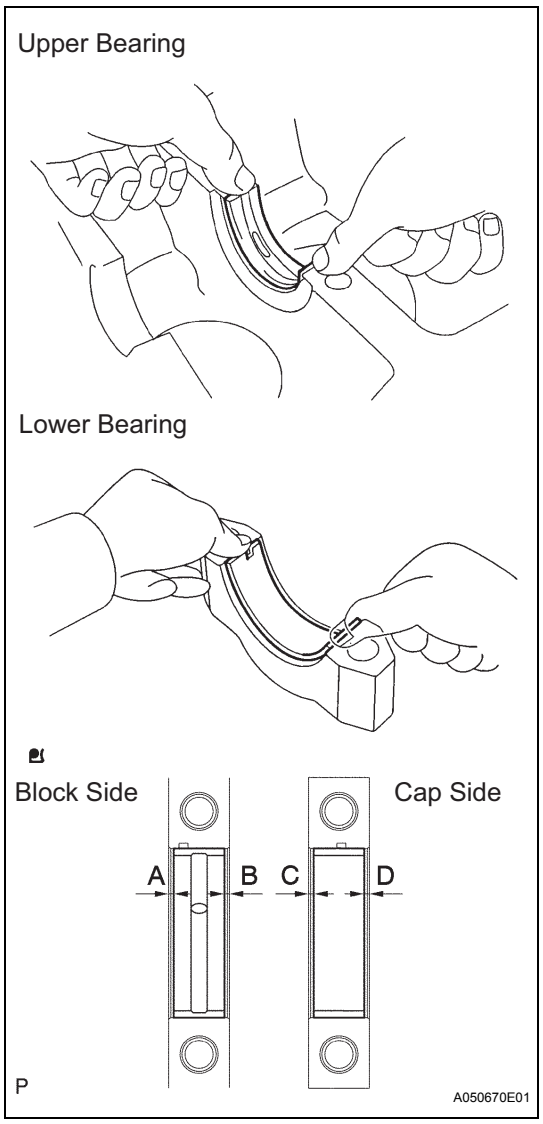


41. REMOVE CRANKSHAFT AND INSPECT OIL CLEARANCE

(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts with SST in the sequence shown in the illustration.
SST 09011-38121

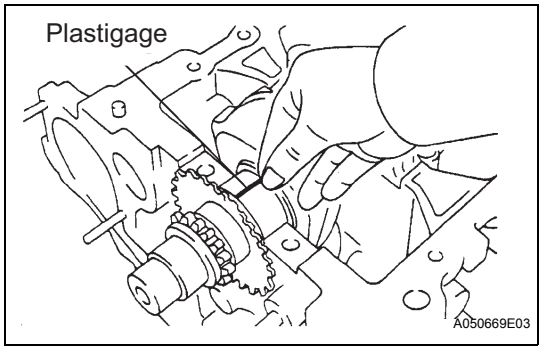
(b) Remove the 5 bearing caps and crankshaft.

(c) Clean each main journal and bearing.

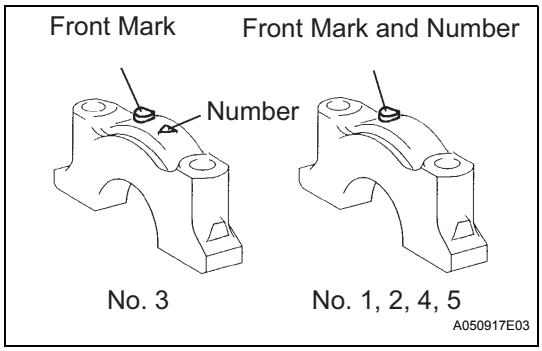


(d) Install the upper bearing with the oil groove onto the cylinder block, and the lower bearing onto the bearing cap.
NOTICE:
Do not apply engine oil to the contact surfaces of the cylinder block or the backside of the bearing.
HINT:
The mass production parts do not have claws as marks. If reusing the mass production parts, measure the clearance of both sides with the bearing in the center of the bearing cap.
Standard clearance:
A - B = within 0.8 mm (0.032 in.)
C - D = within 0.4 mm (0.016 in.)

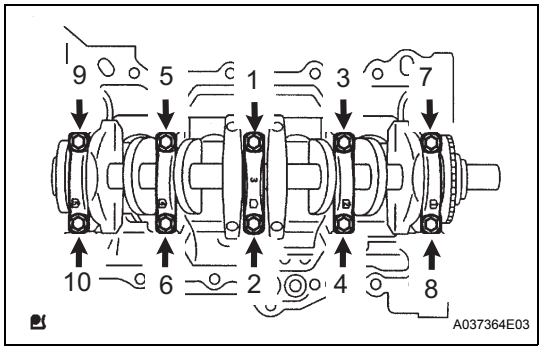
(e) Install the crankshaft onto the cylinder block.



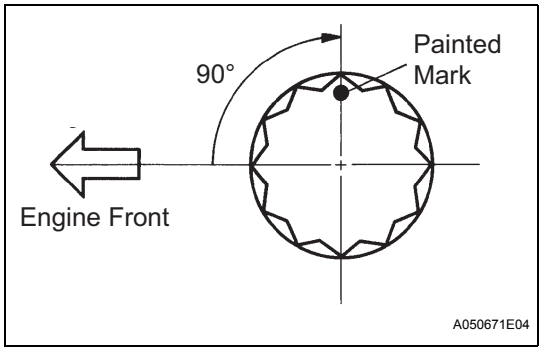
(f) Lay a strip of Plastigage across each journal.



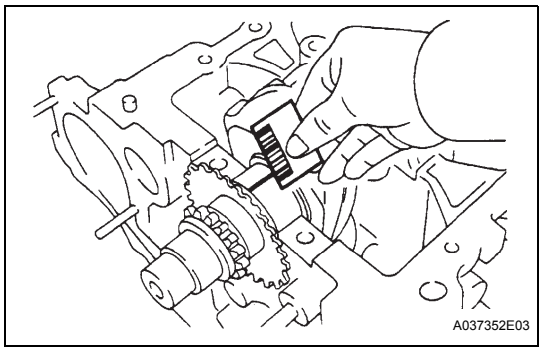
(g) Check the front marks and numbers and install the bearing caps onto the cylinder block.
(h) Apply a light coat of engine oil to the threads of the bearing cap bolts.



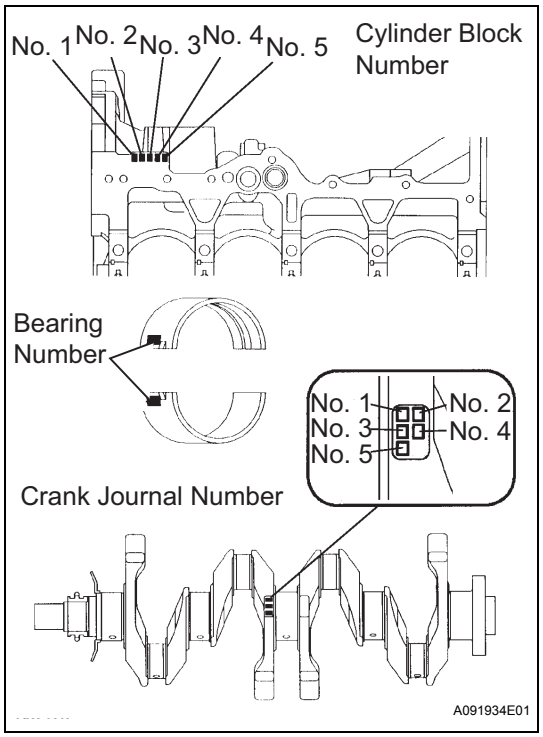
(i) Using SST, tighten the bolts in several steps by the specified torque in the sequence shown in the illustration.
SST 09011-38121
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)
NOTICE:
Do not turn the crankshaft.



(j) Mark the front of the bearing cap bolts with paint.
(k) Retighten the bearing cap bolts by 90° in the same sequence.
(l) Check that the painted mark is now at a 90° angle to the front.
NOTICE:
Do not turn the crankshaft.
(m) Remove the bearing cap.



(n) Measure the Plastigage at its widest point.
Standard oil clearance:
0.010 to 0.023 mm (0.0004 to 0.0009 in.)
Maximum oil clearance:
0.07 mm (0.0028 in.)
NOTICE:
Completely remove the Plastigage.



HINT:

- If the oil clearance is greater than the maximum, select and replace the bearing. If necessary, use an undersized bearing.
- To select the correct bearing size, calculate the bearing number by adding together the numbers imprinted on the cylinder block and crank journal. Example:
  Imprinted number on the cylinder block is 3.
  Imprinted number on the crank journal is 5. 3 + 5 = 8 Select the bearing with the bearing number 3.

Standard cylinder block diameter

Number	Specified Condition
0	50.000 to 50.003 mm (1.9685 to 1.9686 in.)
1	50.003 to 50.005 mm (1.9686 to 1.9687 in.)
2	50.005 to 50.007 mm (1.9687 to 1.9688 in.)
3	50.007 to 50.010 mm (1.9688 to 1.9689 in.)
4	50.010 to 50.012 mm (1.9689 to 1.9690 in.)
5	50.012 to 50.014 mm (1.9690 to 1.9691 in.)
6	50.014 to 50.016 mm (1.9691 to 1.9691 in.)

Standard crankshaft journal diameter

Number	Specified Condition
0	45.998 to 46.000 mm (1.8109 to 1.8110 in.)
1	45.996 to 45.998 mm (1.8109 to 1.8109 in.)
2	45.994 to 45.996 mm (1.8108 to 1.8109 in.)
3	45.992 to 45.994 mm (1.81071 to 1.81079 in.)
4	45.990 to 45.992 mm (1.8106 to 1.8107 in.)
5	45.988 to 45.990 mm (1.8106 to 1.8106 in.)

Reference

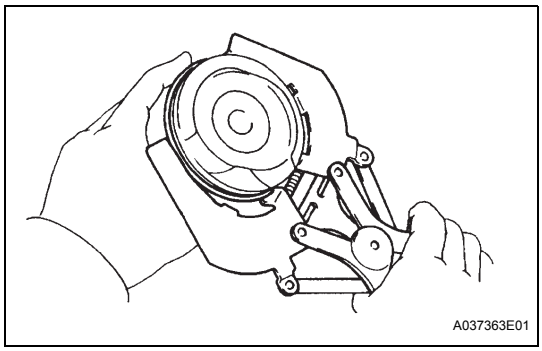
Cylinder Block Number + Crank Journal Number	Bearing Number	Center Bearing Thickness	Oil Clearance
0 to 2	1	1.992 to 1.995 mm (0.0784 to 0.0785 in.)	0.010 to 0.023 mm (0.0004 to 0.0009 in.)
3 to 5	2	1.995 to 1.998 mm (0.0785 to 0.0787 in.)	Same as above
6 to 8	3	1.998 to 2.001 mm (0.0787 to 0.0788 in.)	Same as above
9 to 11	4	2.001 to 2.004 mm (0.0788 to 0.0789 in.)	Same as above
-	U/S 0.25	2.111 to 2.117 mm (0.0831 to 0.0834 in.)	Same as above

42. REMOVE CRANKSHAFT BEARING

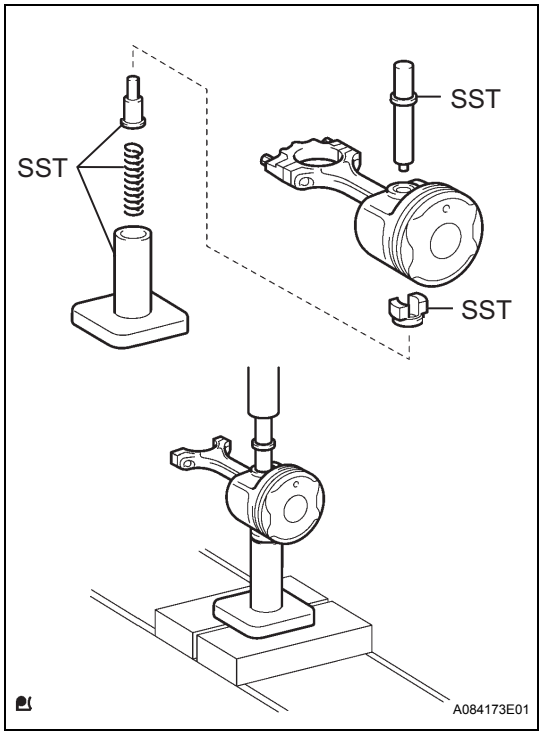
43. REMOVE PISTON RING SET

HINT:
Keep the piston rings in the correct combination and correct order so that they can be returned to the original locations when reassembling.

EM



(a) Using a piston ring expander, remove the 2 compression rings.
(b) Remove the 2 side rails and oil ring by hand.



44. REMOVE PISTON PIN

(a) Using SST, press out the piston pin from the piston.
SST 09221-25026 (09221-00021, 09221-00030, 09221-00190, 09221-00141, 09221-00150)
NOTICE:
Keep the pistons, pins, rings, connecting rods and bearings in the correct order so that they can be returned to the original locations when reassembling.

45. REMOVE CYLINDER BLOCK WATER DRAIN COCK

46. REMOVE STUD BOLT

(a) Using an E5 "torx" wrench, remove the 6 stud bolts.

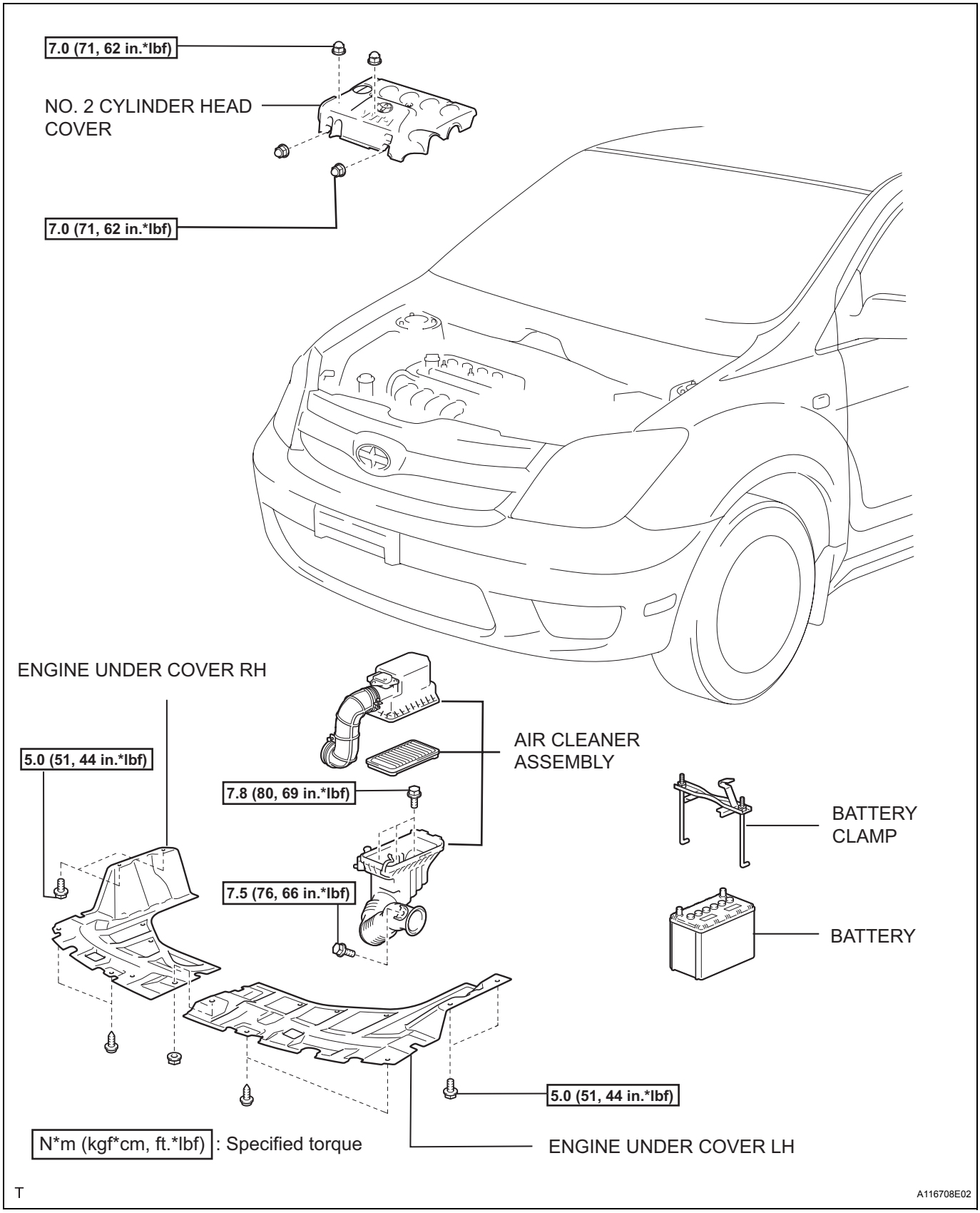
47. REMOVE STRAIGHT PIN

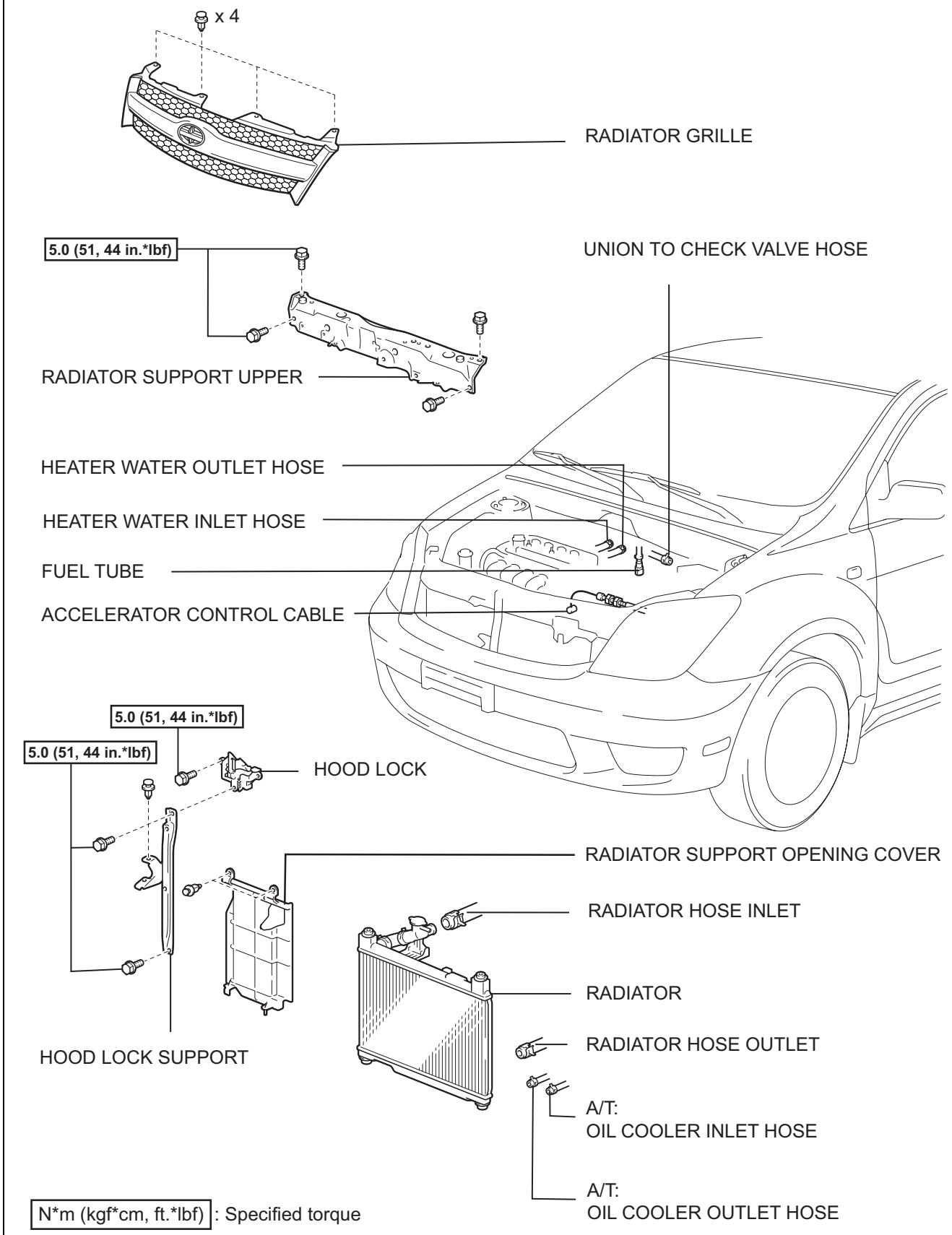
48. REMOVE END PLATE STRAIGHT PIN

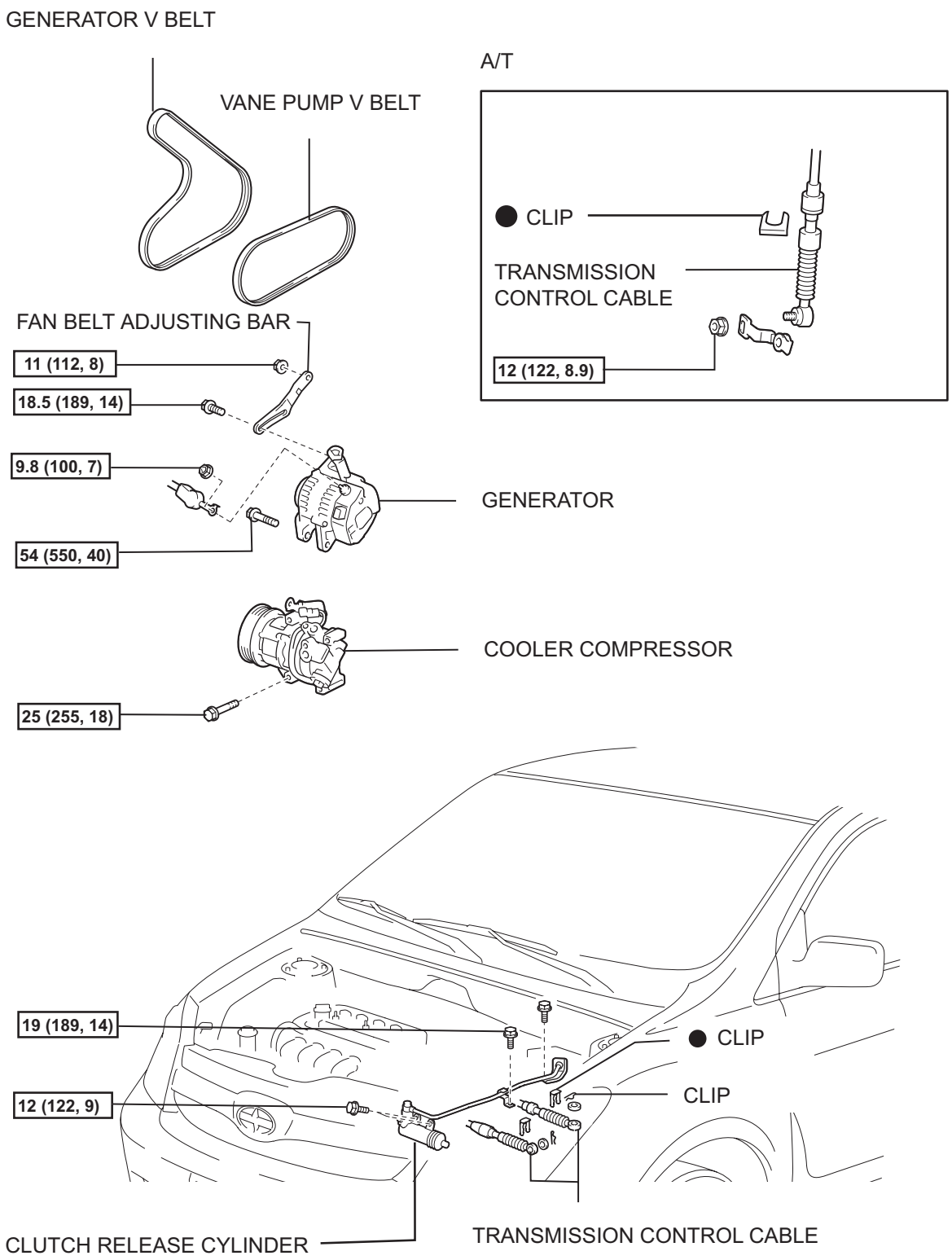
49. REMOVE TIGHT PLUG

ENGINE ASSEMBLY

COMPONENTS




x 4
RADIATOR GRILLE
5.0 (51, 44 in.*lbf)
UNION TO CHECK VALVE HOSE
RADIATOR SUPPORT UPPER
HEATER WATER OUTLET HOSE
HEATER WATER INLET HOSE
FUEL TUBE
ACCELERATOR CONTROL CABLE
5.0 (51, 44 in.*lbf)
5.0 (51, 44 in.*lbf)
HOOD LOCK
RADIATOR SUPPORT OPENING COVER
RADIATOR HOSE INLET
RADIATOR
RADIATOR HOSE OUTLET
HOOD LOCK SUPPORT
A/T:
OIL COOLER INLET HOSE
A/T:
OIL COOLER OUTLET HOSE
N*m (kgf*cm, ft.*lbf) : Specified torque
T
A116709E01



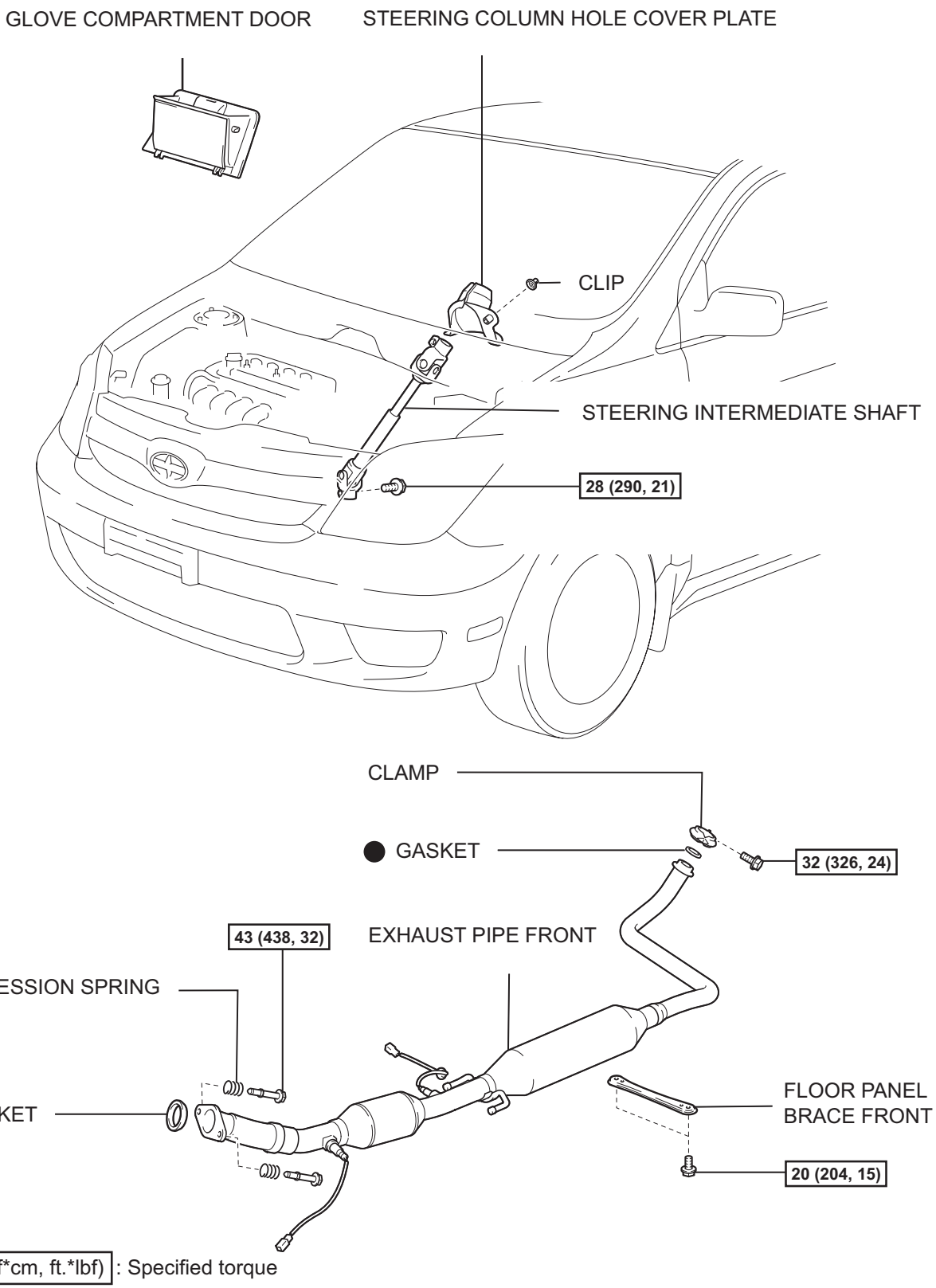
EM

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

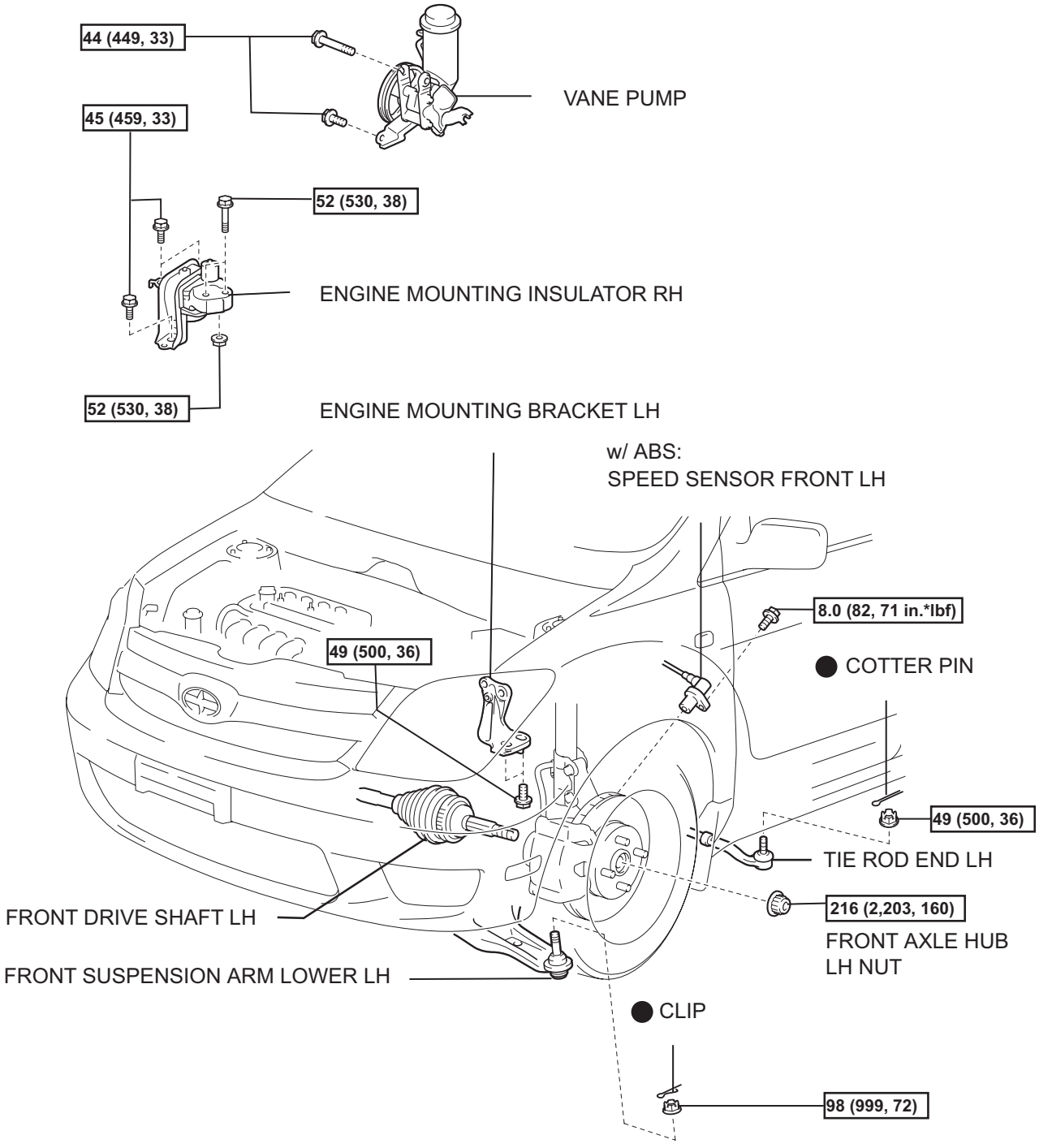
T

A116710E01


GLOVE COMPARTMENT DOOR
STEERING COLUMN HOLE COVER PLATE
CLIP
STEERING INTERMEDIATE SHAFT
28 (290, 21)
CLAMP
GASKET
32 (326, 24)
43 (438, 32)
EXHAUST PIPE FRONT
COMPRESSION SPRING
GASKET
FLOOR PANEL BRACE FRONT
20 (204, 15)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
T
A116712E01

EM

EM

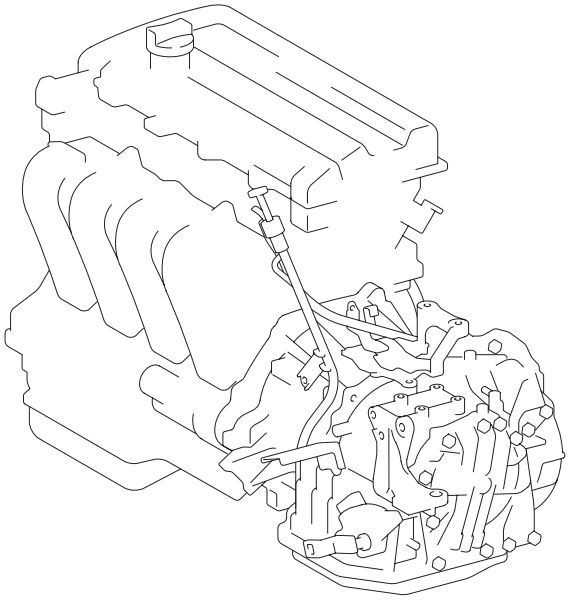


N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

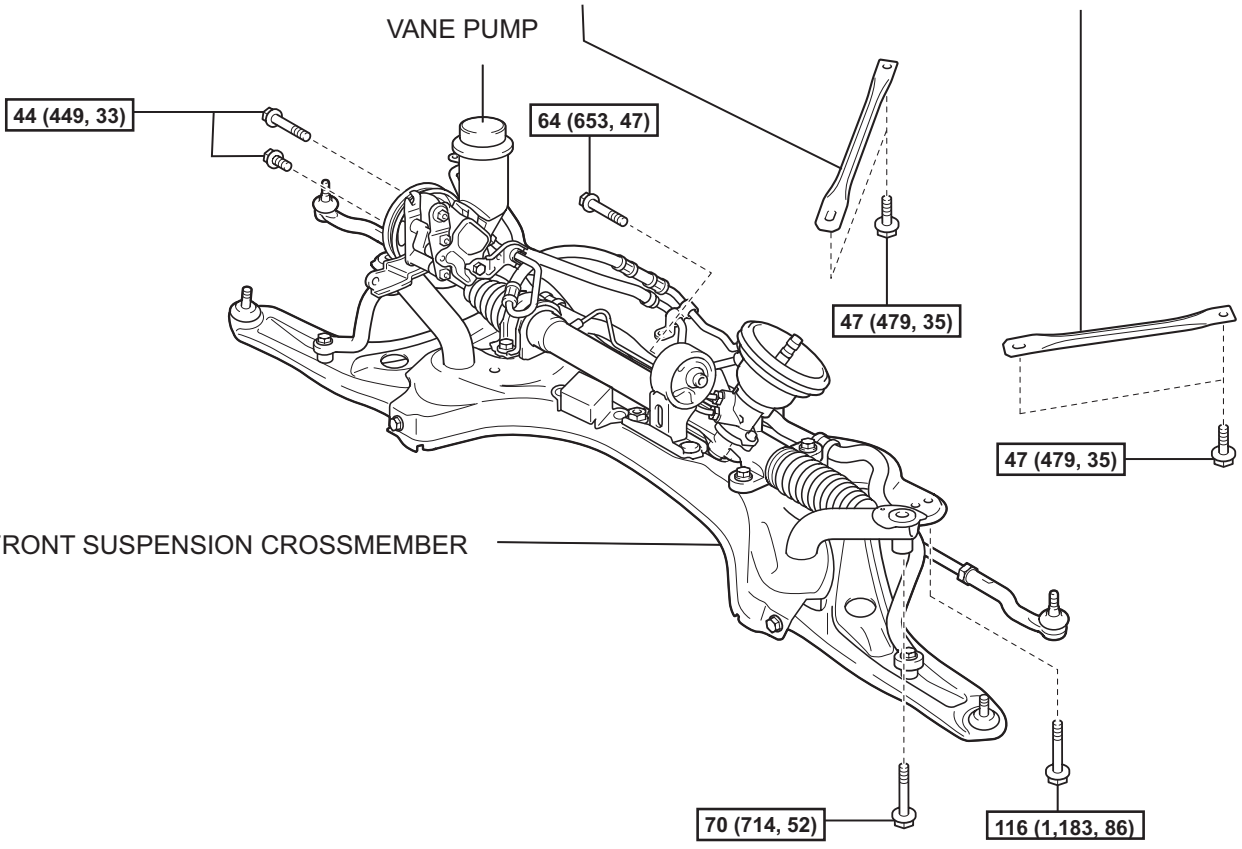
T

A116713E01



FRONT SUSPENSION MEMBER REINFORCEMENT RH

FRONT SUSPENSION MEMBER REINFORCEMENT LH

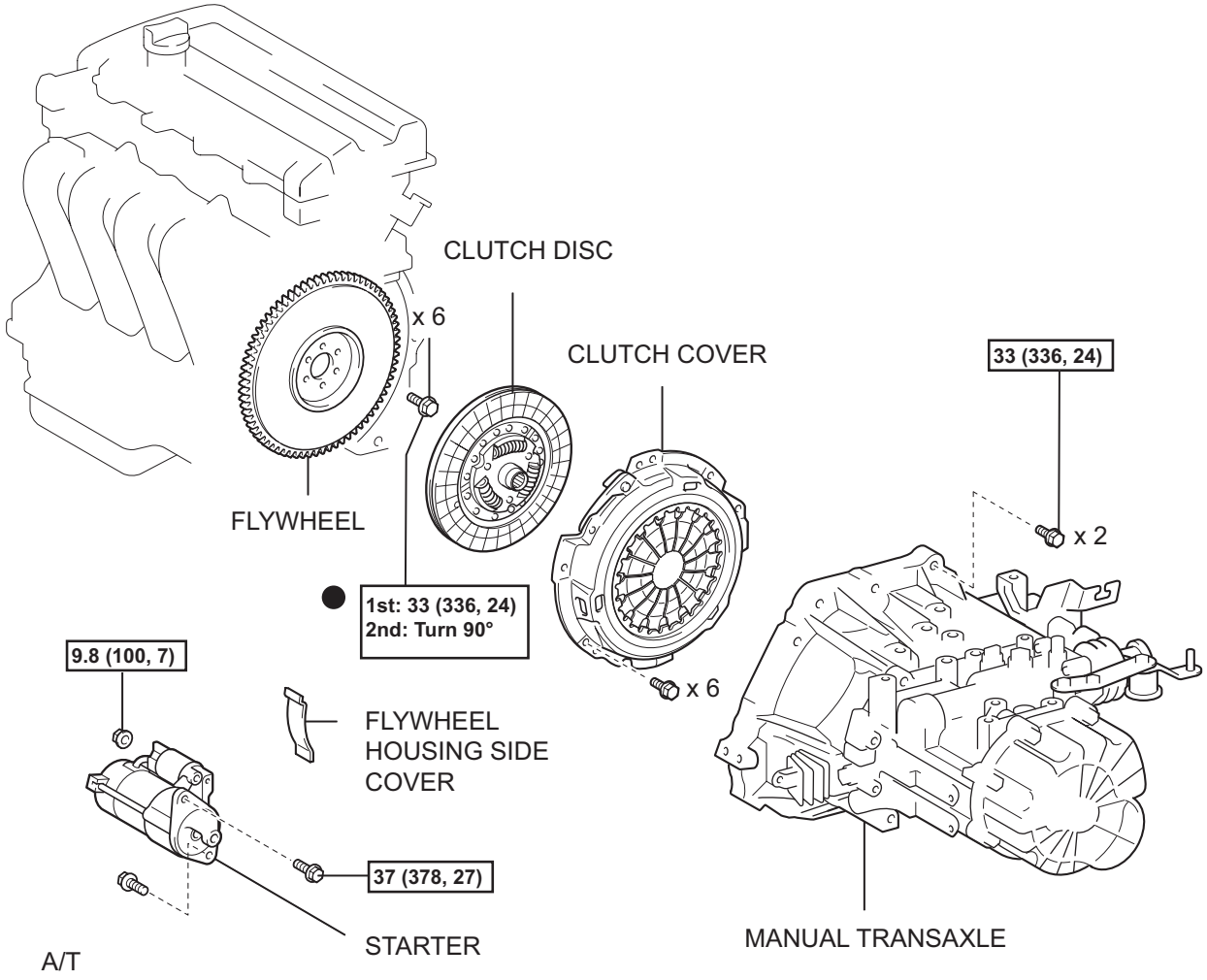


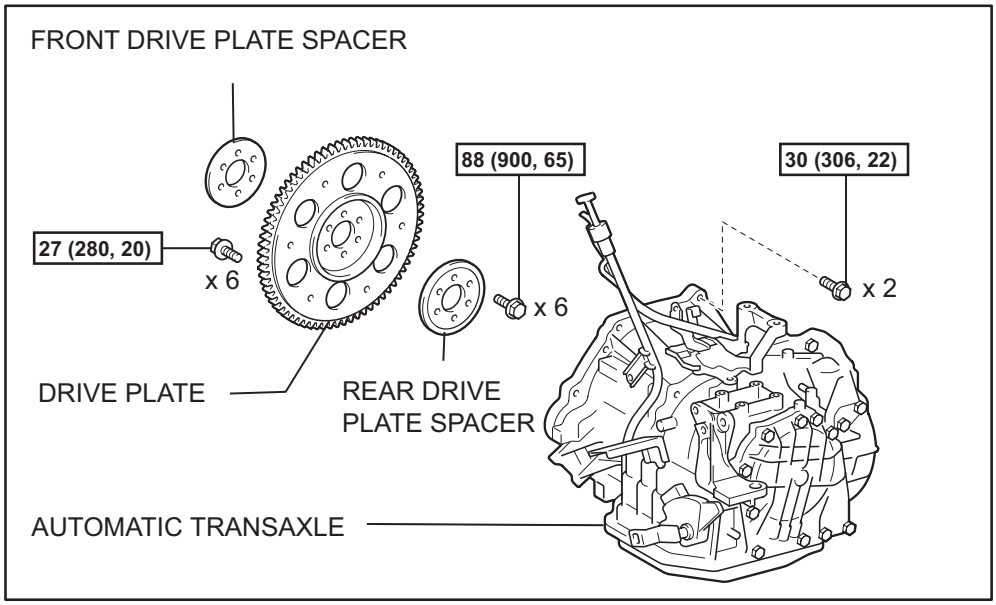
N*m (kgf*cm, ft.*lbf) : Specified torque

P

A116714E01

EM



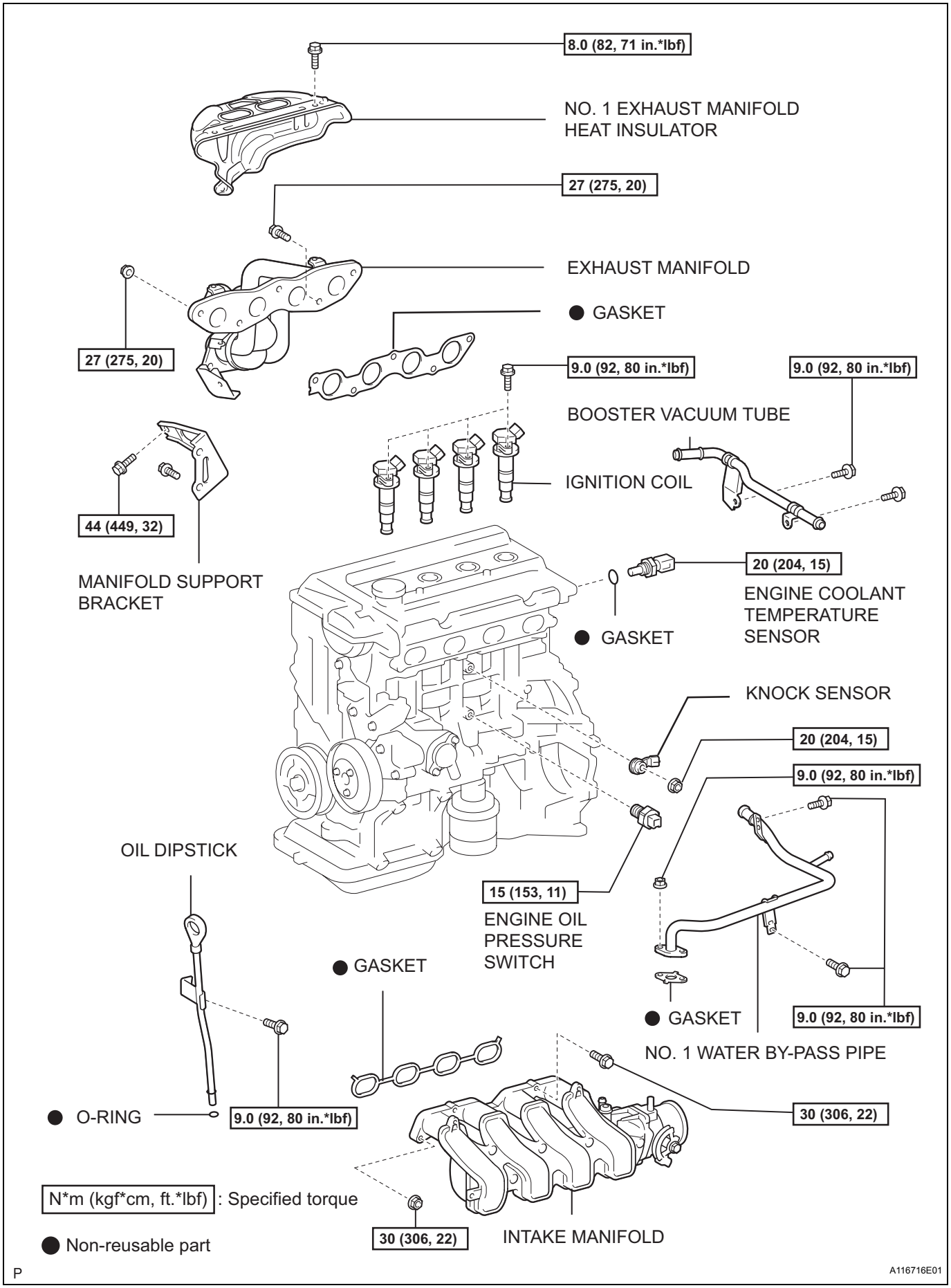


N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

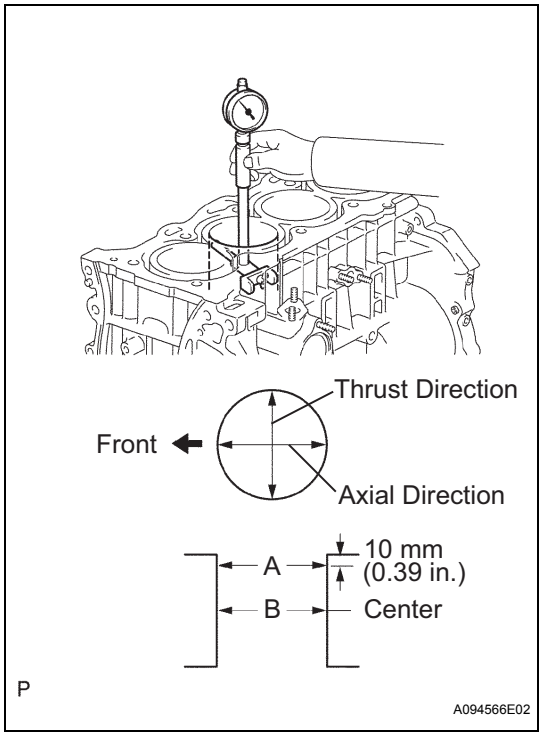
A116715E01


8.0 (82, 71 in.*lbf)
NO. 1 EXHAUST MANIFOLD HEAT INSULATOR
27 (275, 20)
EXHAUST MANIFOLD
● GASKET
27 (275, 20)
9.0 (92, 80 in.*lbf)
9.0 (92, 80 in.*lbf)
BOOSTER VACUUM TUBE
IGNITION COIL
44 (449, 32)
MANIFOLD SUPPORT BRACKET
20 (204, 15)
ENGINE COOLANT TEMPERATURE SENSOR
● GASKET
KNOCK SENSOR
20 (204, 15)
9.0 (92, 80 in.*lbf)
OIL DIPSTICK
15 (153, 11)
ENGINE OIL PRESSURE SWITCH
● GASKET
● GASKET
9.0 (92, 80 in.*lbf)
NO. 1 WATER BY-PASS PIPE
● O-RING
9.0 (92, 80 in.*lbf)
30 (306, 22)
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
30 (306, 22)
INTAKE MANIFOLD
P
A116716E01

INSPECTION

1. **INSPECT CYLINDER BLOCK FOR FLATNESS (See page EM-45)**

2. **INSPECT CYLINDER BORE**



(a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in the thrust and axial directions.

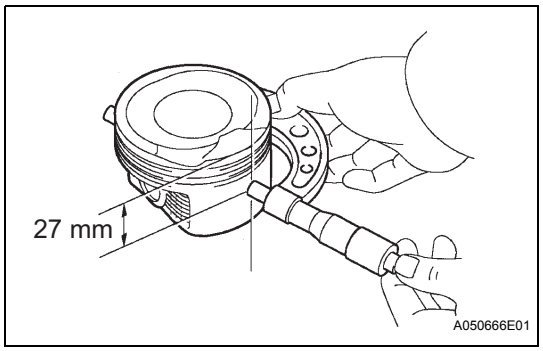
(b) Calculate the average of the thrust diameter and axial diameter at the "A" position in the illustration.

(c) Calculate the average of thrust diameter and axial diameter at the "B" position in the illustration.

Standard diameter:
75.000 to 75.013 mm (2.9528 to 2.9533 in.)

If the value obtained in the step above is not within the range of the standard diameter, replace the cylinder block.

EM



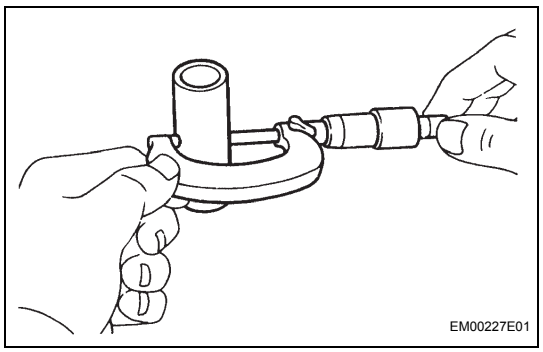
3. **INSPECT PISTON WITH PIN**

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, and at a position 27 mm (1.06 in.) from the top of the piston head.

Standard piston diameter:
74.945 to 74.955 mm (2.9506 to 2.9510 in.)

(b) Using a caliper gauge, measure the piston pin hole diameter of the piston.

Standard piston pin hole diameter:
18.013 to 18.016 mm (0.7092 to 0.7093 in.) at 20°C (68°F)



(c) Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter:
18.001 to 18.004 mm (0.7087 to 0.7088 in.)

(d) Subtract the piston pin diameter measurement from the piston pin hole diameter measurement.

Standard oil clearance:
0.009 to 0.015 mm (0.0004 to 0.0006 in.)
Maximum oil clearance:
0.050 mm (0.0020 in.)

If the clearance is greater than the maximum, replace the bush. If necessary, replace both the piston and piston pin together.

4. INSPECT PISTON CLEARANCE

(a) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:
0.055 to 0.078 mm (0.0022 to 0.0031 in.)
Maximum oil clearance:
0.08 mm (0.0032 in.)

If the oil clearance is greater than the maximum, replace all 4 pistons. If necessary, replace the cylinder block.

5. INSPECT CONNECTING ROD

(a) Using a caliper gauge, measure the internal diameter of the connecting rod.

Standard connecting rod inside diameter:
17.965 to 17.985 mm (0.7073 to 0.7081 in.)

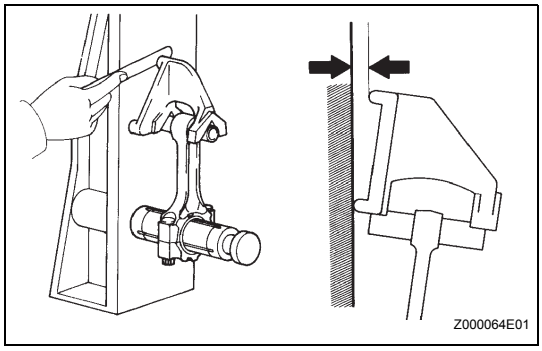
If the diameter is greater than the maximum, replace the connecting rod.

(b) Using a rod aligner and feeler gauge, check the connecting rod alignment.

(1) Check for misalignment.

Maximum misalignment:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

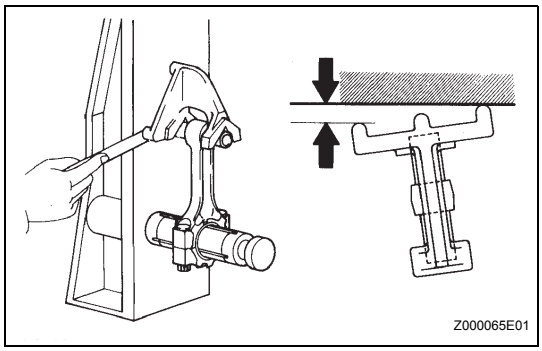
If the misalignment is greater than the maximum, replace the connecting rod assembly.



(2) Check for twist.

Maximum twist:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the twist is greater than the maximum, replace the connecting rod assembly.

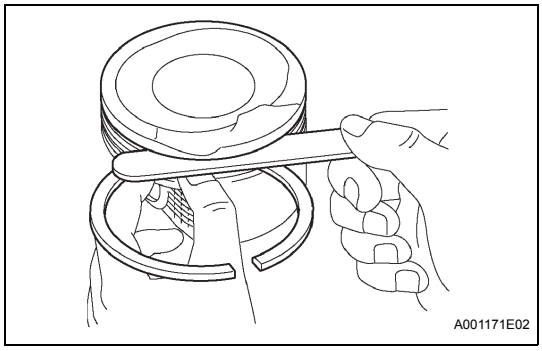


6. INSPECT RING GROOVE CLEARANCE

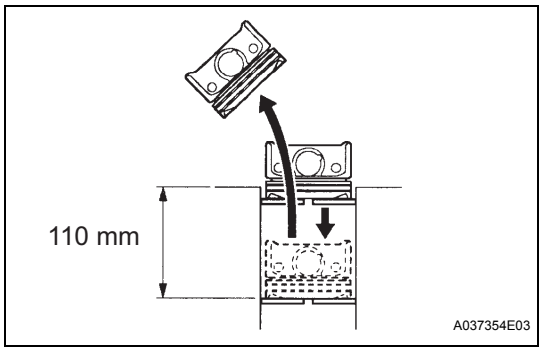
(a) Using a feeler gauge, measure the clearance between the new piston ring and the wall of the ring groove.

Standard ring groove clearance

Item	Specified Condition
No. 1 ring	0.02 to 0.04 mm (0.0008 to 0.0016 in.)
No. 2 ring	0.01 to 0.03 mm (0.0004 to 0.0012 in.)
Oil ring	0.01 to 0.03 mm (0.0004 to 0.0012 in.)

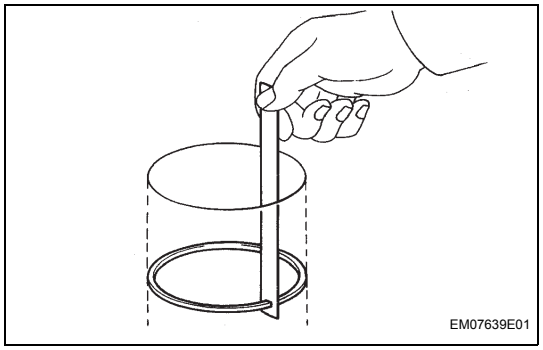


If the clearance is not as specified, replace the piston.



7. INSPECT PISTON RING END GAP

(a) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.

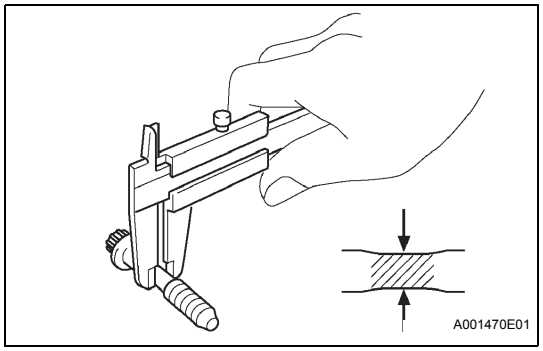


(b) Using a feeler gauge, measure the end gap.

Standard end gap

Item	Standard	Maximum
No. 1 ring	0.25 to 0.35 mm (0.0098 to 0.0138 in.)	0.91 mm (0.0358 in.)
No. 2 ring	0.35 to 0.50 mm (0.0138 to 0.0197 in.)	1.06 mm (0.0417 in.)
Oil ring	0.10 to 0.35 mm (0.0039 to 0.0138 in.)	0.82 mm (0.0323 in.)

If the end gap is greater than the maximum, replace the piston ring and oil ring.

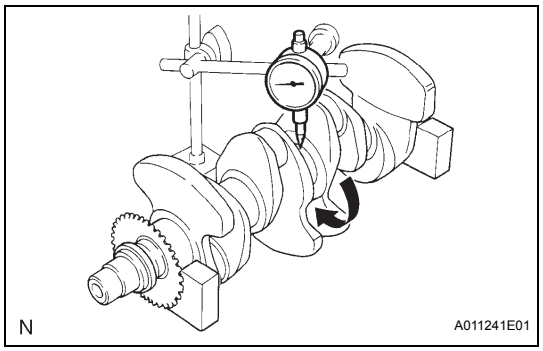


8. INSPECT CONNECTING ROD BOLT

(a) Using a vernier caliper, measure the tension portion diameter of the bolt.

Standard diameter:
6.6 to 6.7 mm (0.260 to 0.264 in.)
Minimum diameter:
6.4 mm (0.252 in.)

If the diameter is less than the minimum, replace the bolt.

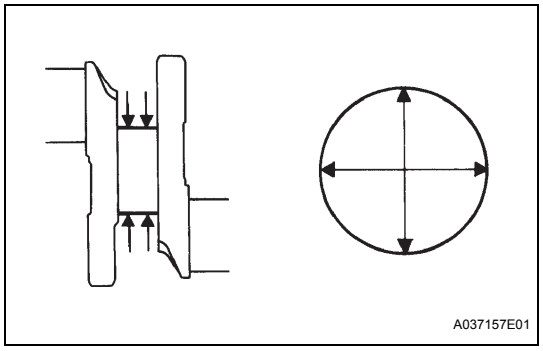


9. INSPECT CRANKSHAFT

(a) Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

Maximum circle runout:
0.03 mm (0.0012 in.)

If the circle runout is greater than the maximum, replace the crankshaft.



(b) Inspect the diameter.

(1) Using a micrometer, measure the diameter of each main journal as illustrated.

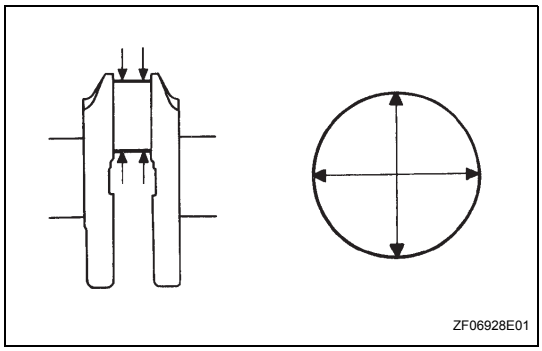
Standard diameter:
45.988 to 46.000 mm (1.8106 to 1.8110 in.)

If the diameter is not as specified, replace the crankshaft.

(2) Calculate the taper and distortion of the main journal.

Maximum taper and distortion:
0.02 mm (0.0008 in.)

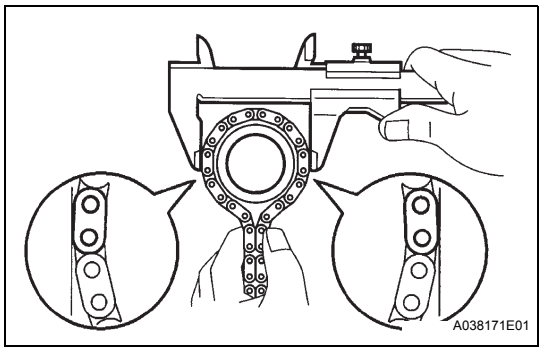
If the taper and distortion are greater than the maximum, replace the crankshaft.



(3) Using a micrometer, measure the diameter of each crank pin as illustrated.
Standard diameter:
39.992 to 40.000 mm (1.5745 to 1.5748 in.)
If the diameter is not as specified, replace the crankshaft.

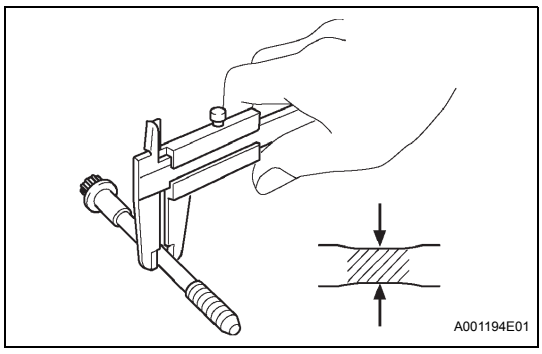
(4) Calculate the taper and distortion of the crank pin.
Maximum taper and distortion:
0.02 mm (0.0008 in.)
If the taper and distortion are greater than the maximum, replace the crankshaft.

EM



(c) Wrap the chain around the timing sprocket as shown in the illustration.

(d) Using a vernier caliper, measure the timing sprocket diameter with the chain wrapped.
Standard sprocket diameter (w/ chain):
51.72 mm (2.0362 in.)
Minimum sprocket diameter (w/ chain):
50.5 mm (1.988 in.)
NOTICE:
When measuring the diameter, the vernier caliper must be in contact with the chain roller.
If the diameter is less than the minimum, replace the chain and crankshaft.

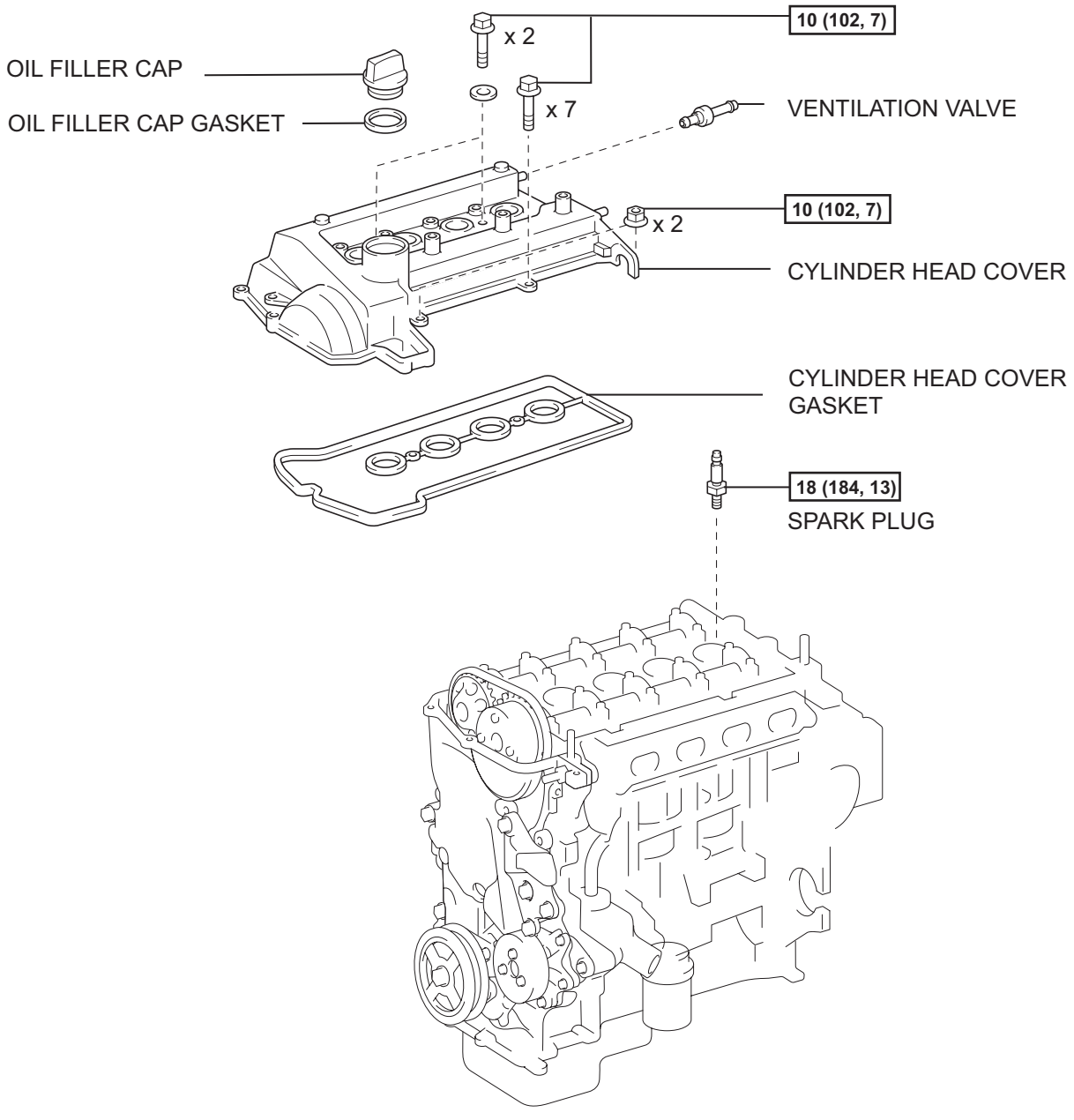


10. INSPECT CRANKSHAFT BEARING CAP SET BOLT

(a) Using a vernier caliper, measure the tension portion diameter of the bolt.
Standard diameter:
7.3 to 7.5 mm (0.287 to 0.295 in.)
Minimum diameter:
7.2 mm (0.283 in.)
If the diameter is less than the minimum, replace the bolt.

ENGINE UNIT

COMPONENTS



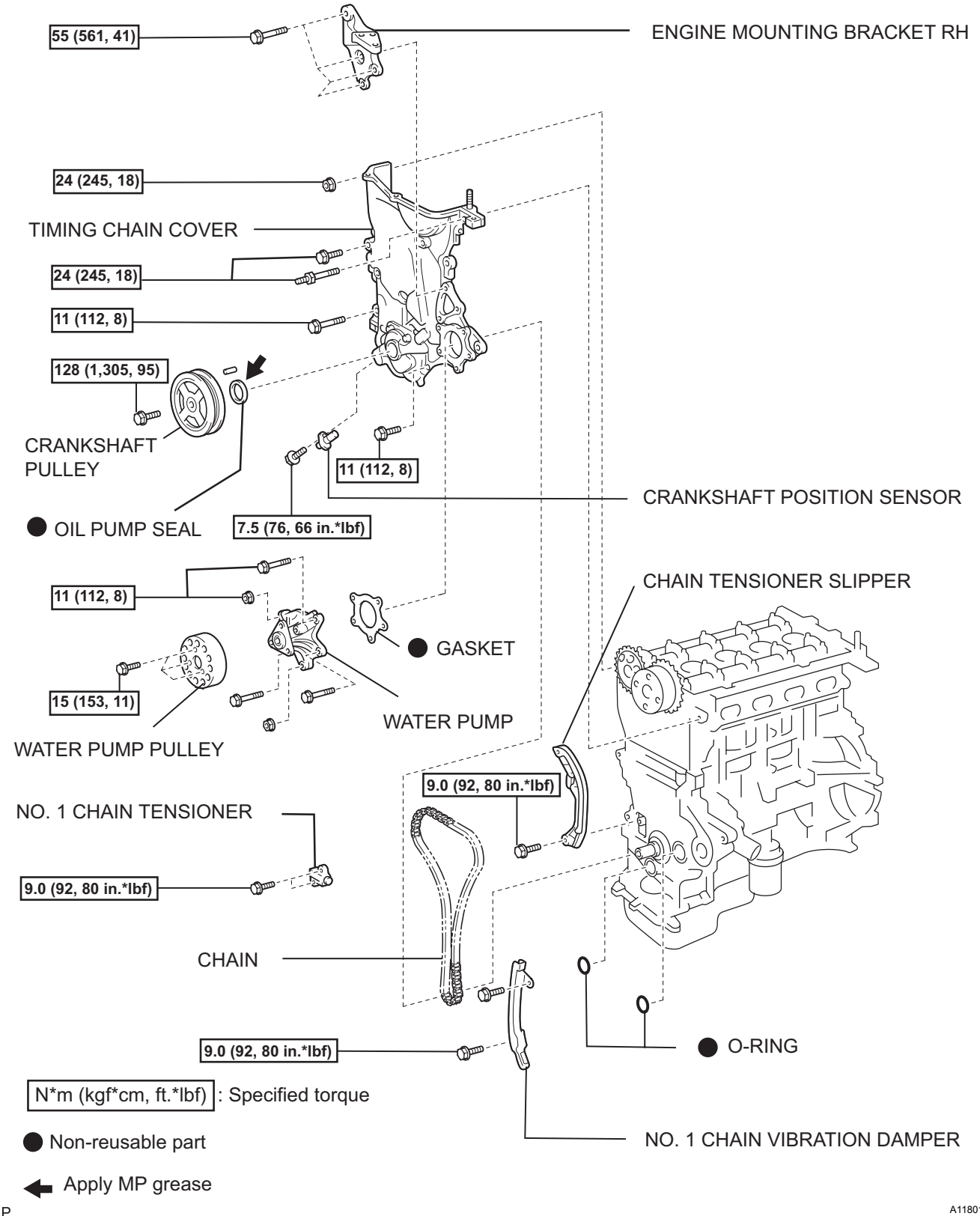
N*m (kgf*cm, ft.*lbf) : Specified torque

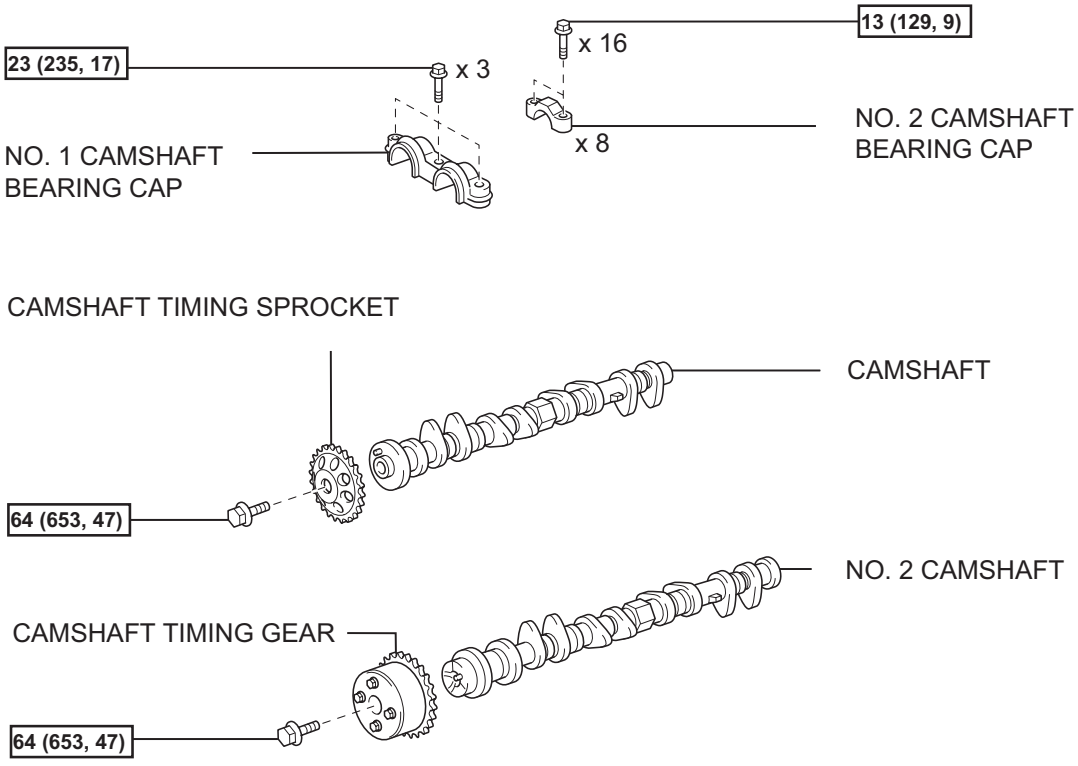
Y

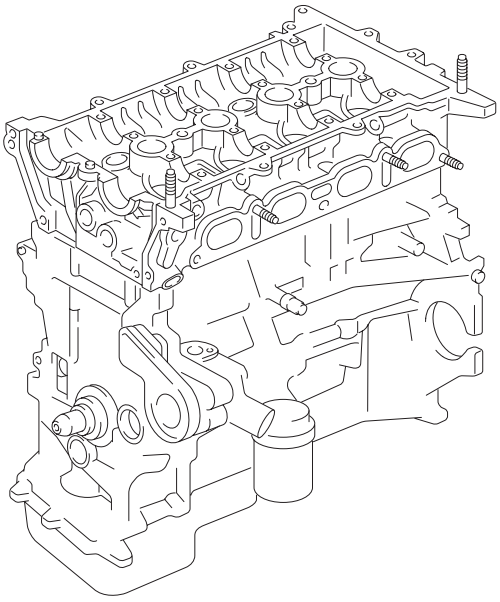
A116718E02

EM

EM


55 (561, 41)
ENGINE MOUNTING BRACKET RH
24 (245, 18)
TIMING CHAIN COVER
24 (245, 18)
11 (112, 8)
128 (1,305, 95)
CRANKSHAFT PULLEY
OIL PUMP SEAL
7.5 (76, 66 in.*lbf)
11 (112, 8)
CRANKSHAFT POSITION SENSOR
11 (112, 8)
GASKET
15 (153, 11)
WATER PUMP
WATER PUMP PULLEY
CHAIN TENSIONER SLIPPER
9.0 (92, 80 in.*lbf)
NO. 1 CHAIN TENSIONER
9.0 (92, 80 in.*lbf)
CHAIN
O-RING
9.0 (92, 80 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Apply MP grease
NO. 1 CHAIN VIBRATION DAMPER
P
A118010E01

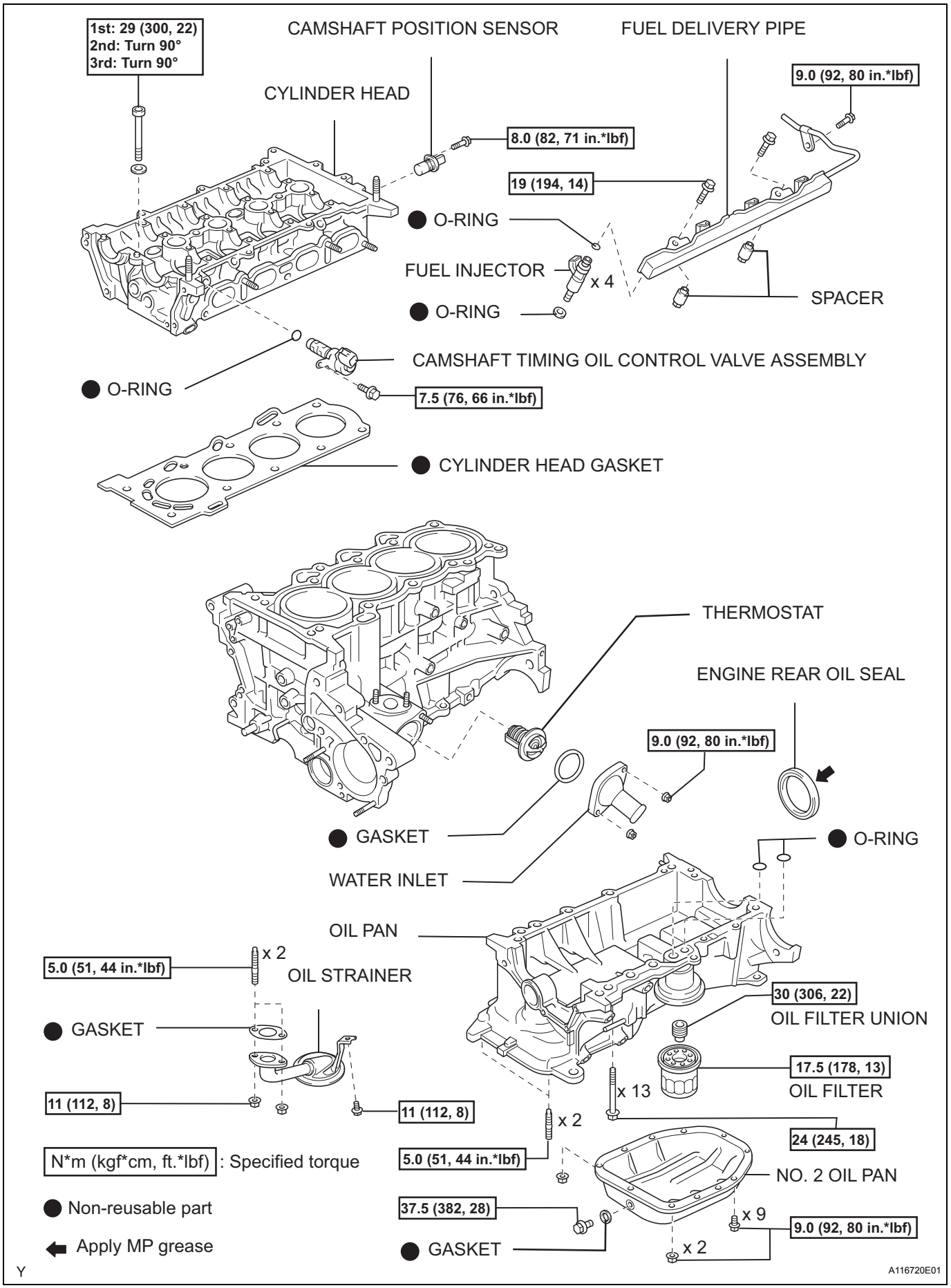


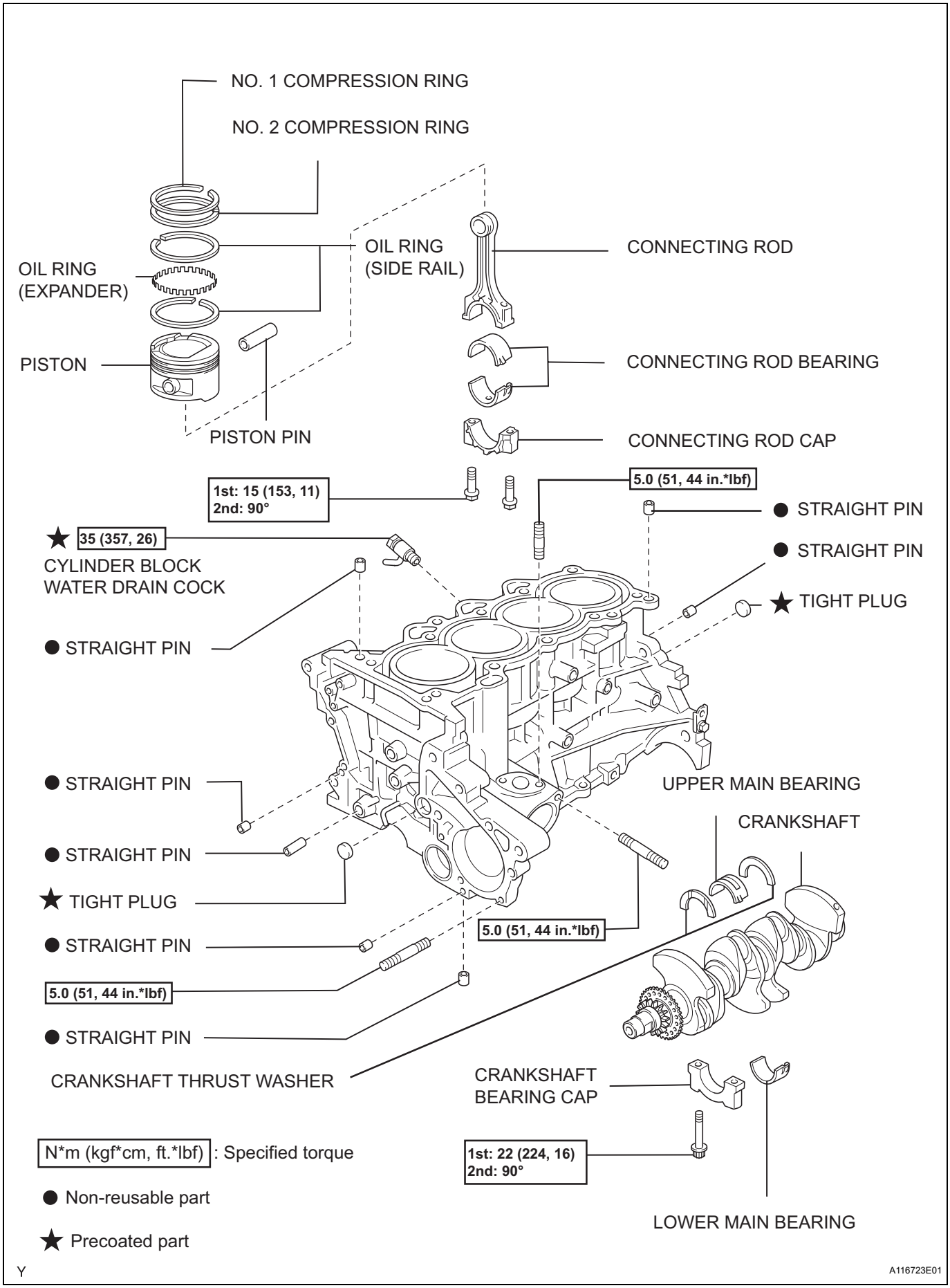


N*m (kgf*cm, ft.*lbf) : Specified torque

Y

A116719E01


1st: 29 (300, 22)
2nd: Turn 90°
3rd: Turn 90°
CAMSHAFT POSITION SENSOR
FUEL DELIVERY PIPE
CYLINDER HEAD
9.0 (92, 80 in.*lbf)
8.0 (82, 71 in.*lbf)
19 (194, 14)
O-RING
FUEL INJECTOR
x 4
O-RING
SPACER
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
O-RING
7.5 (76, 66 in.*lbf)
CYLINDER HEAD GASKET
THERMOSTAT
ENGINE REAR OIL SEAL
9.0 (92, 80 in.*lbf)
GASKET
O-RING
WATER INLET
OIL PAN
x 2
5.0 (51, 44 in.*lbf)
OIL STRAINER
30 (306, 22)
OIL FILTER UNION
GASKET
17.5 (178, 13)
OIL FILTER
x 13
11 (112, 8)
11 (112, 8)
x 2
24 (245, 18)
N*m (kgf*cm, ft.*lbf) : Specified torque
5.0 (51, 44 in.*lbf)
NO. 2 OIL PAN
Non-reusable part
37.5 (382, 28)
x 9
9.0 (92, 80 in.*lbf)
Apply MP grease
GASKET
x 2
Y
A116720E01

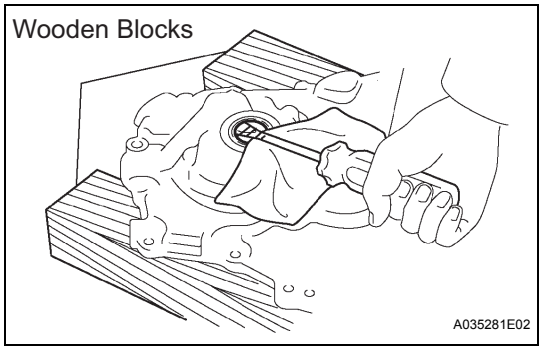

NO. 1 COMPRESSION RING
NO. 2 COMPRESSION RING
OIL RING (SIDE RAIL)
OIL RING (EXPANDER)
PISTON
PISTON PIN
CONNECTING ROD
CONNECTING ROD BEARING
CONNECTING ROD CAP
1st: 15 (153, 11)
2nd: 90°
5.0 (51, 44 in.*lbf)
★ 35 (357, 26)
CYLINDER BLOCK WATER DRAIN COCK
● STRAIGHT PIN
● STRAIGHT PIN
★ TIGHT PLUG
● STRAIGHT PIN
● STRAIGHT PIN
★ TIGHT PLUG
● STRAIGHT PIN
5.0 (51, 44 in.*lbf)
● STRAIGHT PIN
CRANKSHAFT THRUST WASHER
UPPER MAIN BEARING
CRANKSHAFT
5.0 (51, 44 in.*lbf)
CRANKSHAFT BEARING CAP
1st: 22 (224, 16)
2nd: 90°
LOWER MAIN BEARING
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
★ Precoated part
Y
A116723E01

REPLACEMENT

1. REPLACE OIL PUMP SEAL

HINT:

There are 2 ways to remove the oil seal: remove it with the timing chain cover removed, or remove it with the timing chain cover installed.

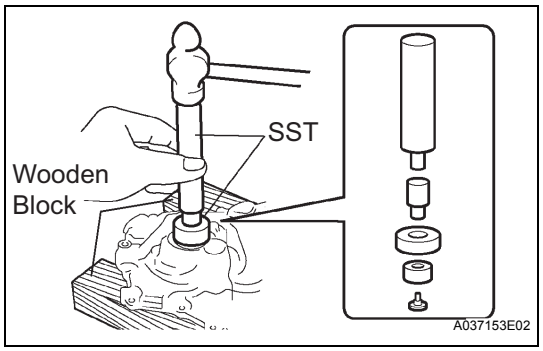


(a) If the timing chain cover is removed:

(1) Using a screwdriver, remove the oil seal.

HINT:

Tape the screwdriver tip before use.



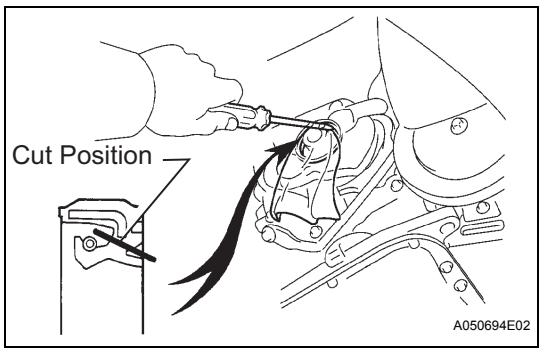
(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.

SST 09950-60010 (09951-00250, 09951-00380, 09952-06010), 09950-70010 (09951-07100)

NOTICE:

- **Be careful not to tap the oil seal at an angle.**
- **Keep the lip free of foreign objects.**

(3) Apply multi-purpose grease to the lip of the oil seal.



(b) If the timing chain cover is installed:

(1) Using a knife, cut off the lip of the oil seal.

(2) Using a screwdriver with the tip wrapped in tape, pry out the oil seal.

NOTICE:

After removal, check if the crankshaft is not damaged. If it is damaged, smooth the surface with 400-grit sandpaper.

(3) Apply multi-purpose grease to the lip of a new oil seal.

NOTICE:

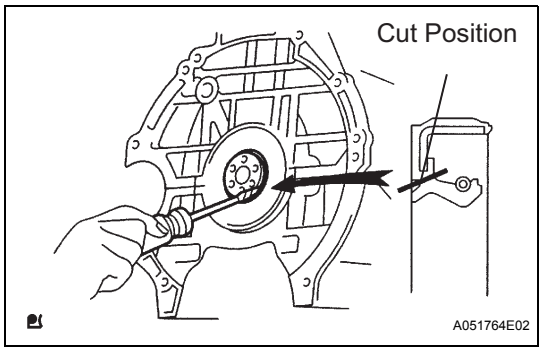
Keep the lip free of foreign objects.

(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the timing chain cover edge.

SST 09223-22010

NOTICE:

- **Be careful not to tap the oil seal at an angle.**
- **Wipe any extra grease off the crankshaft.**



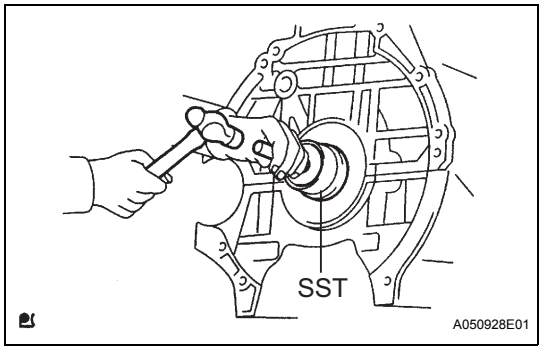
2. REPLACE ENGINE REAR OIL SEAL

(a) Using a knife, cut off the lip of the oil seal.

(b) Using a screwdriver with the tip wrapped in tape, pry out the oil seal.

NOTICE:

After removal, check if the crankshaft is not damaged. If it is damaged, smooth the surface with 400-grit sandpaper.



(c) Apply multi-purpose grease to the lip of a new oil seal.

NOTICE:

Keep the lip free of foreign materials.

(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223-56010

NOTICE:

- **Be careful not to tap the oil seal at an angle.**
- **Wipe any extra grease off the crankshaft.**

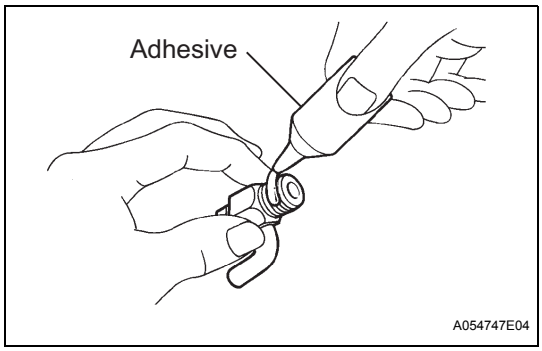
REASSEMBLY

1. INSTALL CYLINDER BLOCK WATER DRAIN COCK

(a) Apply adhesive to 2 or 3 threads of the drain union, and install it within 3 minutes.

Seal packing:

Part No. 08826-00100

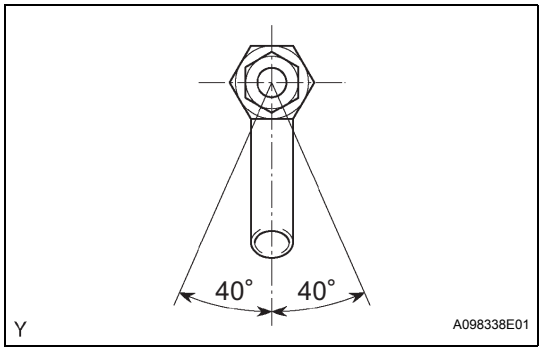


(b) After applying the specified torque, rotate the drain union clockwise until its drain port faces downward.

Torque: 35 N*m (357 kgf*cm, 26 ft.*lbf)

NOTICE:

- **Install the water drain cock within 3 minutes of applying adhesive.**
- **Do not add coolant for at least 1 hour after installation.**
- **Do not rotate the drain union more than 360° in this step, and never loosen it after setting the union correctly.**
- **The pipe of the drain cock should be within 40° of the vertical position.**

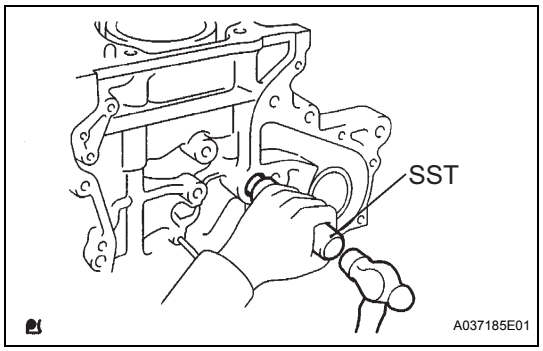


2. INSTALL TIGHT PLUG

(a) Apply adhesive to new tight plugs.

Adhesive:

Part No. 08826-00070, THREE BOND 1324 or equivalent.

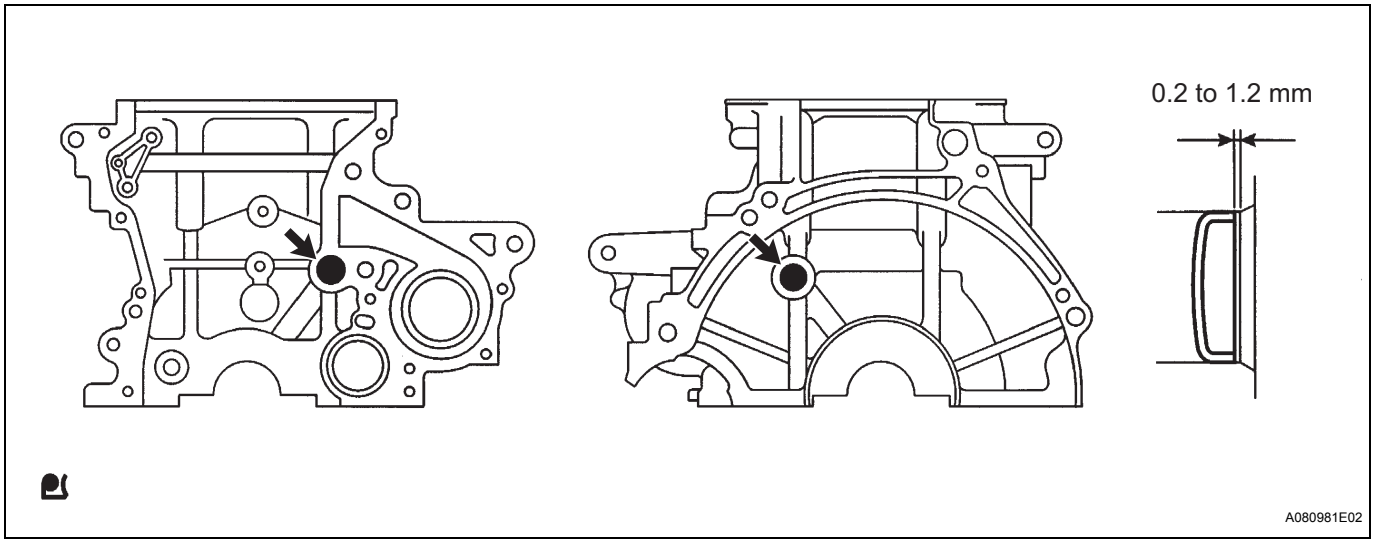


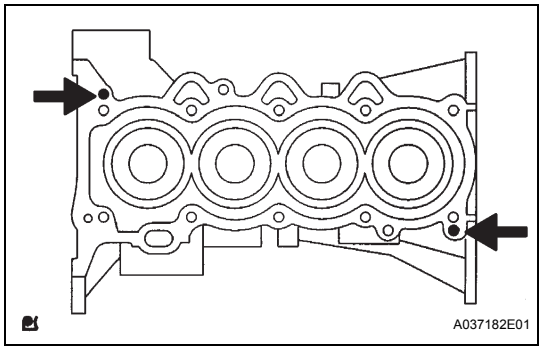
(b) Using SST, tap in the tight plugs as shown in the illustration.

SST 09950-60010 (09951-00180), 09950-70010 (09951-07100)

Standard depth:

0.2 to 1.2 mm (0.008 to 0.047 in.)





3. INSTALL CYLINDER HEAD SET STRAIGHT PIN

(a) Using a plastic-faced hammer, tap in the straight pin.

Standard protrusion:

8.5 to 9.5 mm (0.335 to 0.374 in.)

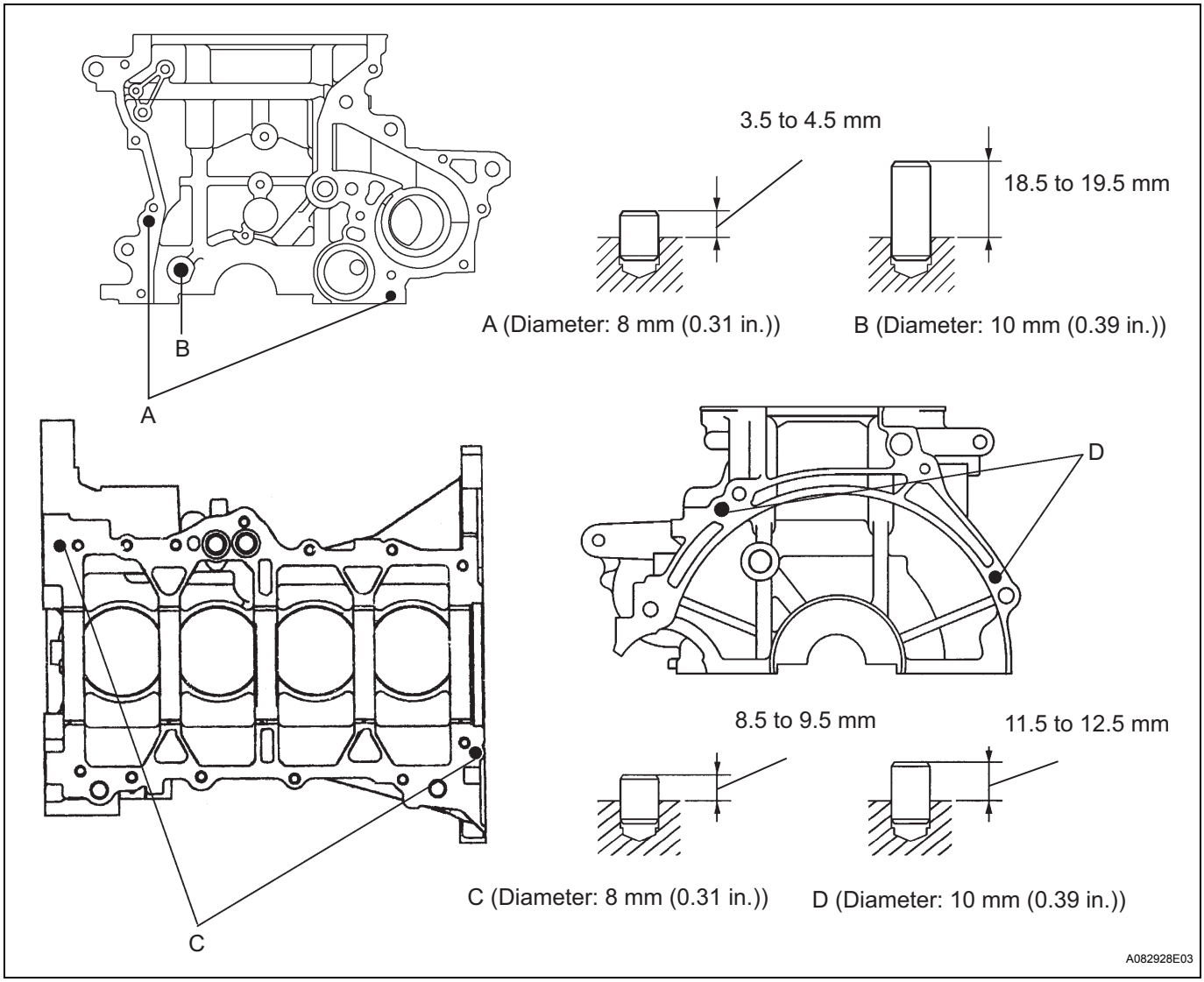
4. INSTALL STRAIGHT PIN

(a) Using a plastic-faced hammer, tap in the straight pin.

Standard protrusion:

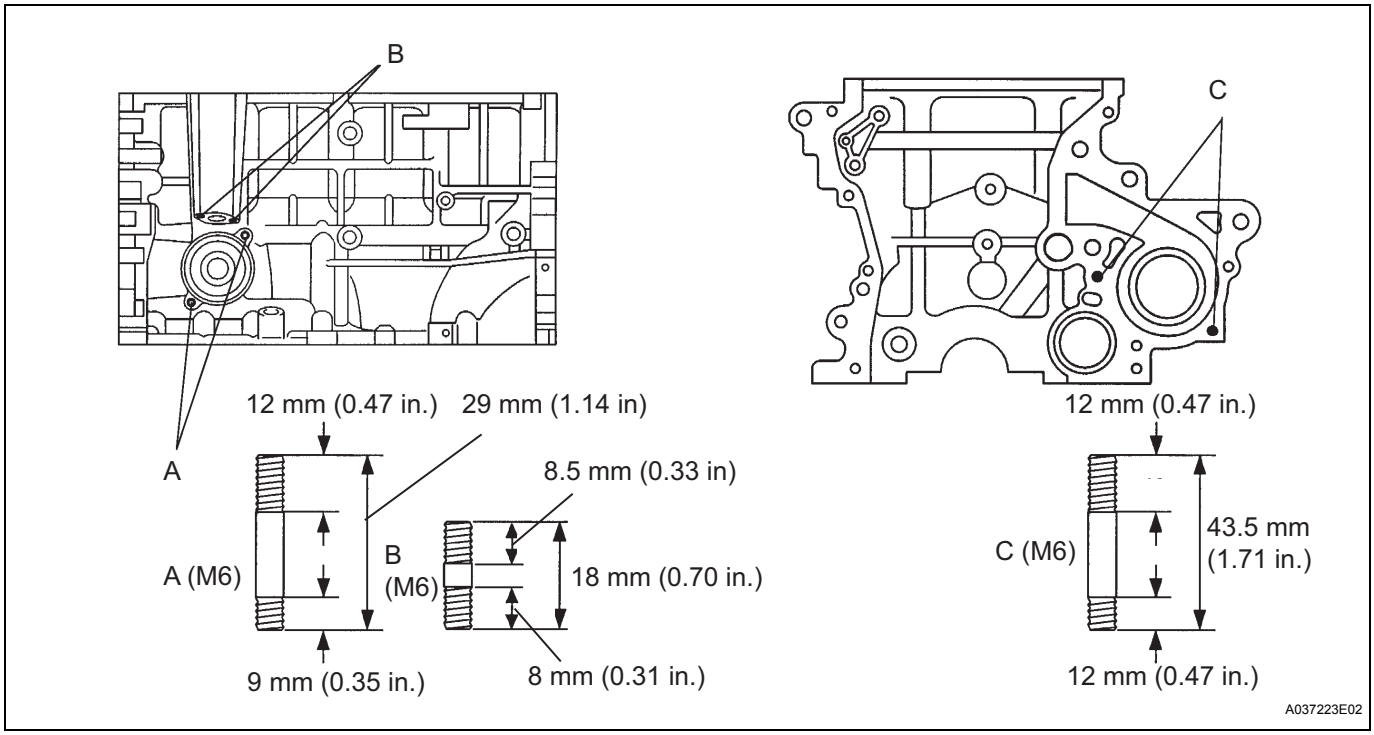
3.5 to 4.5 mm (0.138 to 0.177 in.) for pin A
18.5 to 19.5 mm (0.728 to 0.768 in.) for pin B
8.5 to 9.5 mm (0.335 to 0.724 in.) for pin C
11.5 to 12.5 mm (0.453 to 0.492 in.) for pin D

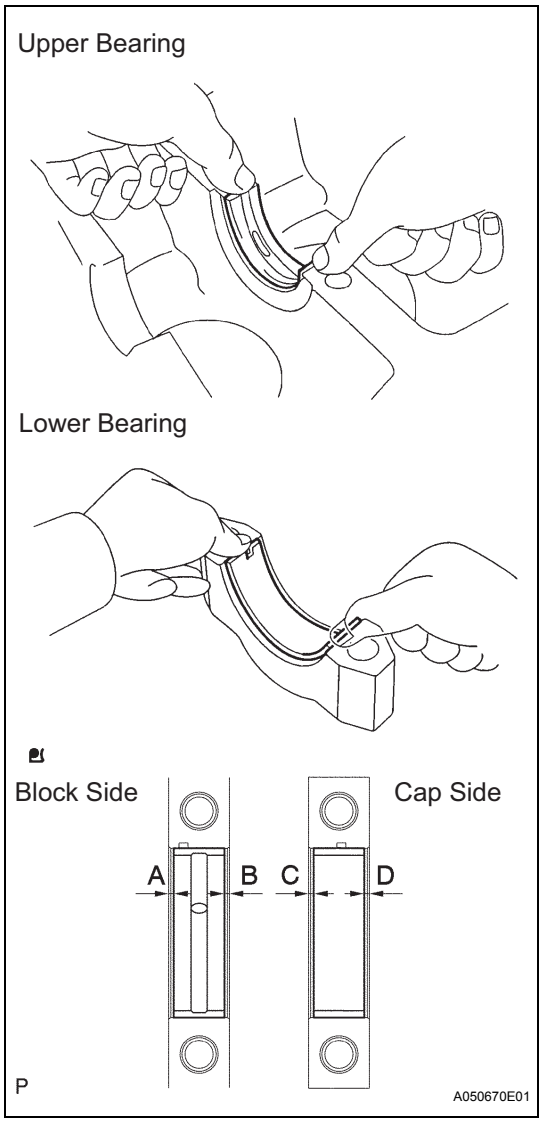
EM



5. INSTALL STUD BOLT

(a) Using an E5 "torx" socket, install the 6 stud bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)





6. INSTALL CRANKSHAFT

(a) Install the upper bearing with the oil groove onto the cylinder block, and the lower bearing onto the bearing cap.

NOTICE:

Do not apply engine oil to the contact surface of the cylinder block or the backside of the bearing.

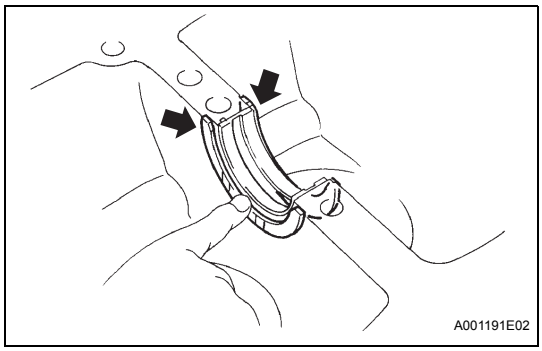
HINT:

Mass production parts do not have claws as marks. If reusing the mass production parts, measure the clearance of both sides with the bearing in the center of the bearing cap.

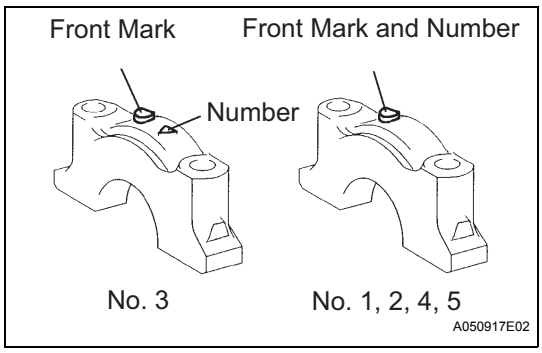
Standard clearance:

A - B = within 0.8 mm (0.032 in.)

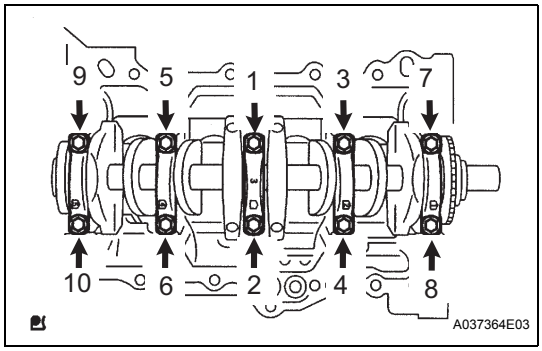
C - D = within 0.4 mm (0.016 in.)



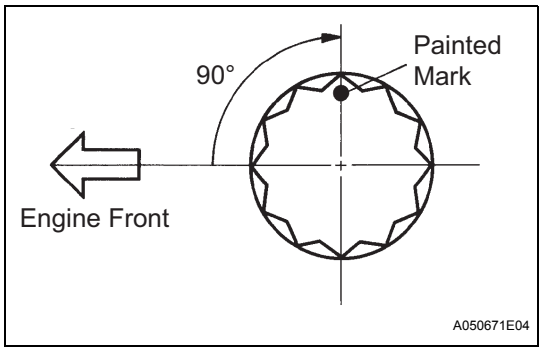
(b) Install the 2 thrust washers onto the No. 3 journal position of the cylinder block with the oil grooves facing outward.
(c) Apply engine oil to the upper bearing and install the crankshaft onto the cylinder block.



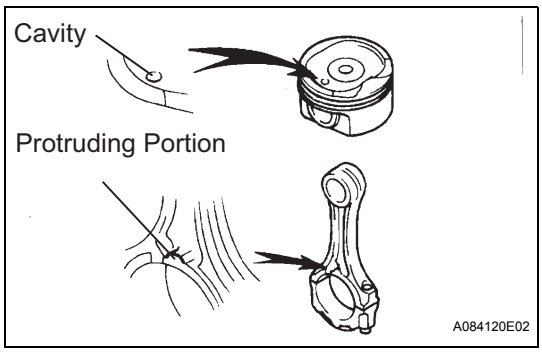
(d) Check the front marks and numbers and install the bearing caps onto the cylinder block.
(e) Apply a light coat of engine oil to the threads of the bearing cap bolts.



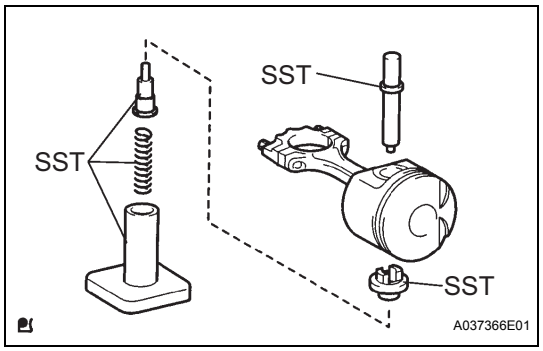
(f) Using SST, tighten the bolts in several steps by the specified torque in the sequence shown in the illustration.
SST 09011-38121
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)
NOTICE:
Check that the crankshaft turns smoothly.



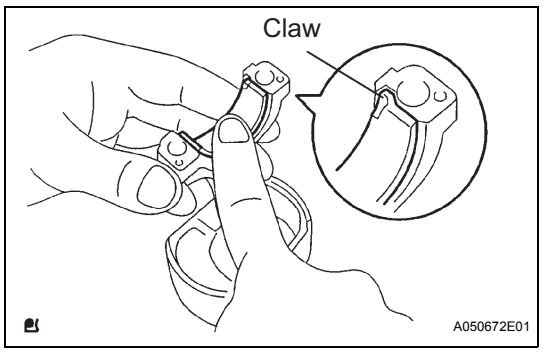
(g) Mark the front of the bearing cap bolts with paint.
(h) Retighten the bearing cap bolts by 90° in the same sequence.
(i) Check that the painted mark is now at a 90° angle to the front.



7. INSTALL PISTON PIN
(a) Coat the inner surface of the connecting rod bore and piston pin with engine oil.
(b) Align the cavity of the piston with the protruding portion of the connecting rod.

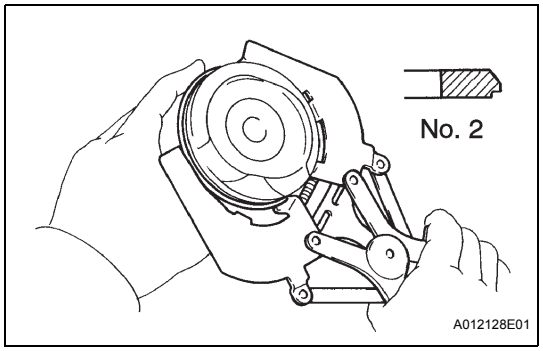


(c) Using SST, push in the piston pin.
SST 09221-25026 (09221-00021, 09221-00030, 09221-00190, 09221-00141, 09221-00150)
NOTICE:
Keep the pistons, pins, rings, connecting rods and bearings in the correct order so that they can be returned to the original locations when reassembling.

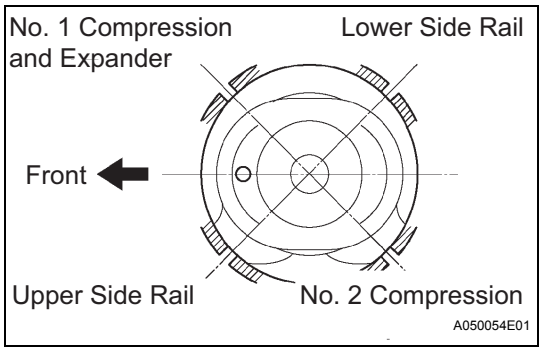


8. INSTALL CONNECTING ROD BEARING
(a) Align the bearing claw with the grooves of the connecting rod and connecting rod cap.
NOTICE:
Clean the backside of the bearing and the bearing surface of the connecting rod, and keep them free of oils.

EM

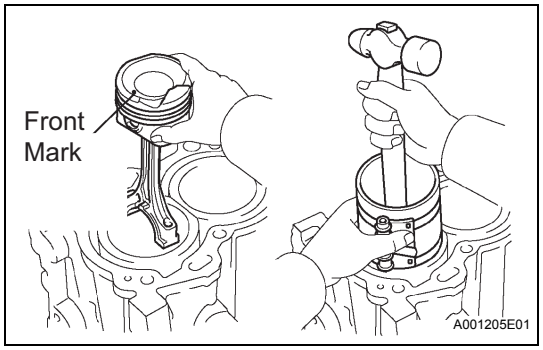


9. INSTALL PISTON RING SET
HINT:
If reusing the piston rings, install them onto the matched pistons with the surfaces facing correctly.
(a) Install the oil ring expander and 2 side rails by hand.
(b) Using a piston ring expander, install the 2 compression rings.

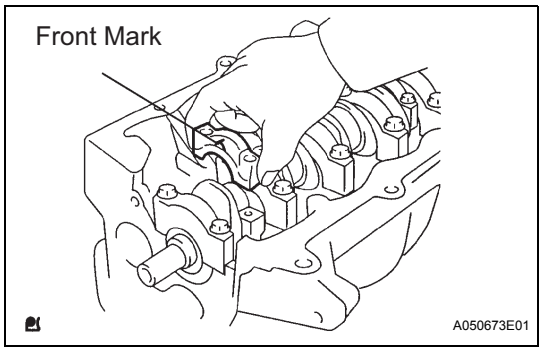


(c) Position the piston rings so that the ring ends are as shown in the illustration.

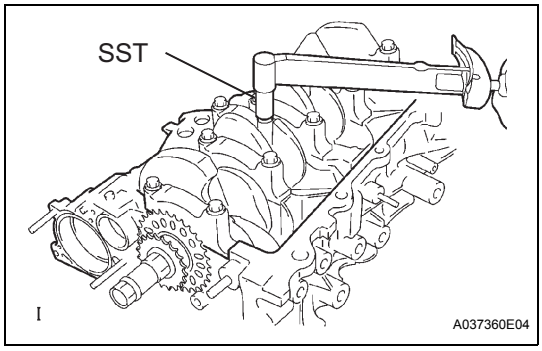
10. INSTALL PISTON WITH CONNECTING ROD
(a) Apply engine oil to the cylinder walls, pistons, and the surfaces of the connecting rod bearings.
(b) Check the position of the piston ring ends.



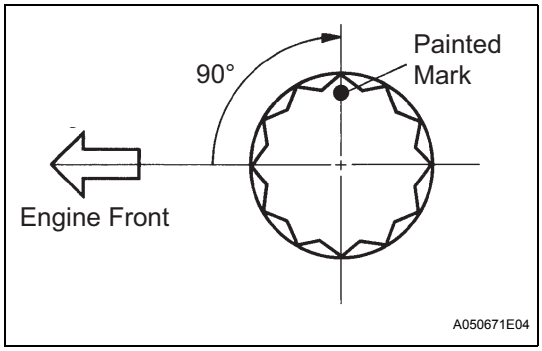
(c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark on the piston facing forward.
NOTICE:
- **Clean the backside of the bearing and the bearing surface of the connecting rod cap, and keep them free of oils.**
- **Match the numbered connecting rod cap with the correct connecting rod.**



(d) Match the connecting rod and cap together in the correct combination. Then install the cap onto the connecting rod, making sure that the front mark on the cap is correctly oriented.
(e) Apply a light coat of engine oil to the threads of the connecting rod cap bolts.

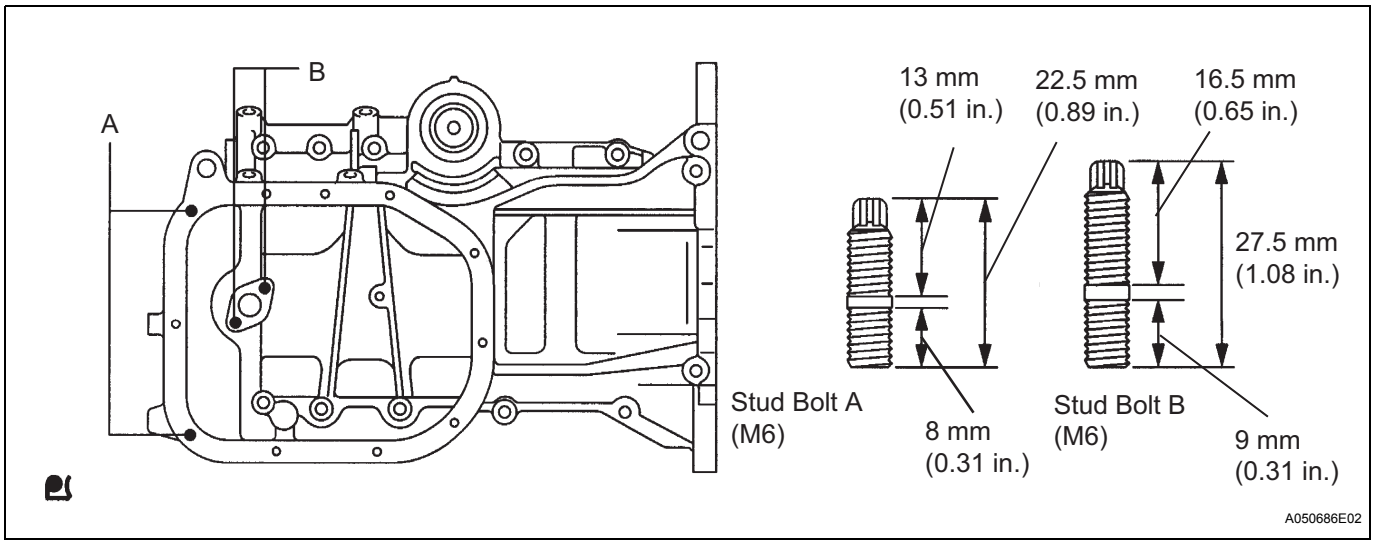


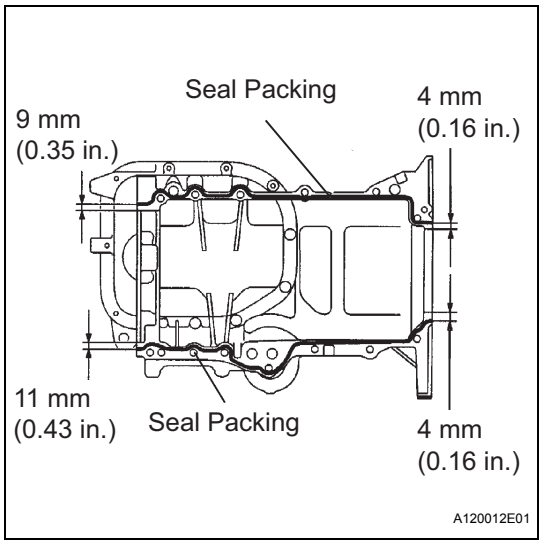
(f) Using SST, tighten the bolts in several steps by the specified torque.
SST 09205-16010
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)



(g) Mark the front of the connecting cap bolts with paint.
(h) Retighten the cap bolts by 90° as shown.
(i) Check that the crankshaft turns smoothly.

11. INSTALL STUD BOLT
(a) Using an E5 "torx" socket, install the 4 stud bolts.



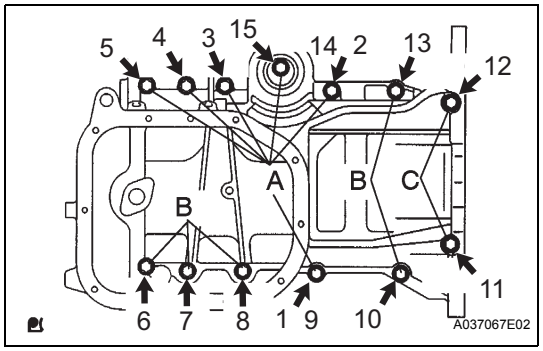


12. INSTALL OIL PAN

(a) Apply a continuous line of seal packing to the oil pan mating surface as shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent
Standard seal diameter:
2.0 mm to 3.0 mm (0.079 to 0.118 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes of applying seal packing.**
- **Do not expose the seal to engine oil for at least 2 hours after installation.**

(b) Install 2 new O-rings onto the cylinder block.

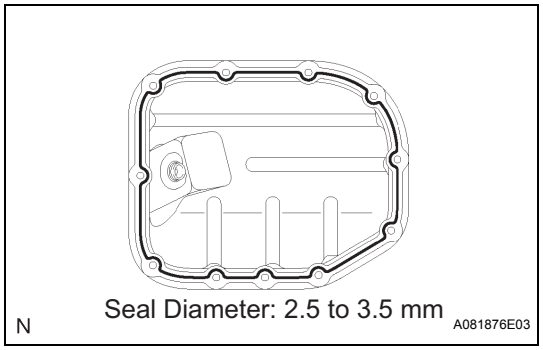
EM



(c) Using several steps, install and uniformly tighten the 13 bolts in the sequence shown in the illustration.
Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)
HINT:
Each bolt length is as follows:
49 mm (1.93 in.) for bolt A
88 mm (3.47 in.) for bolt B
144 mm (5.67 in.) for bolt C

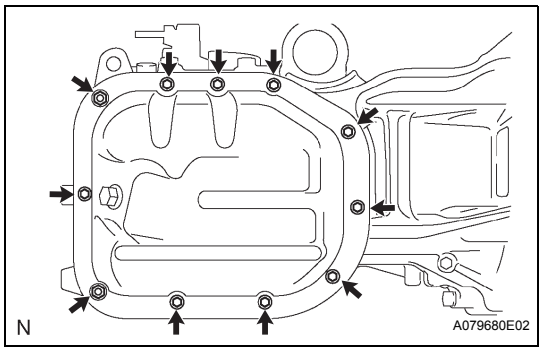
13. INSTALL OIL STRAINER

(a) Install a new gasket and the oil strainer with the 2 nuts and bolt.
Torque: 11 N*m (112 kgf*cm, 8.1 ft.*lbf)

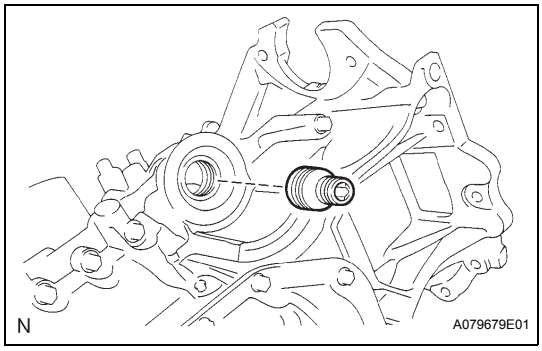


14. INSTALL NO. 2 OIL PAN

(a) Apply a continuous line of seal packing to the oil pan mating surface as shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent
Standard seal diameter:
2.5 mm to 3.5 mm (0.098 to 0.14 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes of applying seal packing.**
- **Do not expose the seal to engine oil for at least 2 hours after installation.**
- **Do not start the engine within 2 hours of installation.**

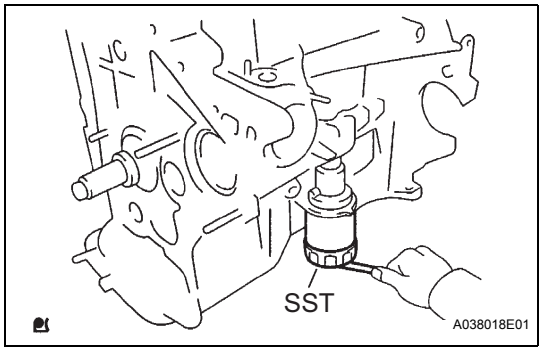


(b) Install the No. 2 oil pan with the 9 bolts and 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
(c) Install the drain plug with a new gasket.
Torque: 37.5 N*m (382 kgf*cm, 28 ft.*lbf)

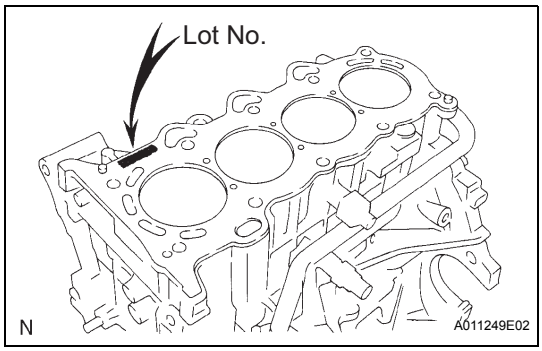


15. INSTALL OIL FILTER UNION
(a) Using a 12 mm hexagon wrench, install the oil filter union.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

16. INSTALL OIL FILTER
(a) Check and clean the oil filter installation surface.
(b) Apply clean engine oil to the gasket of the new oil filter.
(c) Lightly screw the oil filter into place, and tighten it until the gasket comes into contact with the seat.

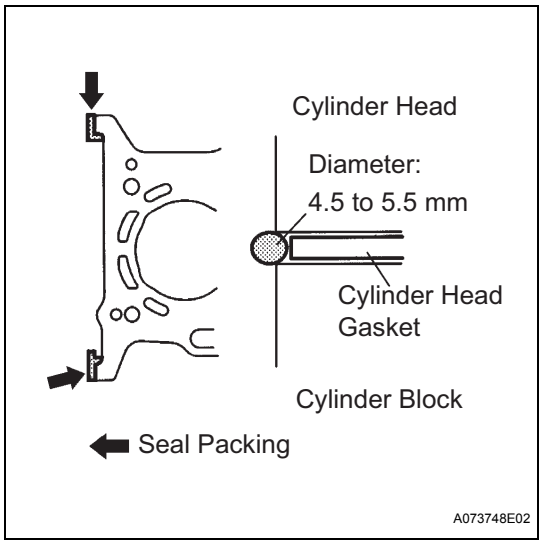


(d) Using SST, tighten it an additional 3/4 turn.
SST 09228-06501
If using a torque wrench, tighten to the specified torque.
Torque: 17.5 N*m (178 kgf*cm, 13 ft.*lbf)



17. INSTALL CYLINDER HEAD GASKET
(a) Place a new cylinder head gasket on the cylinder block with the Lot No. stamp facing upward.
NOTICE:
- **Remove any oil from the contact surface.**
- **Pay attention to the mounting orientation of the cylinder head gasket.**
- **Place the cylinder head on the cylinder block gently in order not to damage the gasket at the bottom part of the head.**

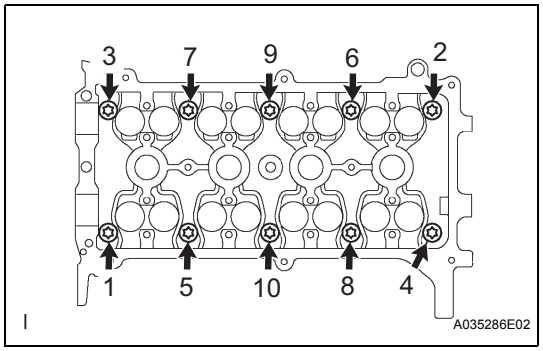
18. INSTALL CYLINDER HEAD
HINT:
The cylinder head bolts are tightened in 2 successive steps.



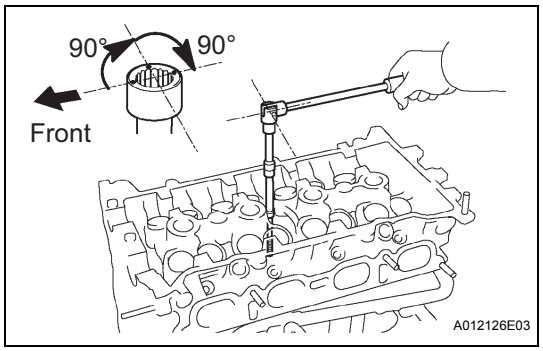
(a) Apply seal packing as shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent
Standard seal diameter:
3.5 mm to 4.5 mm (0.177 to 0.217 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes of applying seal packing.**

(b) Apply a light coat of engine oil to the threads of the cylinder head bolts.

EM

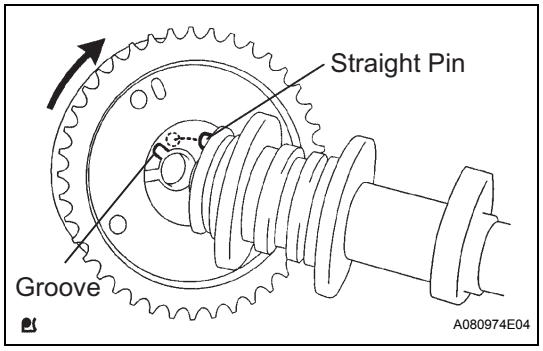


(c) Using several steps, install and uniformly tighten the 10 cylinder head bolts and plate washers with an 8 mm bi-hexagon wrench in the sequence shown in the illustration.
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)



(d) Mark the front of the cylinder head bolt with paint.
(e) Retighten the cylinder head bolts by an additional 90° and then another 90°, as shown in the illustration.
(f) Check that the painted mark is now at a 180° angle to the front.

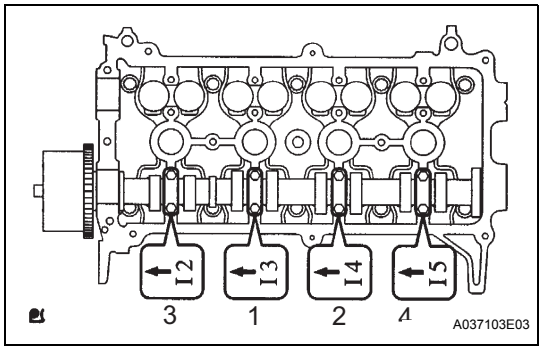
19. INSTALL ENGINE REAR OIL SEAL (See page EM-107)



20. INSTALL CAMSHAFT TIMING GEAR

(a) Put the camshaft timing gear assembly and the camshaft together with the straight pin of the groove.
(b) Turn the camshaft timing gear assembly clockwise while pushing it lightly towards the camshaft. Push further at the position where the pin fits into the groove.
NOTICE:
Be careful not to turn the camshaft timing gear to the retard angle (to the right).
(c) Check that there is no clearance between the gear fringe and the camshaft.
(d) Tighten the flange bolt with the camshaft timing gear fixed in place.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

(e) Check that the camshaft timing gear can move to the retard angle (to the right) and is locked in the most retarded position.



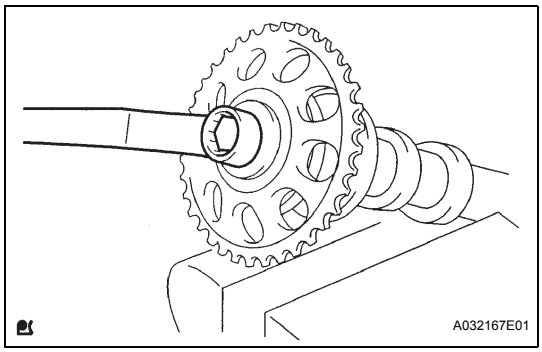
21. INSTALL CAMSHAFT

(a) Apply a light coat of engine oil to the camshaft journals.

(b) Place the camshaft on the cylinder head with the timing mark on the camshaft timing gear facing upward.

(c) Examine the front marks and numbers, and tighten the bolts in the sequence shown in the illustration.
Torque: 13 N*m (129 kgf*cm, 9 ft.*lbf)
NOTICE:
Tighten each bolt uniformly, keeping the camshaft level.

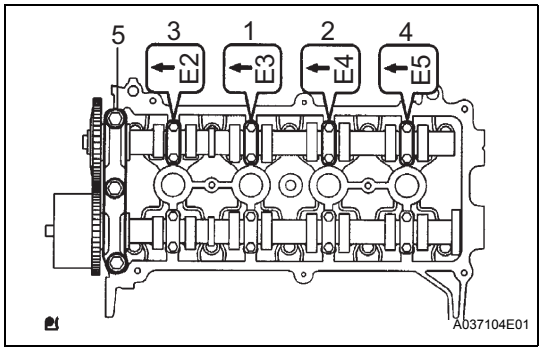
EM



22. INSTALL CAMSHAFT TIMING SPROCKET

(a) Clamp the camshaft in a vise.

(b) Align the knock pin hole of the camshaft timing sprocket with the knock pin of the camshaft, and install the camshaft timing sprocket.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)
NOTICE:
Be careful not to damage the camshaft.



23. INSTALL NO. 2 CAMSHAFT

(a) Apply a light coat of engine oil to the camshaft journals.

(b) Place the camshaft on the cylinder head with the timing mark on the camshaft timing gear facing upward.

(c) Examine the front marks and numbers, and tighten the bolts in the sequence shown in the illustration.
Torque: 13 N*m (133 kgf*cm, 9 ft.*lbf)
NOTICE:
Tighten each bolt uniformly, keeping the camshaft level.

(d) Install the No. 1 bearing cap.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

24. INSTALL CAMSHAFT POSITION SENSOR

(a) Apply engine oil to the O-ring.
NOTICE:
If the O-ring is damaged, replace the camshaft position sensor.

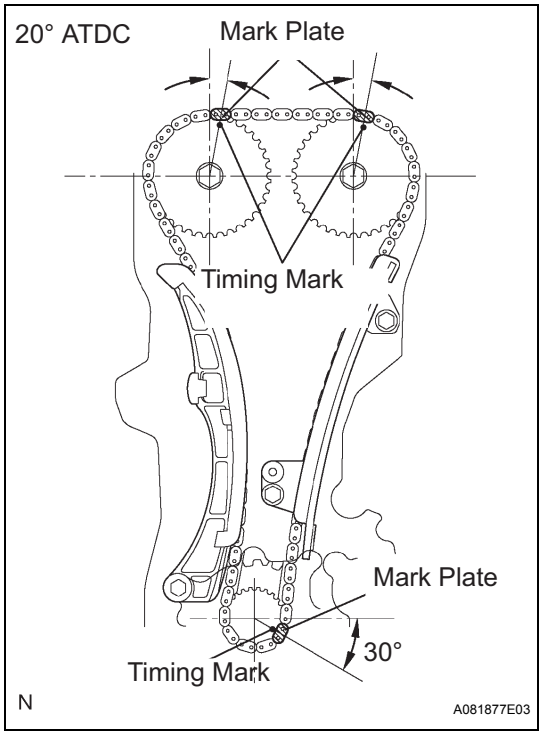
(b) Install the camshaft position sensor with the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

25. INSTALL CHAIN

(a) Set the position of the No. 1 cylinder to 20° ATDC.
NOTICE:
To prevent the pistons from hitting against valves, the following procedures must be performed in the order below.

(1) Set the crankshaft between 40 to 140° ATDC.
(2) Set the cams of the intake and exhaust timing sprockets to 20° ATDC.
(3) Reset the crankshaft to 20° ATDC.

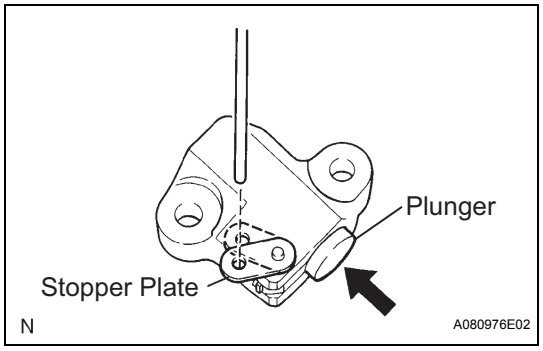
(b) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



(c) Align the matchmarks of the camshaft timing sprocket, camshaft timing gear and crankshaft timing sprocket with each mark plate (colored in yellow) of the timing chain.
HINT:
To prevent the exhaust camshaft from springing back, turn it using a wrench and set it at the mark on the chain.

(d) Install the chain tensioner slipper with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

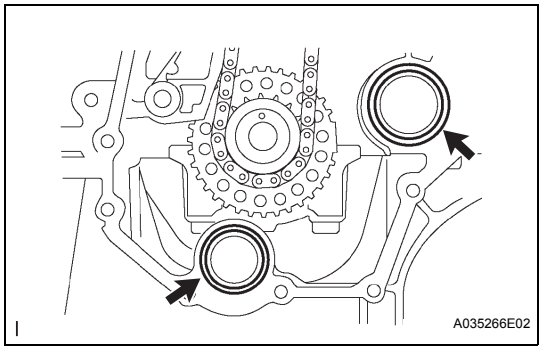
EM



(e) While rotating the stopper plate of the chain tensioner upward as shown in the illustration, push in the plunger of the tensioner.
(f) While rotating the stopper plate of the tensioner downward, insert a 2.5 mm (0.098 in.) diameter bar into the holes of the stopper plate and the tensioner to hold the stopper plate.
(g) Install the chain tensioner with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
(h) Remove the bar from the chain tensioner.
(i) Check the tension between the intake and exhaust camshaft timing sprocket.

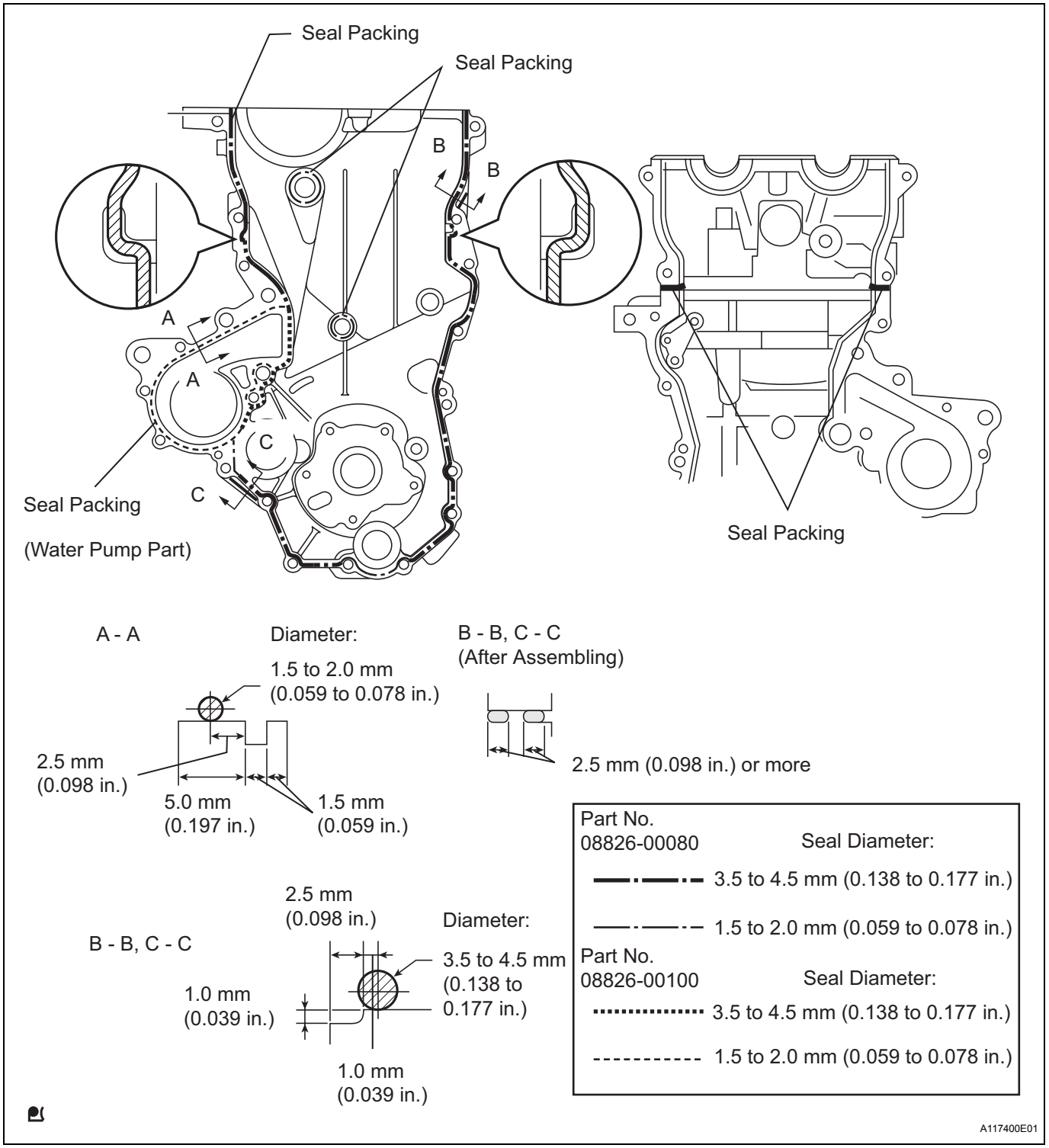
26. INSTALL OIL PUMP SEAL (See page EM-106)

27. INSTALL TIMING CHAIN COVER



(a) Install 2 new O-rings onto the 2 locations as shown in the illustration.
(b) Remove any old packing material from the contact surface.

(c) Apply seal packing to the oil pump assembly, cylinder head and cylinder block as shown in the illustration below.

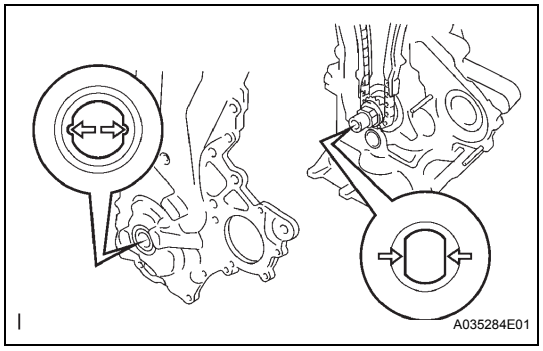


Seal packing:
Water pump part: Part No. 08826-00100 or equivalent
Other part: Part No. 08826-00080 or equivalent

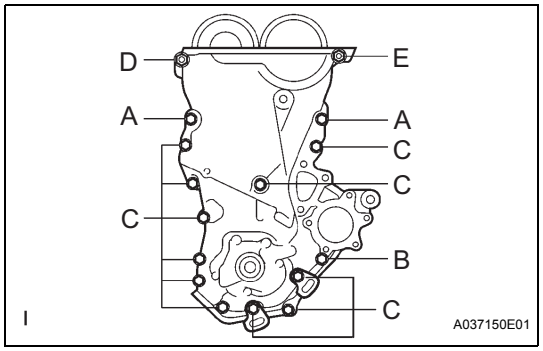
NOTICE:

- **Remove any oil from the contact surface.**

- **Install the oil pump within 3 minutes of applying seal packing.**
- **Do not expose the seal to engine oil for at least 2 hours after installation.**
- **Do not start the engine for at least 2 hours after installation.**



(d) Align the keyway of the oil pump drive rotor with the rectangular portion of the crankshaft, and slide the oil pump into place.



(e) Install the oil pump assembly with the 15 bolts and nut. Uniformly tighten the bolts and nut in several steps.

Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf) for bolt A
11 N*m (112 kgf*cm, 8.1 ft.*lbf) for bolt B
11 N*m (112 kgf*cm, 8.1 ft.*lbf) for bolt C
24 N*m (245 kgf*cm, 18 ft.*lbf) for nut D
24 N*m (245 kgf*cm, 18 ft.*lbf) for bolt E

NOTICE:

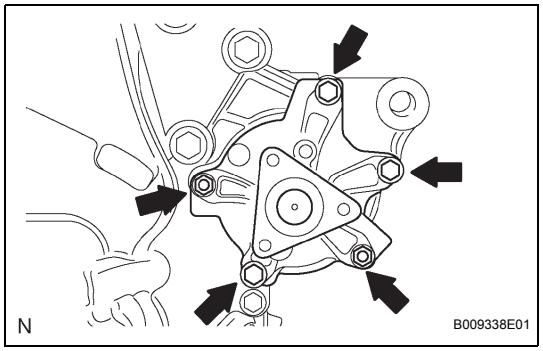
- **Pay attention not to disturb the seal packing.**
- **After installing the timing chain case, install the mounting bracket and water pump within 15 minutes.**

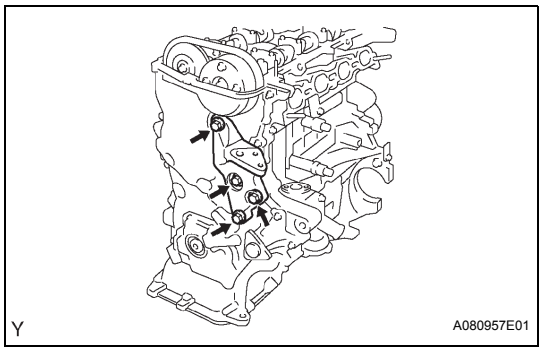
HINT:
Each bolt length is as follows:
30 mm (1.18 in.) for bolt A
35 mm (1.38 in.) for bolt B
20 mm (0.79 in.) for bolt C
20 to 14 mm (0.79 to 0.55 in.) for bolt E

28. INSTALL WATER PUMP

(a) Install a new gasket and the water pump with the 3 bolts and 2 nuts.

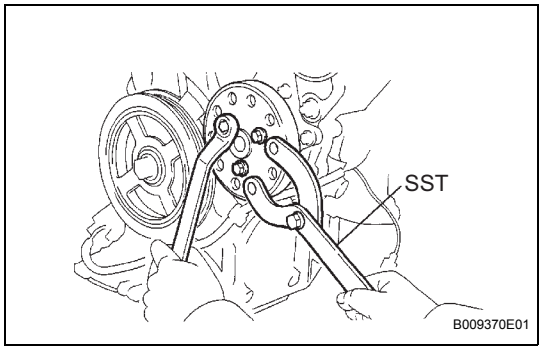
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)





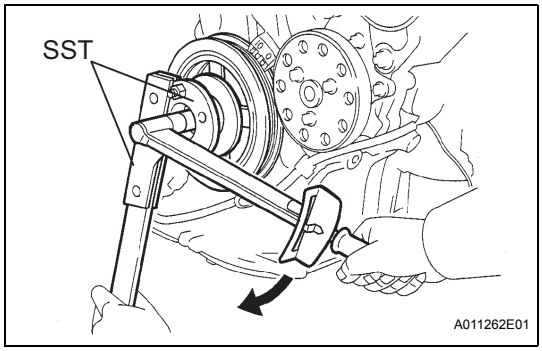
29. INSTALL ENGINE MOUNTING BRACKET RH

(a) Install the engine mounting bracket RH with the 4 bolts.
Torque: 55 N*m (561 kgf*cm, 41 ft.*lbf)



30. INSTALL WATER PUMP PULLEY

(a) Using SST, install the pump pulley with the 3 bolts.
SST 09960-10010 (09962-01000, 09963-00600)
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

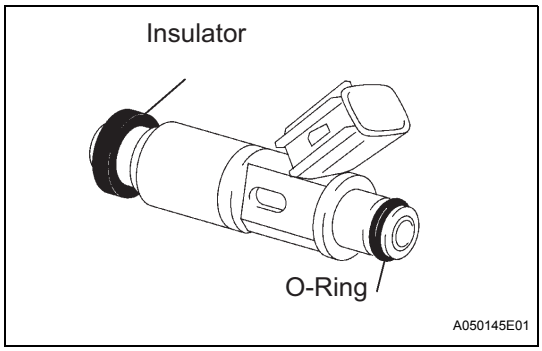


31. INSTALL CRANKSHAFT PULLEY

(a) Align the pin hole of the crankshaft pulley with the pin position, and install the crankshaft pulley.
(b) Using SST, install the pulley bolt.
SST 09330-00021, 09213-58012 (91111-50845)
Torque: 128 N*m (1,305 kgf*cm, 95 ft.*lbf)

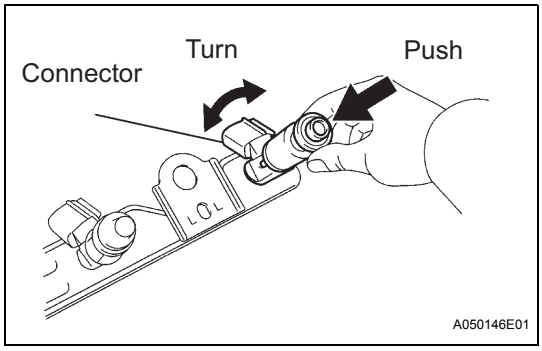
32. INSPECT VALVE CLEARANCE (See page EM-10)

33. ADJUST VALVE CLEARANCE (See page EM-11)



34. INSTALL FUEL INJECTOR

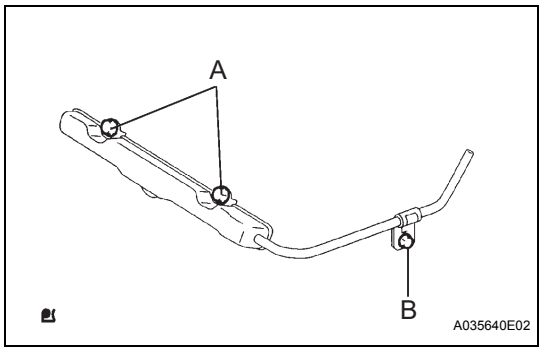
(a) Install new insulators onto each fuel injector.
(b) Apply a light coat of spindle oil or gasoline to new O-rings and install them onto each fuel injector.
(c) Apply a light coat of spindle oil or gasoline to the place where a delivery pipe comes into contact with the O-ring.



(d) While turning the injector clockwise and counterclockwise, install it to the delivery pipe.
NOTICE:
- **Be careful not to twist the O-ring.**
- **After installing the fuel injectors, check that they turn smoothly. If not, reinstall it with a new O-ring.**

35. INSTALL FUEL DELIVERY PIPE

(a) Install the 2 spacers onto the cylinder head.

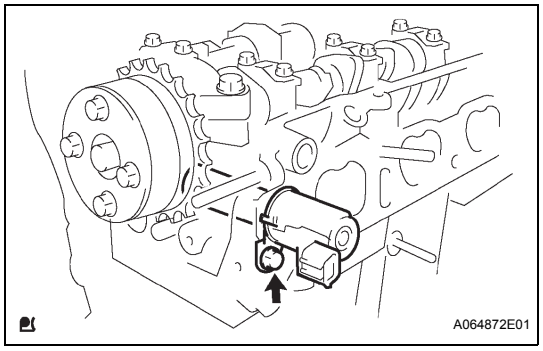


(b) Install the fuel delivery pipe and 4 fuel injectors together.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf) for bolt A
9.0 N*m (92 kgf*cm, 80 in.*lbf) for bolt B

NOTICE:

- **Be careful not to drop the fuel injectors when installing the fuel delivery pipe.**
- **Check that the fuel injectors rotate smoothly after installing the fuel delivery pipe.**



36. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

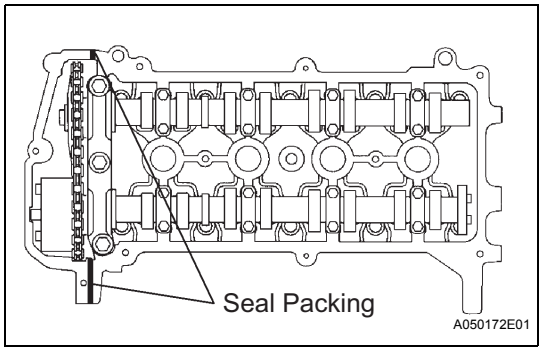
(a) Apply a light coat of engine oil to a new O-ring, and install it onto the oil control valve.

(b) Install the oil control valve with the bolt.

Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

NOTICE:

Be careful not to twist the O-ring.



37. INSTALL CYLINDER HEAD COVER

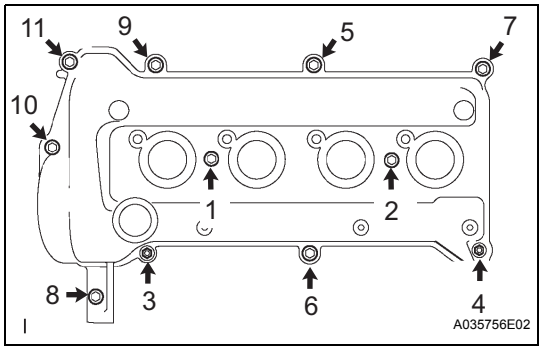
(a) Install the gasket onto the cylinder head cover.

(b) Apply seal packing to the 2 locations as shown in the illustration.

Seal packing:
Part No. 08826-00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes of applying seal packing.**
- **Do not start the engine for at least 2 hours after installation.**

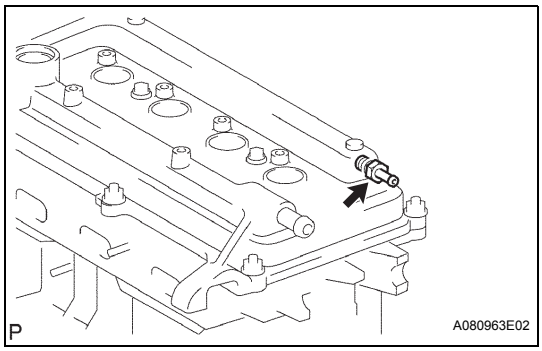


(c) Install the cylinder head cover with the 9 bolts, 2 seal washers and 2 nuts.

(d) Using several steps, uniformly tighten the bolts and nuts in the sequence shown in the illustration.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

EM



38. INSTALL VENTILATION VALVE

(a) Install the ventilation valve onto the cylinder head cover.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

39. INSTALL OIL DIPSTICK GUIDE

(a) Apply a light coat of engine oil to a new O-ring and install it to the dipstick guide.
(b) Install the dipstick guide with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

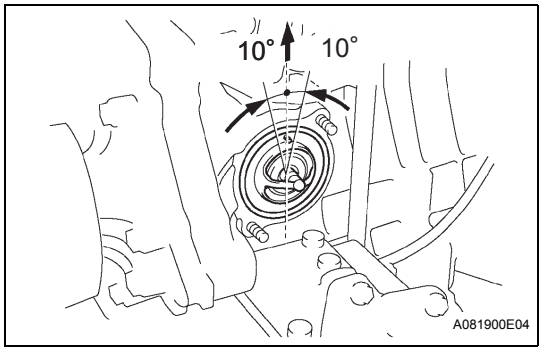
40. INSTALL CRANKSHAFT POSITION SENSOR

(a) Apply a light coat of engine oil to the O-ring on the crankshaft position sensor.
NOTICE:
If the O-ring is damaged, replace the crankshaft position sensor.
(b) Install the crankshaft position sensor with the bolt.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

EM

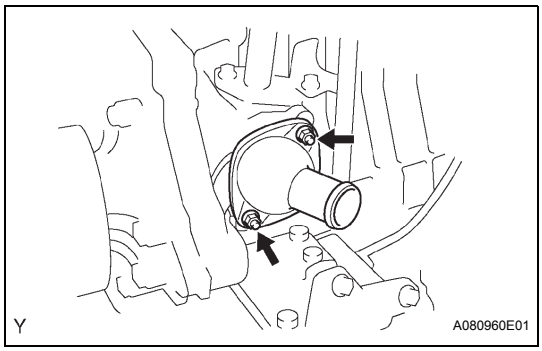
41. INSTALL OIL FILLER CAP

(a) Install a new gasket and the oil filler cap.



42. INSTALL THERMOSTAT

(a) Install a new gasket onto the thermostat.
(b) Install the thermostat with the jiggle valve facing upward.
HINT:
The jiggle valve may be set within 10° on either side as shown in the illustration.

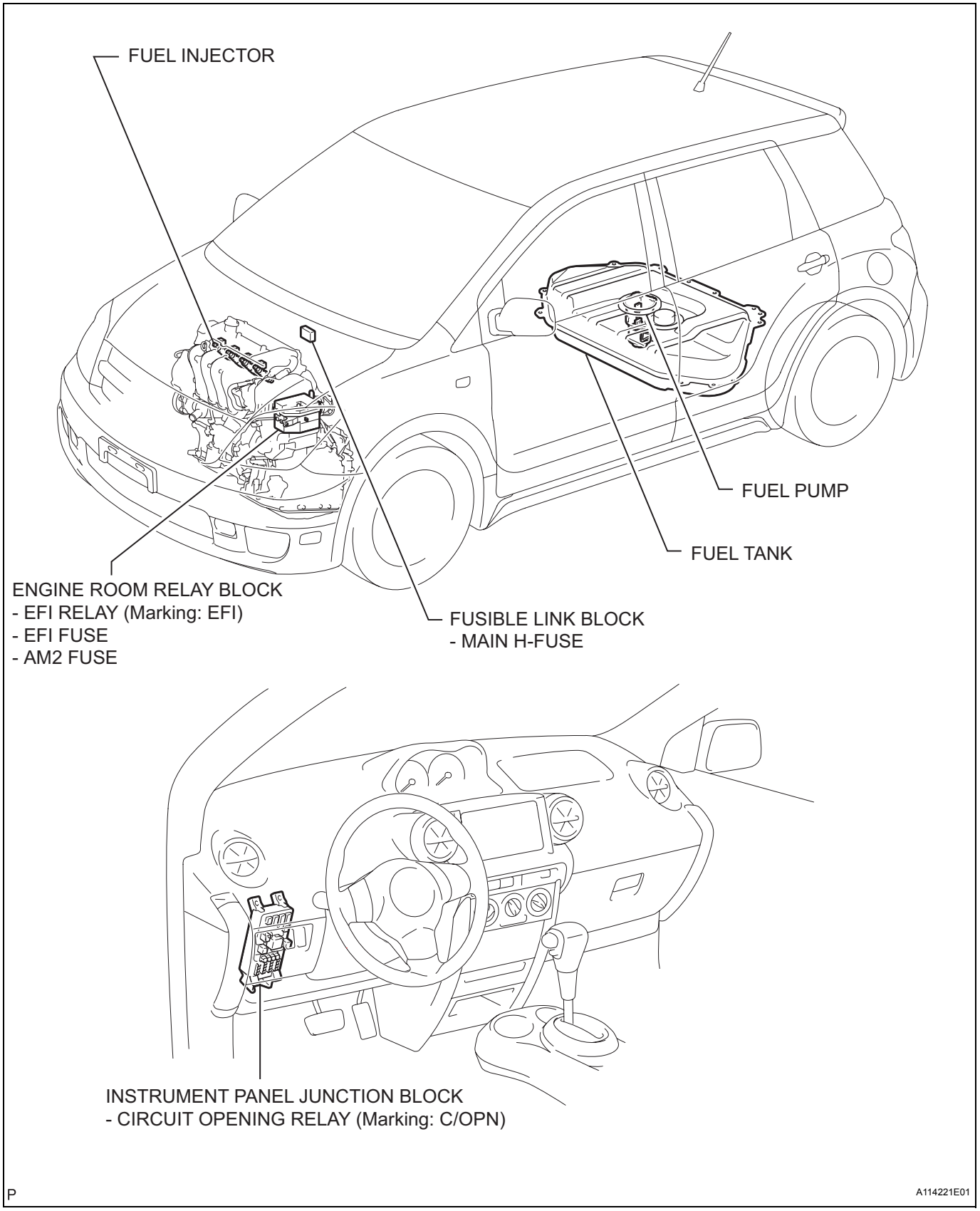


(c) Install the water inlet with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

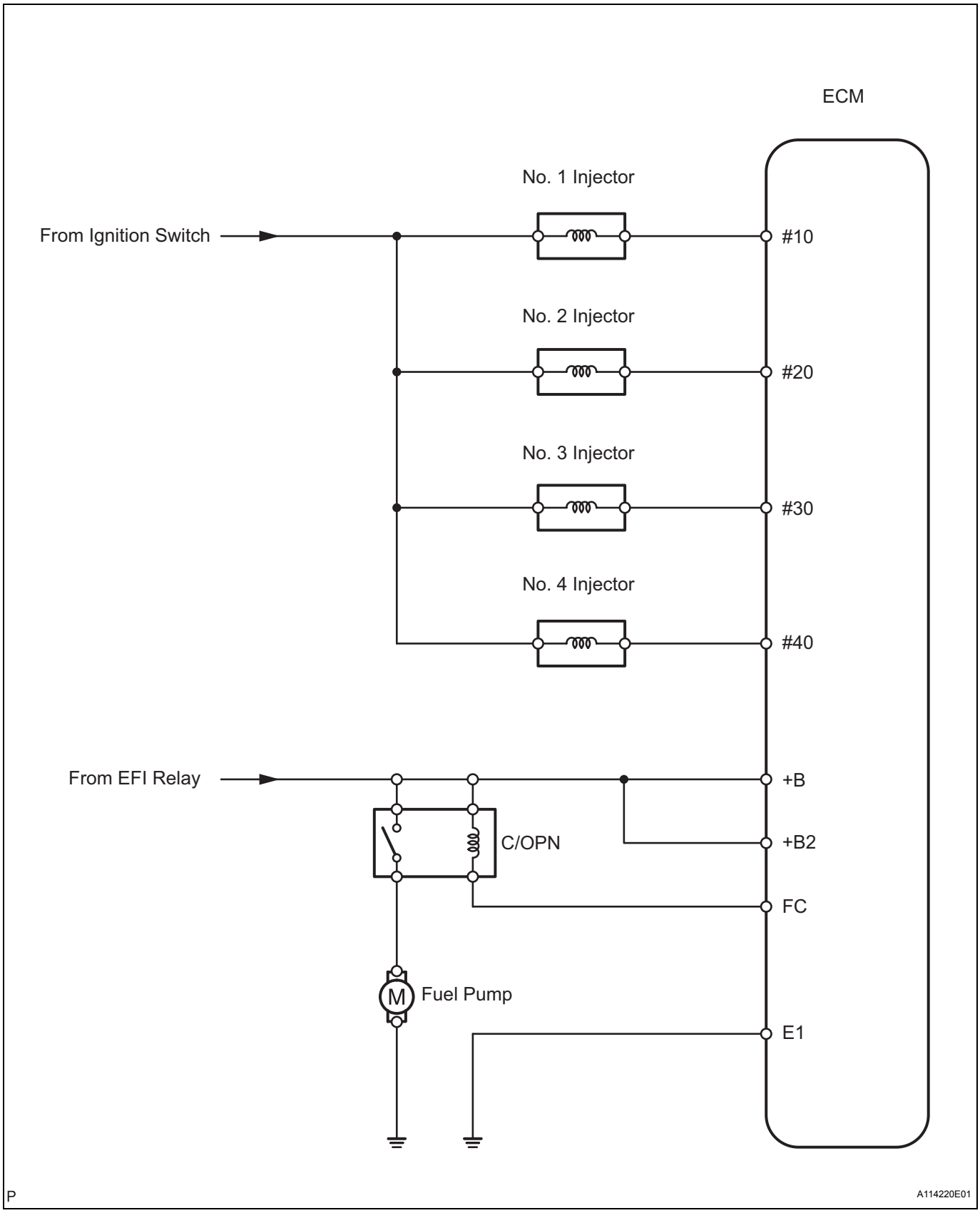
43. INSTALL SPARK PLUG

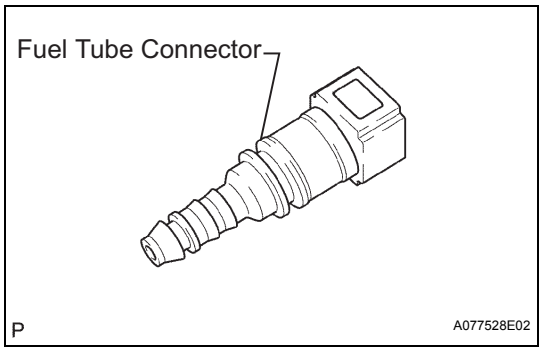
(a) Using a 16 mm plug wrench, install the 4 spark plugs.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

PARTS LOCATION



SYSTEM DIAGRAM





ON-VEHICLE INSPECTION

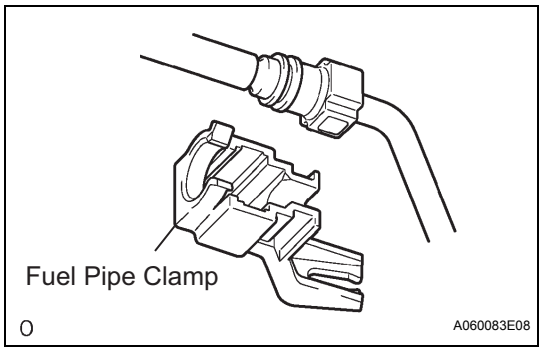
1. CHECK FUEL PRESSURE

(a) Discharge the fuel system pressure and take precautions against possible fuel spray (see page FU-11).

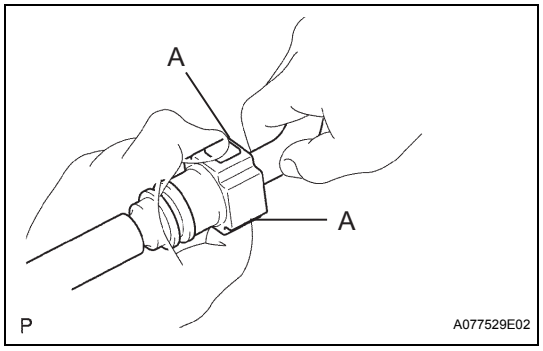
(b) Check that the battery voltage is above 11 V.

(c) Disconnect the cable from the negative (-) battery terminal.

(d) Prepare the part number shown below. Remove the connector from the tube.
HINT:
Part No. 23901-22130

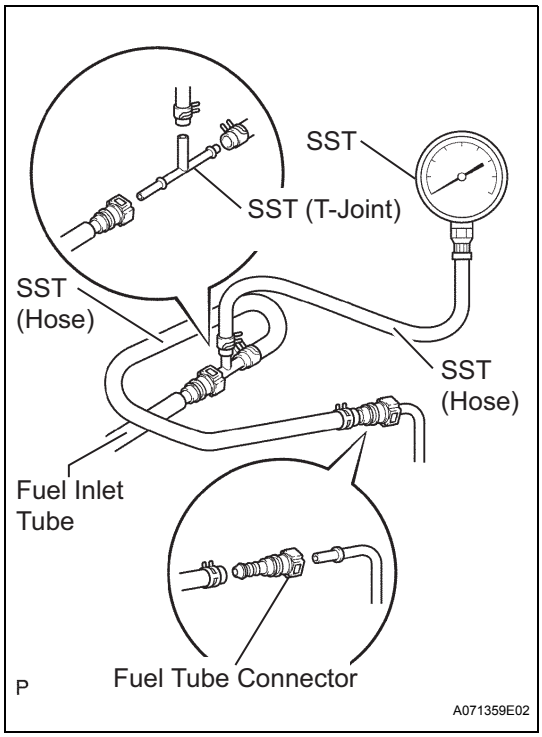


(e) Remove the fuel pipe clamp from the fuel tube connector.



(f) Disconnect the fuel tube connector from the fuel pipe by pinching part A with your fingers as shown in the illustration.
CAUTION:
- **DISCHARGE FUEL SYSTEM PRESSURE procedures must be performed before disconnecting any part of the fuel system,**
- **After performing the DISCHARGE FUEL SYSTEM PRESSURE procedures, pressure will remain in the fuel line. When disconnecting the fuel line, place a cloth or equivalent over fittings to reduce the risk of fuel spray.**

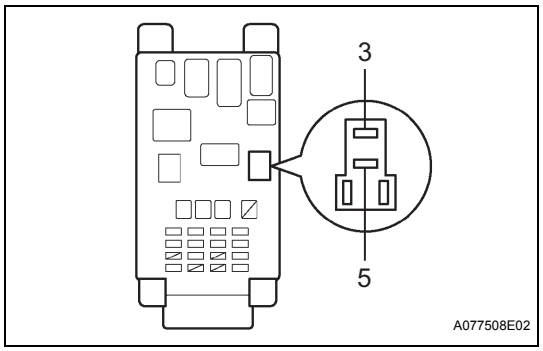
FU



(g) Install SST (pressure gauge) and the fuel tube connector as shown in the illustration using SST.
SST 09268-41047 (95336-08070), 09268-45014 (09268-41250, 09268-41200, 09268-41220)
(h) Wipe up any gasoline.
(i) Reconnect the cable to the negative (-) battery terminal.
(j) Connect the intelligent tester to the DLC3.
(k) Measure the fuel pressure.
Standard fuel pressure:
304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 50 psi)
If the pressure is greater than the specified range, replace the fuel pressure regulator.
If the pressure is less than the specified range, check the fuel hose connections, fuel pump, fuel filter and fuel pressure regulator.
(l) Disconnect the intelligent tester from the DLC3.
(m) Start the engine.
(n) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.
Standard fuel pressure:
147 kPa (1.5 kgf/cm^2, 21 psi)
HINT:
If the pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.
(o) After checking the fuel pressure, disconnect the negative (-) battery cable and carefully remove SST and the fuel tube connector to prevent fuel spray.
(p) Reconnect the fuel inlet tube (fuel tube connector).
CAUTION:
After taking the precautions, connect the fuel tube connector (quick type).

2. CHECK FUEL PUMP OPERATION AND CHECK FOR FUEL LEAKS

(a) When using the intelligent tester:
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON and intelligent tester main switch ON.
NOTICE:
Do not start the engine.
(3) Select the ACTIVE TEST mode on the intelligent tester.
(4) Please refer to the intelligent tester operator's manual for further details.



(b) When not using the intelligent tester:
  (1) Remove the circuit opening relay from the instrument panel junction block.
  (2) Using a service wire, connect terminals 3 and 5 of the relay block.
  NOTICE:
  Pay due attention to the terminal connecting position to avoid malfunctions.
  (3) Turn the ignition switch ON, and check that the fuel pump operates.
  NOTICE:
  Do not start the engine.
(c) Check that there are no fuel leaks after doing maintenance to the fuel system.
(d) Disconnect the intelligent tester from the DLC3.

INSPECTION

1. INSPECT FUEL INJECTOR ASSEMBLY

(a) Inspect the resistance.

(1) Measure the resistance between the terminals.

Standard resistance:

13.5 to 14.2 Ω at 21°C (70°F)

If the result is not as specified, replace the injector assembly.

(b) Inspect the injector operation.

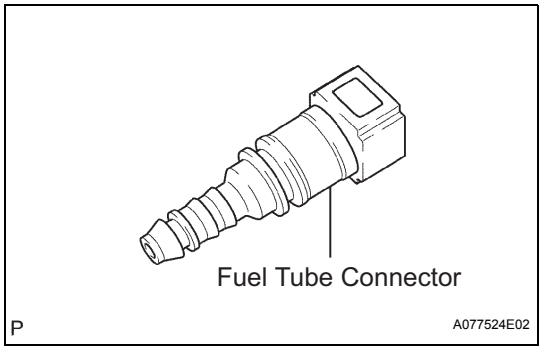
CAUTION:

- **Perform the test in a well-ventilated area and be careful of flames.**
- **Carefully handle the fuel tube connector.**

(1) Prepare a fuel tube connector.

HINT:

Part No. 23901-21060

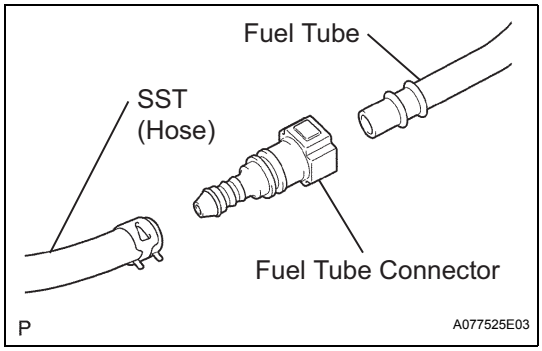


(2) Connect SST and the fuel tube connector to the fuel pipe.

SST 09268-41047 (95336-08070)

CAUTION:

After following the precautions of the FUEL SYSTEM, connect the fuel tube connector (quick type).



(3) Install a new O-ring to the injector.

(4) Connect SST (union and hose) to the injector, and hold the injector and union with SST (clamp).

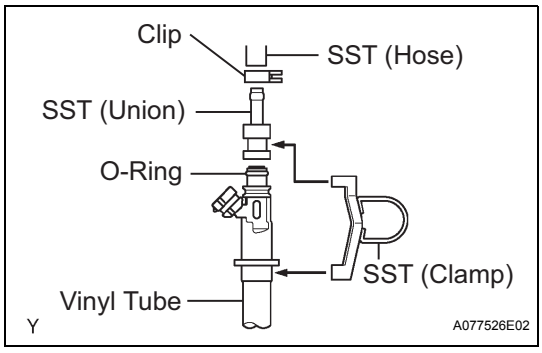
SST 09268-41047 (95336-08070, 09268-41110, 09268-41300), 09842-30080

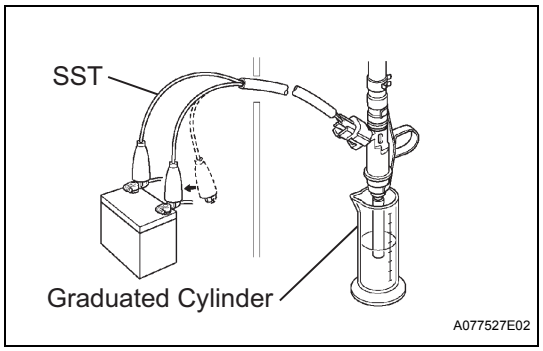
(5) Put the injector into a graduated cylinder.

HINT:

Install a suitable vinyl tube onto the injector to prevent fuel spray.

(6) Operate the fuel pump (see page FU-8).





(7) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with the graduated cylinder. Test each injector 2 or 3 times.
SST 09842-30080
Standard injection volume

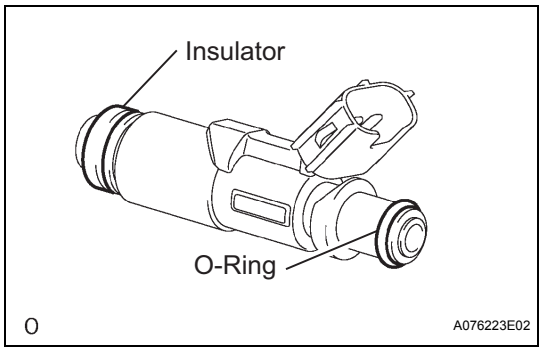
Injection Volume	Difference between each injector
47 to 58 cm^3 (2.9 to 3.5 cu in.) per 15 seconds	11 cm^3 (0.6 cu in.) or less

NOTICE:
Always do the switching at the battery side.
If the injection volume is not as specified, replace the injector assembly.

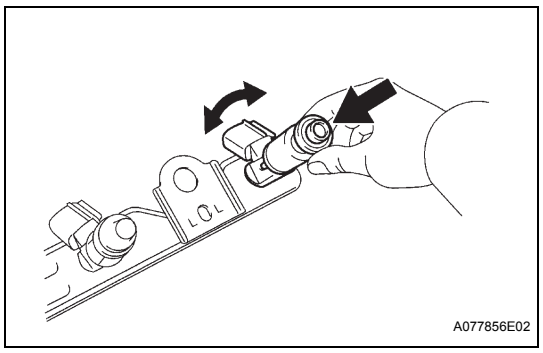
(c) Inspect the leakage.
(1) In the condition above, disconnect the test probes of SST (wire) from the battery and check the fuel leakage from the injector.
Standard fuel drop:
1 drop or less in 12 minutes
If the injection volume is not as specified, replace the injector assembly.

FU

INSTALLATION

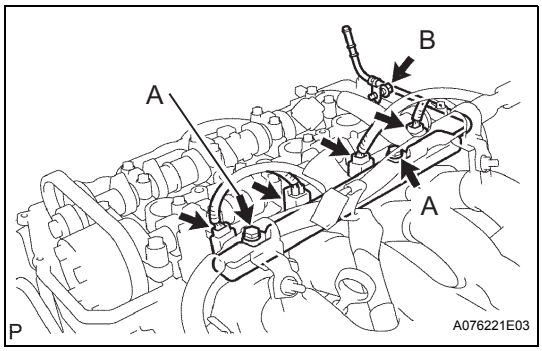


1. INSTALL FUEL INJECTOR ASSEMBLY
(a) Install new insulators onto each fuel injector.
(b) Apply a light coat of grease or gasoline to new O-rings and install them onto each fuel injector.
(c) Apply a light coat of grease or gasoline to the place where each fuel delivery pipe comes into contact with each O-ring.



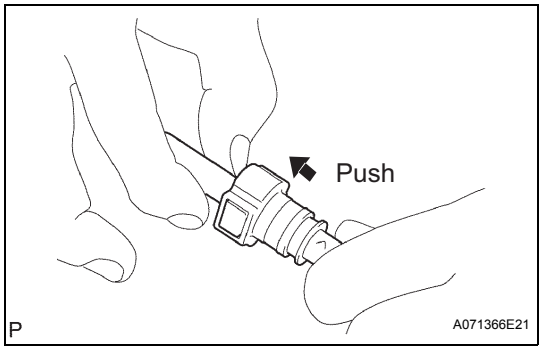
(d) While turning each fuel injector clockwise and counterclockwise, push it into each fuel delivery pipe.
NOTICE:
- **Be careful not to twist the O-ring.**
- **After installing the fuel injectors, check that they turn smoothly. If they do not, replace the O-ring of the improperly installed fuel injector with a new one, and install the fuel injector again.**

2. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY
(a) Install the 2 spacers onto the cylinder head.



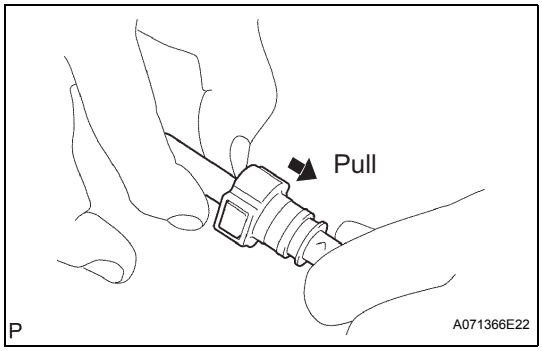
(b) Install the fuel delivery pipe with the 4 fuel injectors.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf) for bolt A
9.0 N*m (92 kgf*cm, 80 in.*lbf) for bolt B
NOTICE:
- **Be careful not to drop the fuel injectors when installing the fuel delivery pipe.**
- **Check that the fuel injectors rotate smoothly after installing the fuel delivery pipe.**

(c) Connect the 4 fuel injector connectors.



3. CONNECT FUEL TUBE SUB-ASSEMBLY

(a) Connect the fuel tube.
(1) Check the connected part of the pipe for damage or foreign objects.
(2) Align the axis of the connector with the axis of the pipe, and push the pipe into the connector until the connector makes a "click" sound. If the connection is tight, apply a small amount of fresh engine oil to the tip of the pipe.



(3) After finishing the connection, check that the pipe and connector are securely connected by pulling them.

(b) Install the fuel pipe clamp.

4. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-30)

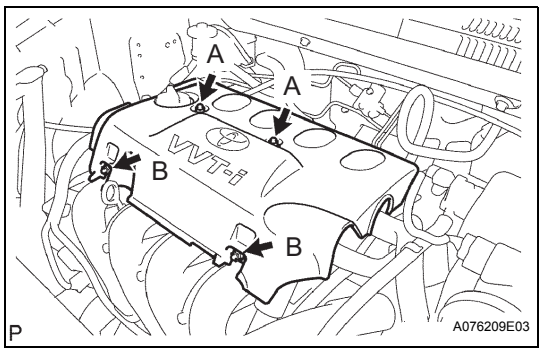
5. INSTALL IGNITION COIL (See page IG-7)

6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

7. CHECK FOR FUEL LEAKS (See page FU-8)

8. INSTALL NO. 2 CYLINDER HEAD COVER

(a) Install the cylinder head cover.
(b) First tighten the nuts labeled A, and then tighten the nuts labeled B.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)



9. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FUEL SYSTEM

PRECAUTION

1. PRECAUTION

(a) Before working on the fuel system, disconnect the negative (-) battery terminal.

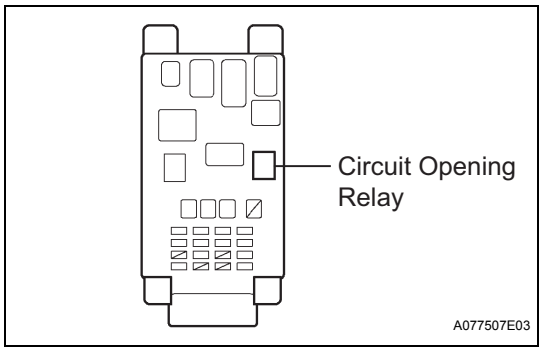
(b) Do not smoke or work near fire when handling the fuel system.

(c) Keep gasoline away from rubber or leather parts.

2. DISCHARGE FUEL SYSTEM PRESSURE

CAUTION:

- **DISCHARGE FUEL SYSTEM PRESSURE procedures must be performed before disconnecting any part of the fuel system.**
- **After performing the DISCHARGE FUEL SYSTEM PRESSURE procedures, pressure will remain in the fuel line. When disconnecting the fuel line, place a cloth or equivalent over fittings to reduce the risk of fuel spray.**



(a) Remove the circuit opening relay (Marking: C/OPN) from the instrument panel junction block.

(b) Start the engine. After the engine has stopped, turn the ignition switch OFF.
HINT:
Possibly DTC P0171 (system too lean) will be set.

(c) Check that the engine does not start.

(d) Remove the fuel tank cap, and let the air out of the fuel tank.

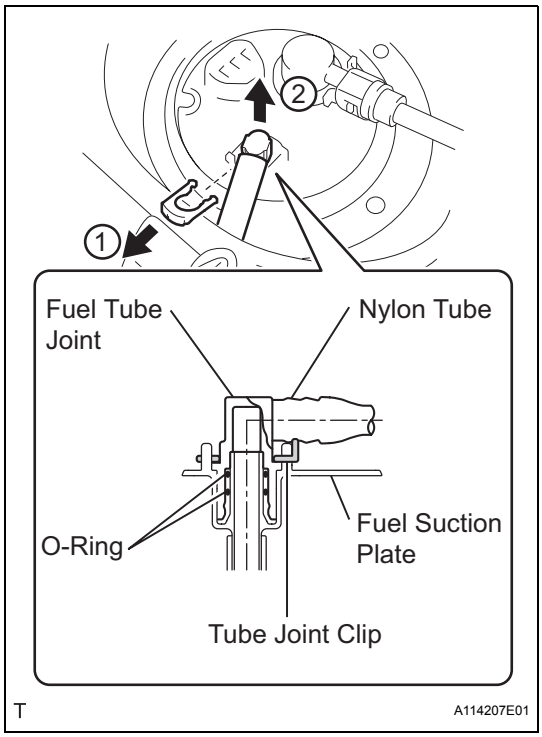
(e) Disconnect the cable from the negative (-) battery terminal.

(f) Install the circuit opening relay.

3. FUEL SYSTEM

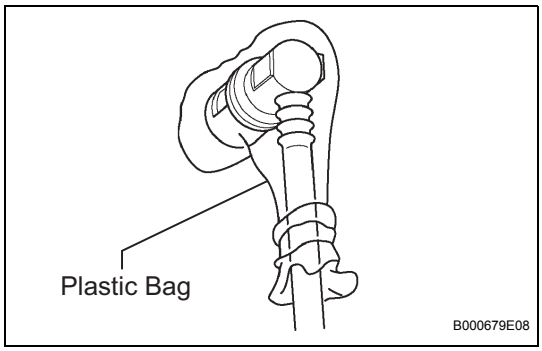
(a) When disconnecting the high pressure fuel line, a large amount of fuel will spray out, so perform these procedures.
(1) Discharge the pressure in the fuel system.

FU

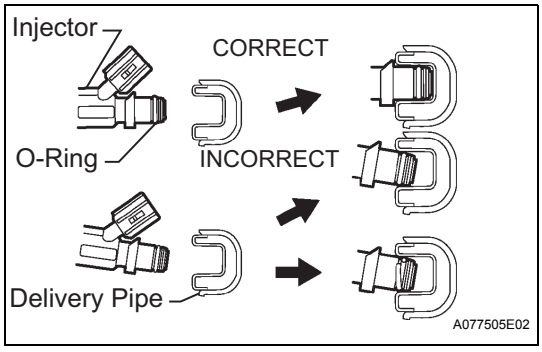


(2) Disconnect the fuel pump tube.
1. Remove the tube joint clip, and pull out the fuel pump tube.
NOTICE:
- **Check around the connector for dirt or mud before this operation and clean as necessary.**
- **Be careful of mud because the quick connector has an O-ring (which seals the pipe and connector) that can be contaminated.**
- **Do not use any tool in this operation.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**
- **When the pipe and connector are stuck, push and pull the connector to release and disconnect the connector.**

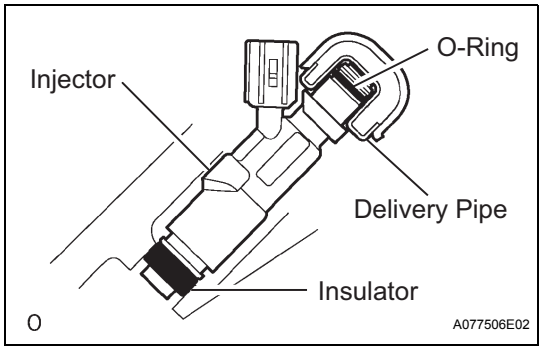
(3) Drain the fuel remaining inside the fuel pump tube.



(4) Cover the disconnected fuel pump tube with a plastic bag to prevent damage and intrusion of foreign objects.
(5) Place a tray under the vehicle or point of disconnection to catch any fuel spray.

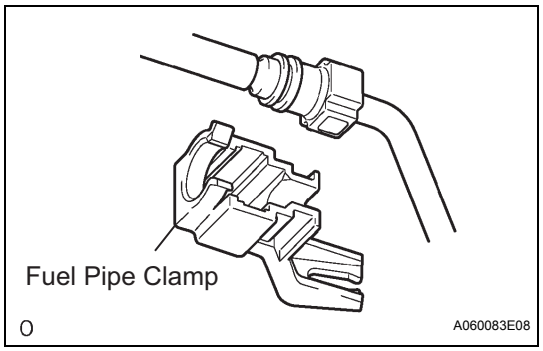


(b) Follow these precautions when removing and installing the fuel injectors.
NOTICE:
Never reuse the O-ring.
(1) When installing a new O-ring onto the injector, be careful not to damage it.
(2) Coat the new O-ring with grease or gasoline before installing. Never use engine oil, gear oil or brake oil.

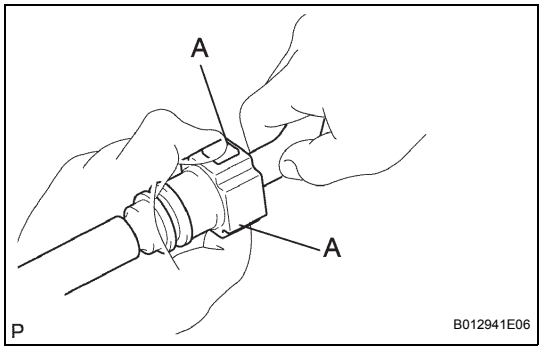


(c) Install the injector onto the delivery pipe and cylinder head as shown in the illustration. Before installing the injector, be sure to apply grease or gasoline to the place where the delivery pipe comes into contact with the O-ring of the injector.

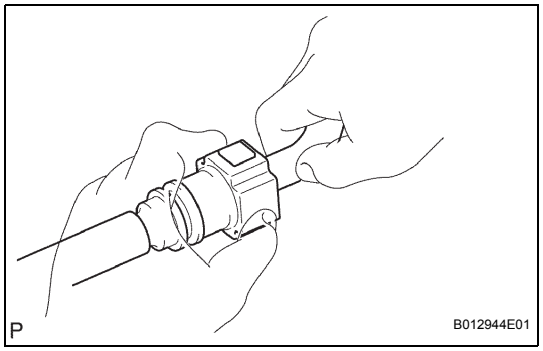
FU



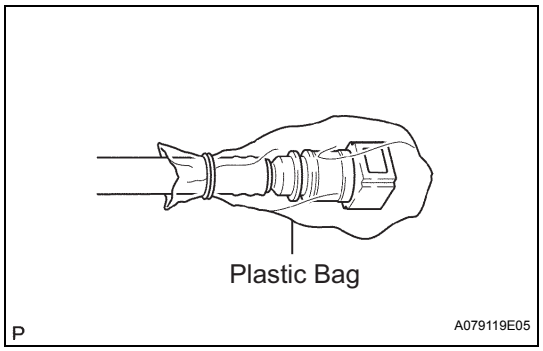
(d) Follow these precautions when disconnecting the fuel tube connectors.
(1) Remove the fuel pipe clamp from the connector.
(2) Check the pipe and around the connector for dirt or mud before disconnecting it and clean as necessary.



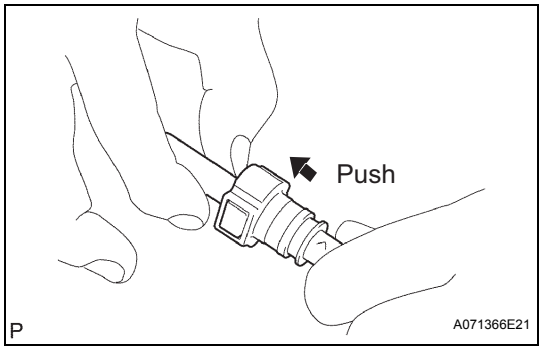
(3) Disconnect the connector from the hose while pinching part A with your fingers as shown in the illustration.



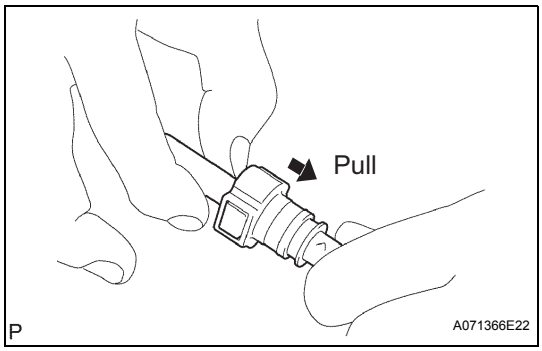
(4) If the connector and pipe are stuck, pinch the fuel pipe with your fingers, then push and pull the connector to release and disconnect the fuel tube connector. Do not use any tools.
(5) If there is dirt or any other substance in the sealing surface that might interfere with the seal, clean the area thoroughly before assembling.



(6) Cover the disconnected fuel tube connector and pipe with a plastic bag to prevent damage and intrusion of foreign objects.



(e) Follow these precautions when connecting the fuel tube connectors.
(1) Check the connected part of the pipe for damage or foreign objects.
(2) Align the axis of the connector with the axis of the pipe, and push the pipe into the connector until the connector makes a "click" sound. If the connection is tight, apply a small amount of fresh engine oil to the tip of the pipe.

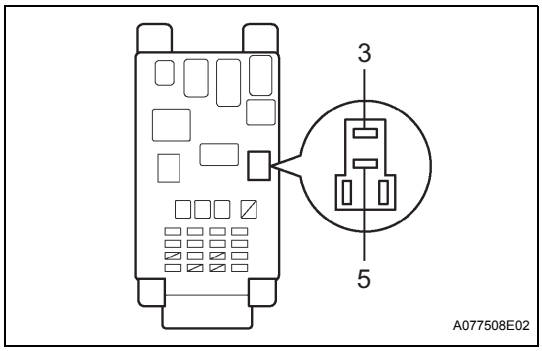


(3) After finishing the connection, check that the pipe and connector are securely connected by pulling them.
(4) Install the fuel pipe clamp to the connector.
(5) Check for fuel leaks.

4. CHECK FOR FUEL LEAKS

(a) When using the intelligent tester:
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch ON.
NOTICE:
Do not start the engine.
(3) Select the ACTIVE TEST mode on the intelligent tester.
(4) Please refer to the intelligent tester operator's manual for further details.

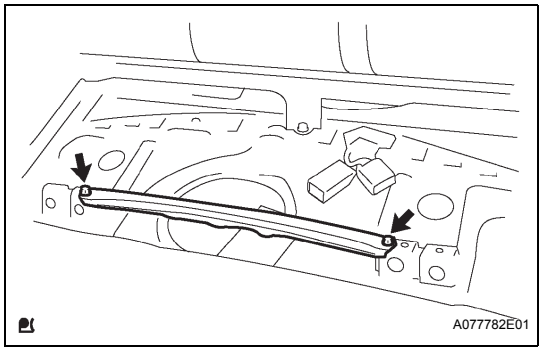
FU



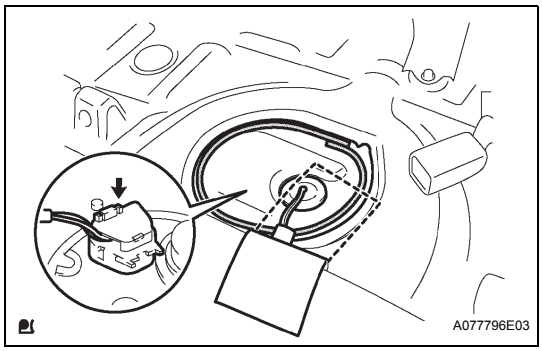
(b) When not using the intelligent tester:
(1) Remove the circuit opening relay from the instrument panel junction block.
(2) Using a service wire, connect terminals 3 and 5 of the relay block.
NOTICE:
Pay attention to the terminal connecting position to avoid malfunctions.
(3) Turn the ignition switch ON, and check that the fuel pump operates.
NOTICE:
Do not start the engine.
(c) Check that there are no fuel leaks after doing maintenance to the fuel system.
(d) Disconnect the intelligent tester from the DLC3.

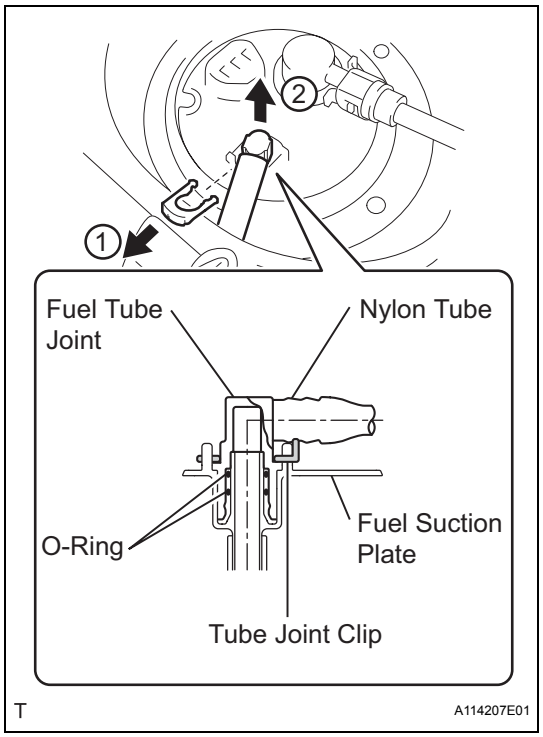
REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE (See page FU-11)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-12)**
4. **REMOVE REAR SEAT CUSHION SUPPORT BRACKET**
   (a) Remove the 2 bolts and rear seat cushion support bracket.



5. **REMOVE REAR FLOOR SERVICE HOLE COVER**
   (a) Remove the rear floor service hole cover.
6. **DISCONNECT FUEL PUMP CONNECTOR**





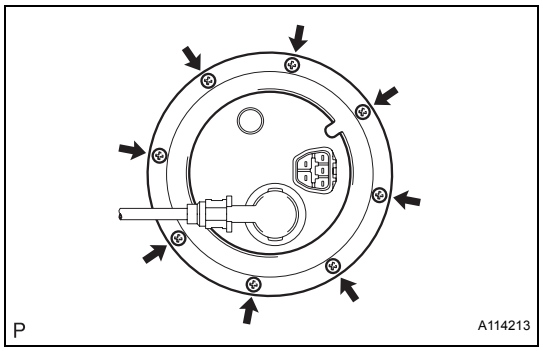
7. DISCONNECT FUEL PUMP TUBE SUB-ASSEMBLY

(a) Remove the tube joint clip, and pull out the fuel pump tube.

NOTICE:

- **Check around the connector for dirt or mud before this operation and clean as necessary.**
- **Be careful of mud because the quick connector has an O-ring (which seals the pipe and connector) that can be contaminated.**
- **Do not use any tool in this operation.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**
- **When the pipe and connector are stuck, push and pull the connector to release and disconnect the connector.**

FU

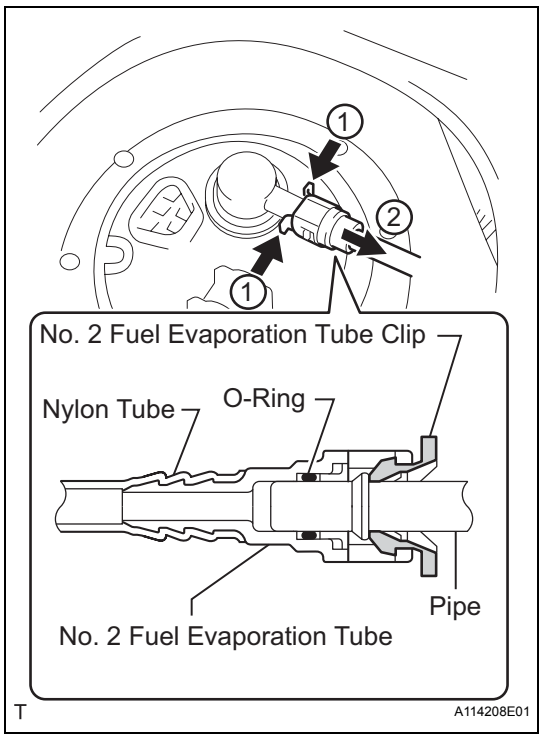


8. REMOVE FUEL TANK VENT TUBE SET PLATE BOLT

(a) Remove the 8 bolts.

HINT:

Only remove the bolts. The fuel tank vent tube set plate is removed in the next step.



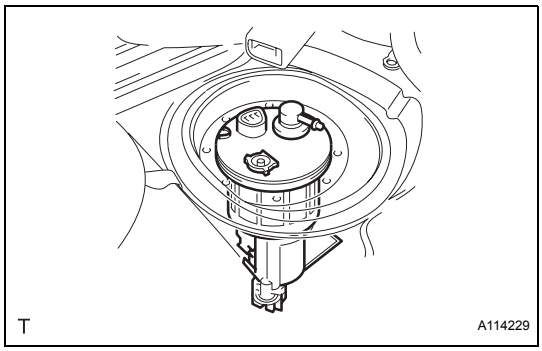
9. DISCONNECT NO. 2 FUEL EVAPORATION TUBE SUB-ASSEMBLY

(a) Pinch the No. 2 fuel evaporation tube clip and then pull out the No. 2 fuel evaporation tube.

NOTICE:

- **Check around the connector for dirt or mud before this operation and clean as necessary.**
- **Be careful of mud because the quick connector has an O-ring (which seals the pipe and connector) that can be contaminated.**
- **Do not use any tool in this operation.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**
- **When the pipe and connector are stuck, push and pull the connector to release and disconnect the connector.**

(b) Remove the fuel tank vent tube set plate.

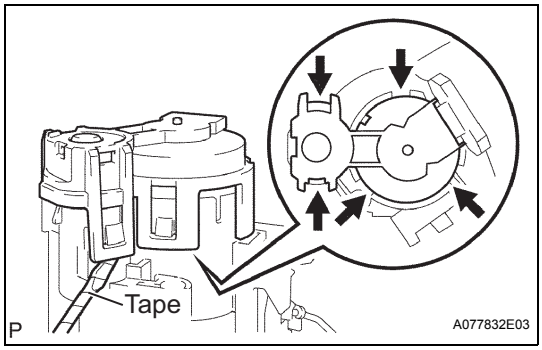


10. REMOVE FUEL PUMP ASSEMBLY WITH FUEL SENDER GAUGE ASSEMBLY

(a) Remove the fuel pump with fuel sender gauge from the fuel tank.

CAUTION:

- **Do not damage the fuel pump filter.**
- **Do not bend the arm of the fuel sender gauge.**

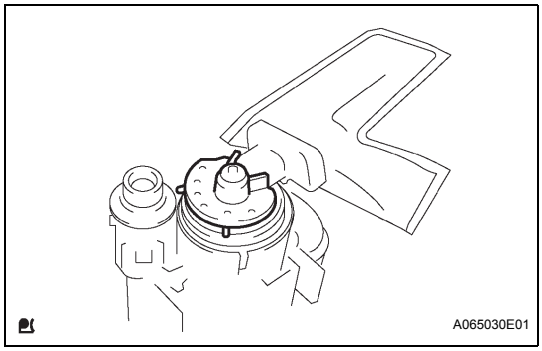


11. REMOVE NO. 2 FUEL SUCTION SUPPORT

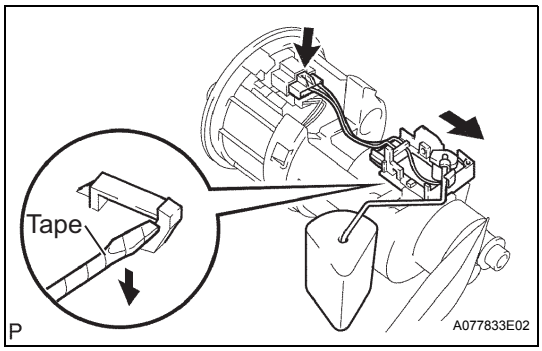
(a) Using a screwdriver with its tip wrapped in tape, detach the 5 snap claws from the claw holes, and remove the fuel suction support.

NOTICE:

Do not damage the fuel suction support.



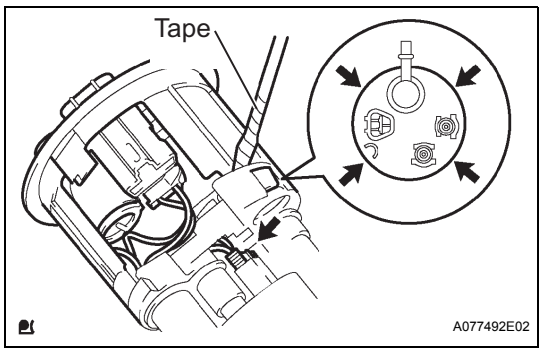
12. REMOVE FUEL PUMP CUSHION RUBBER



13. REMOVE FUEL SENDER GAUGE ASSEMBLY

(a) Disconnect the fuel sender gauge connector.

(b) Using a screwdriver with its tip wrapped in tape, unfasten the clamp to release the fuel sender gauge. Slide the fuel sender gauge to remove it from the fuel pump.



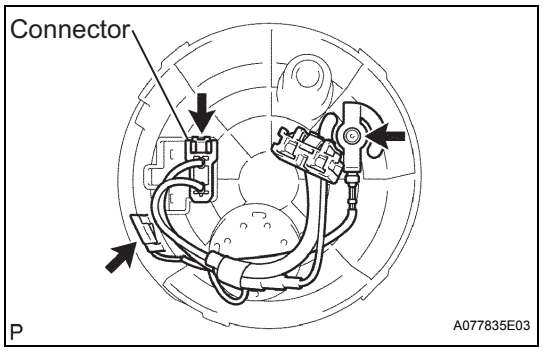
14. REMOVE FUEL SUCTION PLATE SUB-ASSEMBLY

(a) Disconnect the fuel pump connector.

(b) Using a screwdriver with its tip wrapped in tape, detach the 4 snap claws from the claw holes, and pull out the fuel suction plate.

NOTICE:

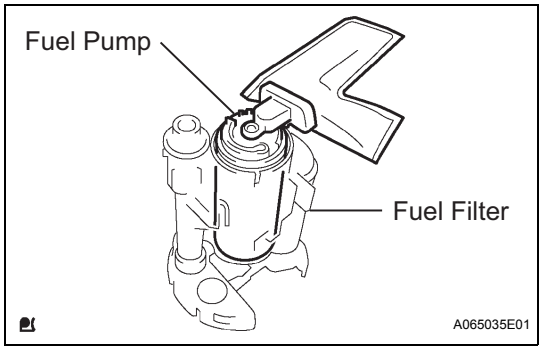
Do not damage the fuel pump filter.



15. REMOVE FUEL PUMP HARNESS

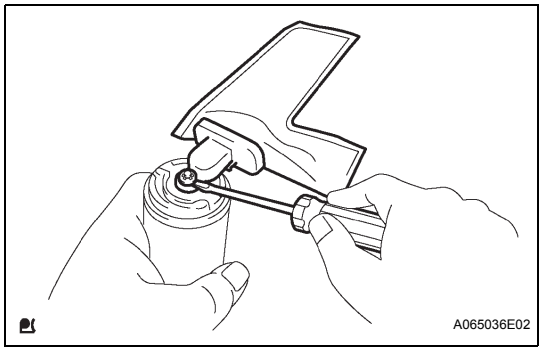
(a) Disconnect the connector.

(b) Using a small screwdriver, pry out the fuel pump harness.



16. REMOVE FUEL PUMP

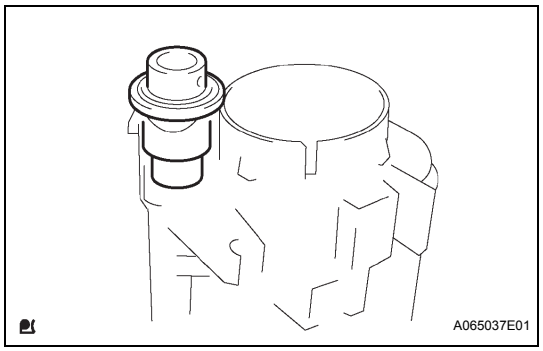
(a) Pull out the fuel pump from the fuel filter.



17. REMOVE FUEL PUMP FILTER

(a) Using a small screwdriver, pry out the clip.

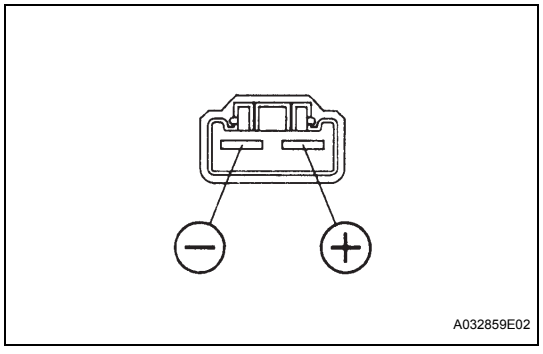
(b) Pull out the fuel pump filter from the fuel pump.



18. REMOVE FUEL PRESSURE REGULATOR ASSEMBLY

(a) Pull out the fuel pressure regulator from the fuel filter.

(b) Remove the O-ring from the fuel pressure regulator.



INSPECTION

1. INSPECT FUEL PUMP

(a) Inspect the fuel pump resistance.

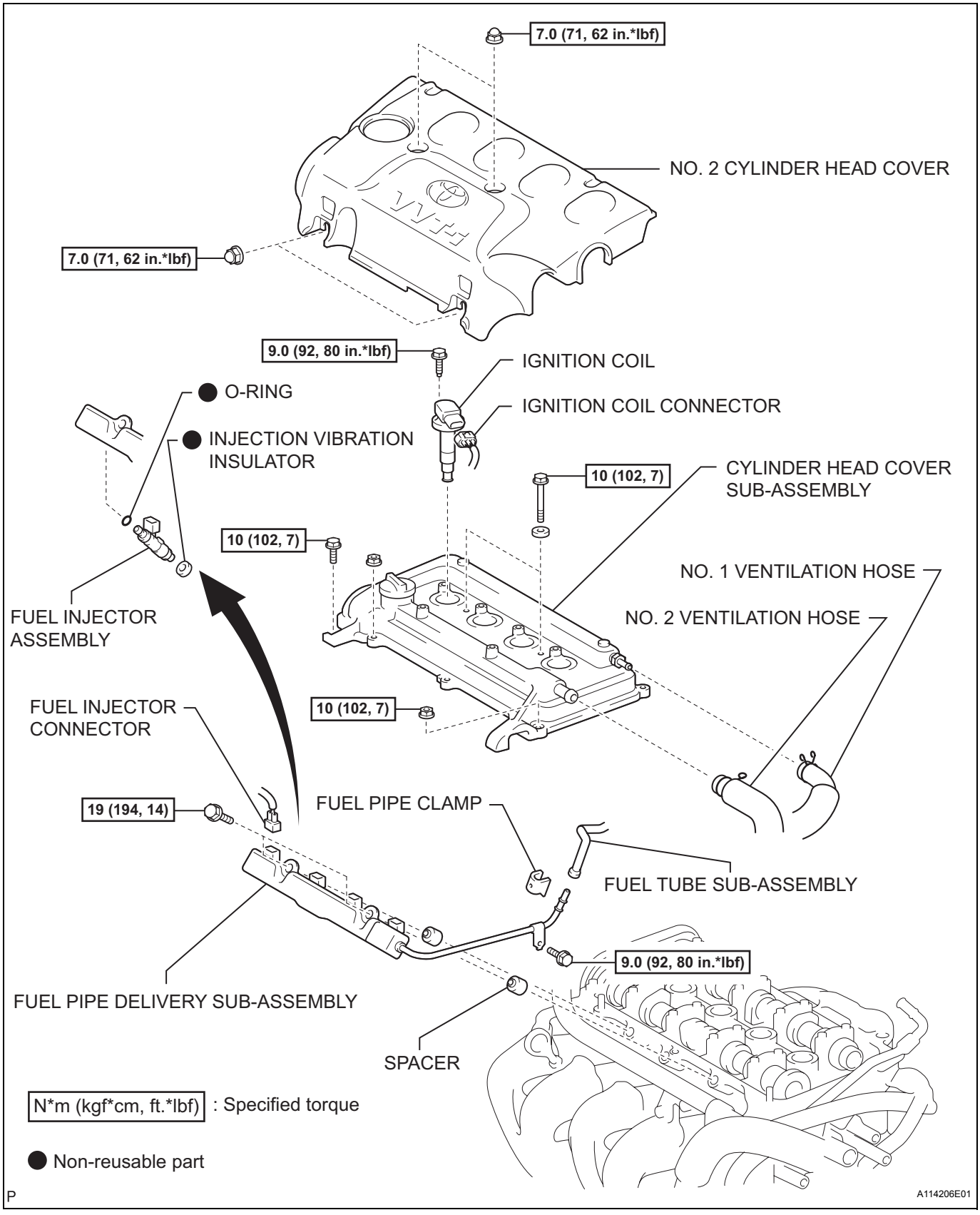
(1) Measure the resistance between the terminals.

Standard resistance:

0.2 to 3.0 Ω at 20°C (68°F)

FUEL INJECTOR

COMPONENTS

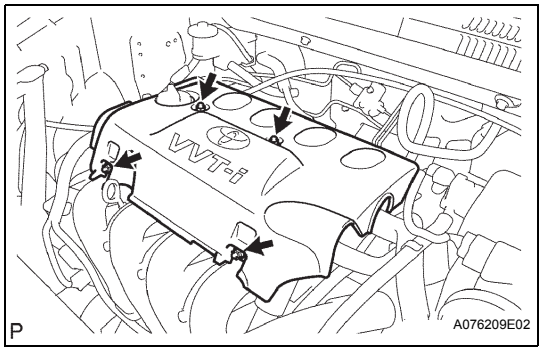


REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   CAUTION:
   - **DISCHARGE FUEL SYSTEM PRESSURE procedures must be performed before disconnecting any part of the fuel system.**
   - **After performing the DISCHARGE FUEL SYSTEM PRESSURE procedures, pressure will remain in the fuel line. When disconnecting the fuel line, place a cloth or equivalent over fittings to reduce the risk of fuel spray.**

   (a) Remove the circuit opening relay (Marking: C/OPN) from the instrument panel junction block.
   (b) Start the engine. After the engine has stopped, turn the ignition switch OFF.
   HINT:
   Possibly DTC P0171 (system too lean) will be set.
   (c) Check that the engine does not start.
   (d) Remove the fuel tank cap, and let the air out of the fuel tank.
   (e) Disconnect the cable from the negative (-) battery terminal.
   (f) Install the circuit opening relay.

2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

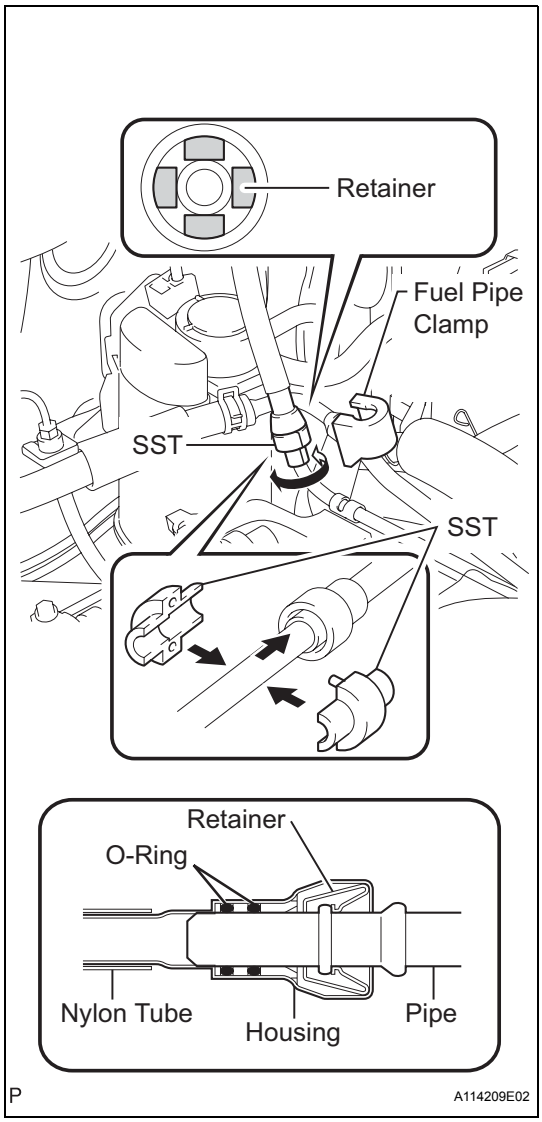


3. **REMOVE NO. 2 CYLINDER HEAD COVER**
   (a) Remove the 4 nuts and cover.

4. **REMOVE IGNITION COIL (See page IG-7)**

5. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-26)**

FU



6. DISCONNECT FUEL TUBE SUB-ASSEMBLY

(a) Remove the fuel pipe clamp.

(b) Using SST, disconnect the fuel tube.

SST 09268-21010

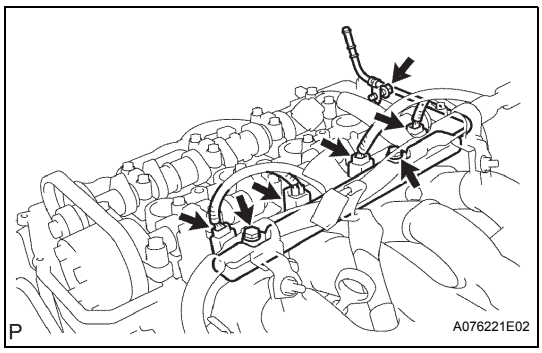
(1) Assemble SST onto the connection of the fuel tube as shown in the illustration.

(2) Rotate SST, align the retainers inside the connector with SST chamfered parts, and insert SST into the connector.

(3) Push SST and the connector together towards the fuel tube assembly.

NOTICE:

- **Remove dirt or foreign objects in the connector before this work.**
- **Do not forcibly bend and twist the nylon tube.**
- **When the connector and pipe are stuck, push and pull the connector to release and disconnect the connector.**
- **Cover the disconnected pipe and connector with a plastic bag to prevent damage and keep out foreign matter.**



7. REMOVE FUEL PIPE DELIVERY SUB-ASSEMBLY

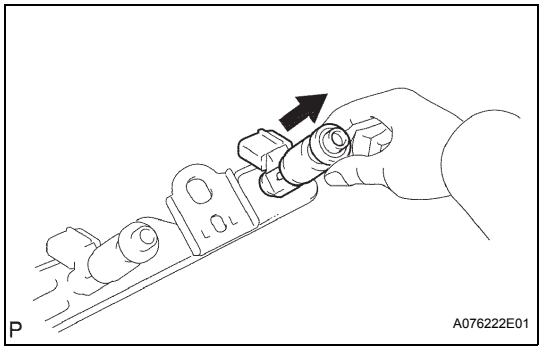
(a) Disconnect the 4 fuel injector connectors.

(b) Remove the 3 bolts and then remove the fuel delivery pipe with the 4 fuel injectors.

NOTICE:

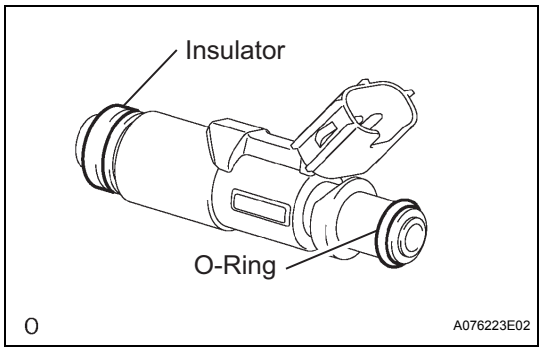
Be careful not to drop the fuel injectors when removing the fuel delivery pipe.

(c) Remove the 2 spacers from the cylinder head.



8. REMOVE FUEL INJECTOR ASSEMBLY

(a) Remove the 4 fuel injectors from the delivery pipe.

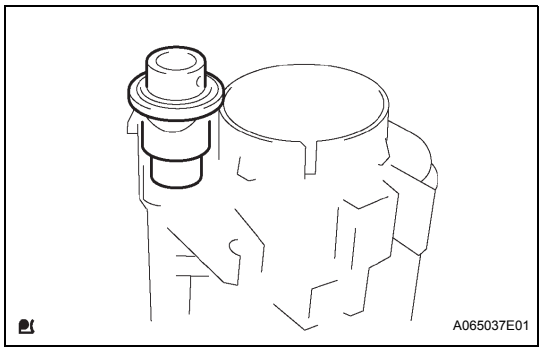


(b) Remove the 4 O-rings and 4 insulators.

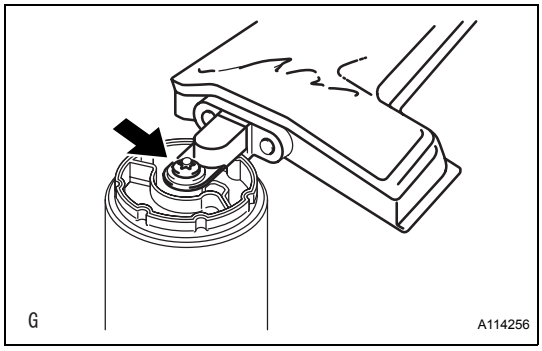
(b) Check the fuel pump operation.
(1) Apply battery voltage between the terminals. Check that the pump operates.
NOTICE:
- **These tests must be done quickly (within 10 seconds) to prevent coil burnout.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always do the switching at the battery side.**

If the operation is not as specified, replace the fuel pump.

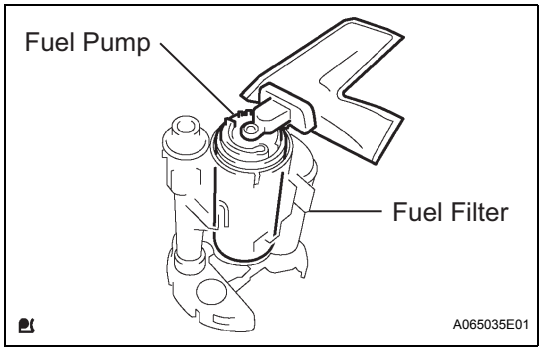
INSTALLATION



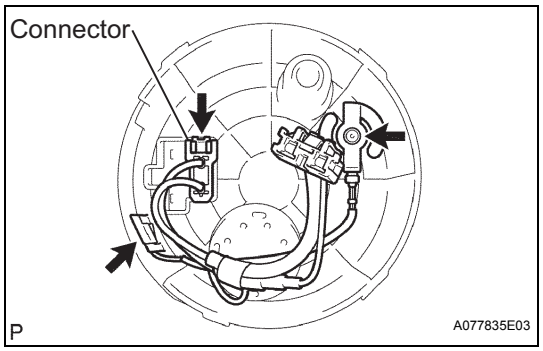
1. INSTALL FUEL PRESSURE REGULATOR ASSEMBLY
(a) Apply a light coat of gasoline or grease to a new O-ring, and install it onto the fuel pressure regulator.
(b) Push the fuel pressure regulator into the fuel filter.



2. INSTALL FUEL PUMP FILTER
(a) Install the fuel pump filter with a new clip.



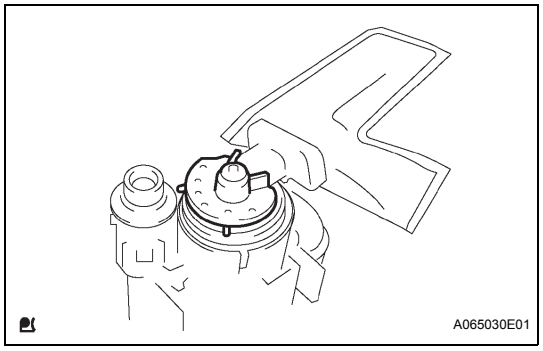
3. INSTALL FUEL PUMP
(a) Install the fuel pump to the fuel filter.



4. CONNECT FUEL PUMP HARNESS
(a) Connect the fuel pump harness.
(b) Connect the connector.

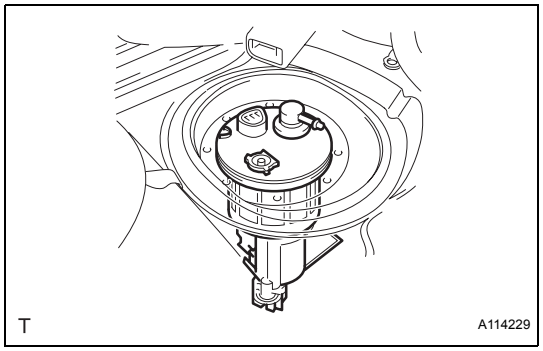
5. INSTALL FUEL SUCTION PLATE SUB-ASSEMBLY
(a) Attach the 4 snap claws to the claw holes.
(b) Connect the fuel pump connector.

6. INSTALL FUEL SENDER GAUGE ASSEMBLY
(a) Install the sender gauge to the fuel pump.
(b) Connect the fuel sender gauge connector.



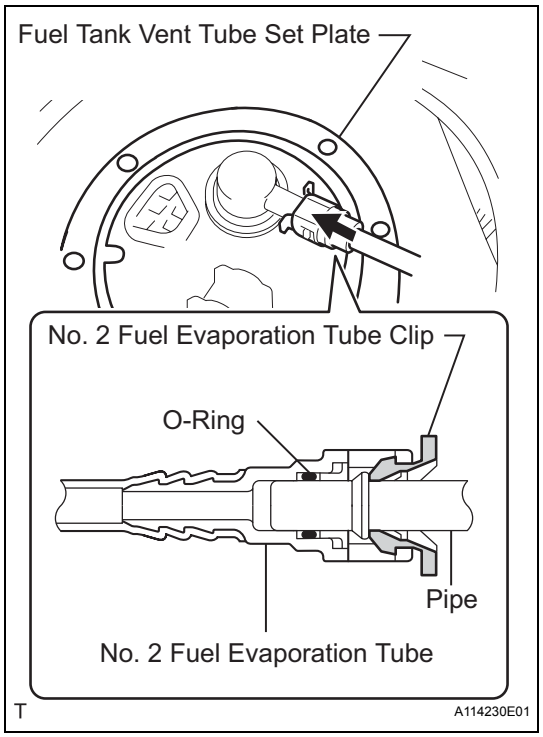
7. INSTALL FUEL PUMP CUSHION RUBBER

8. INSTALL NO. 2 FUEL SUCTION SUPPORT
(a) Attach the 5 snap claws to the claw hoses and install the fuel suction support.



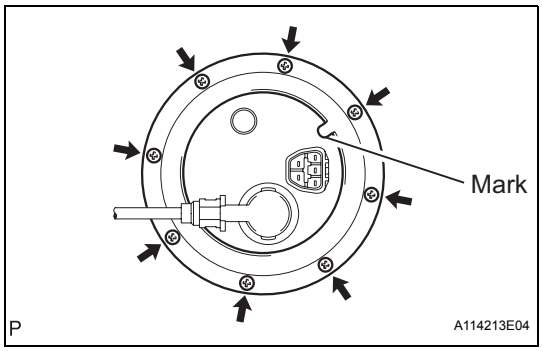
9. INSTALL FUEL PUMP ASSEMBLY WITH FUEL SENDER GAUGE ASSEMBLY
(a) Install a new gasket onto the fuel pump with fuel sender gauge.
(b) Install the fuel pump with fuel sender gauge onto the fuel tank.

10. CONNECT NO. 2 FUEL EVAPORATION TUBE SUB-ASSEMBLY
(a) Set the fuel tank vent tube set plate on the fuel tank.

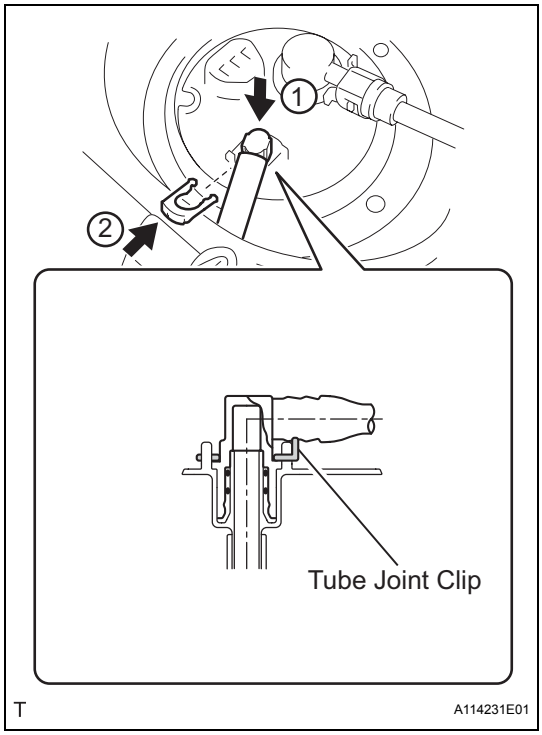


(b) Push the No. 2 fuel evaporation tube onto the pipe until the No. 2 fuel evaporation tube makes a "click" sound.
NOTICE:
- **Check the connected part for damage or foreign objects.**
- **After connecting, check if the No. 2 fuel evaporation tube and pipe are securely connected by pulling in them.**

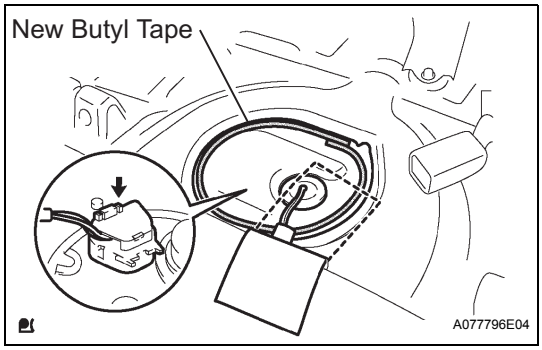
FU



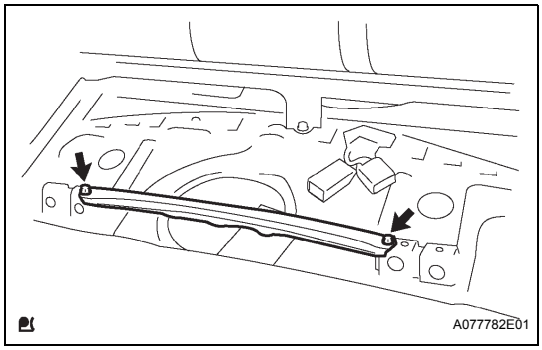
11. **INSTALL FUEL TANK VENT TUBE SET PLATE BOLT**
    (a) Align the marks of the fuel tank vent tube set plate and fuel pump with fuel sender gauge.
    (b) Install the fuel tank vent tube set plate with the 8 bolts.
    Torque: 3.5 N*m (36 kgf*cm, 31 in.*lbf)



12. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY**
    (a) Install the fuel pump tube with the tube joint clip.
    NOTICE:
    - **Check that there are no scratches or foreign objects on the connected part.**
    - **Check that the fuel tube joint is inserted securely.**
    - **Check that the tube joint clip is on the collar of the fuel tube joint.**
    - **After installing the tube joint clip, check that the fuel tube joint is not pulled off.**
13. **CONNECT FUEL PUMP CONNECTOR**
14. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
15. **CHECK FOR FUEL LEAKS (See page FU-8)**



16. **INSTALL REAR FLOOR SERVICE HOLE COVER**
    (a) Using new butyl tape, install the rear floor service hole cover.



17. **INSTALL REAR SEAT CUSHION SUPPORT BRACKET**
    (a) Install the bracket with the 2 bolts.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
18. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-17)**

19. PERFORM INITIALIZATION

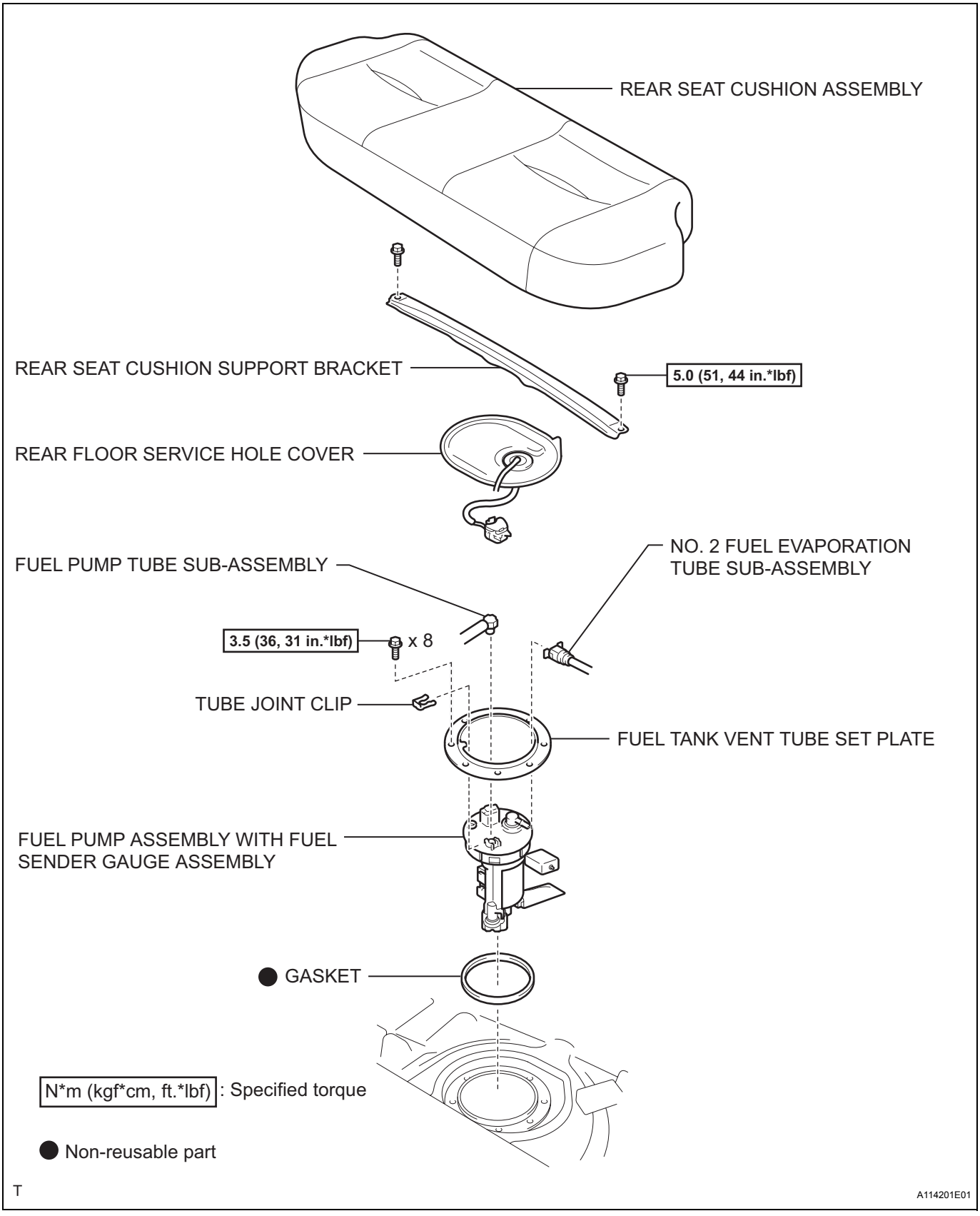
(a) Perform initialization (see page IN-23).

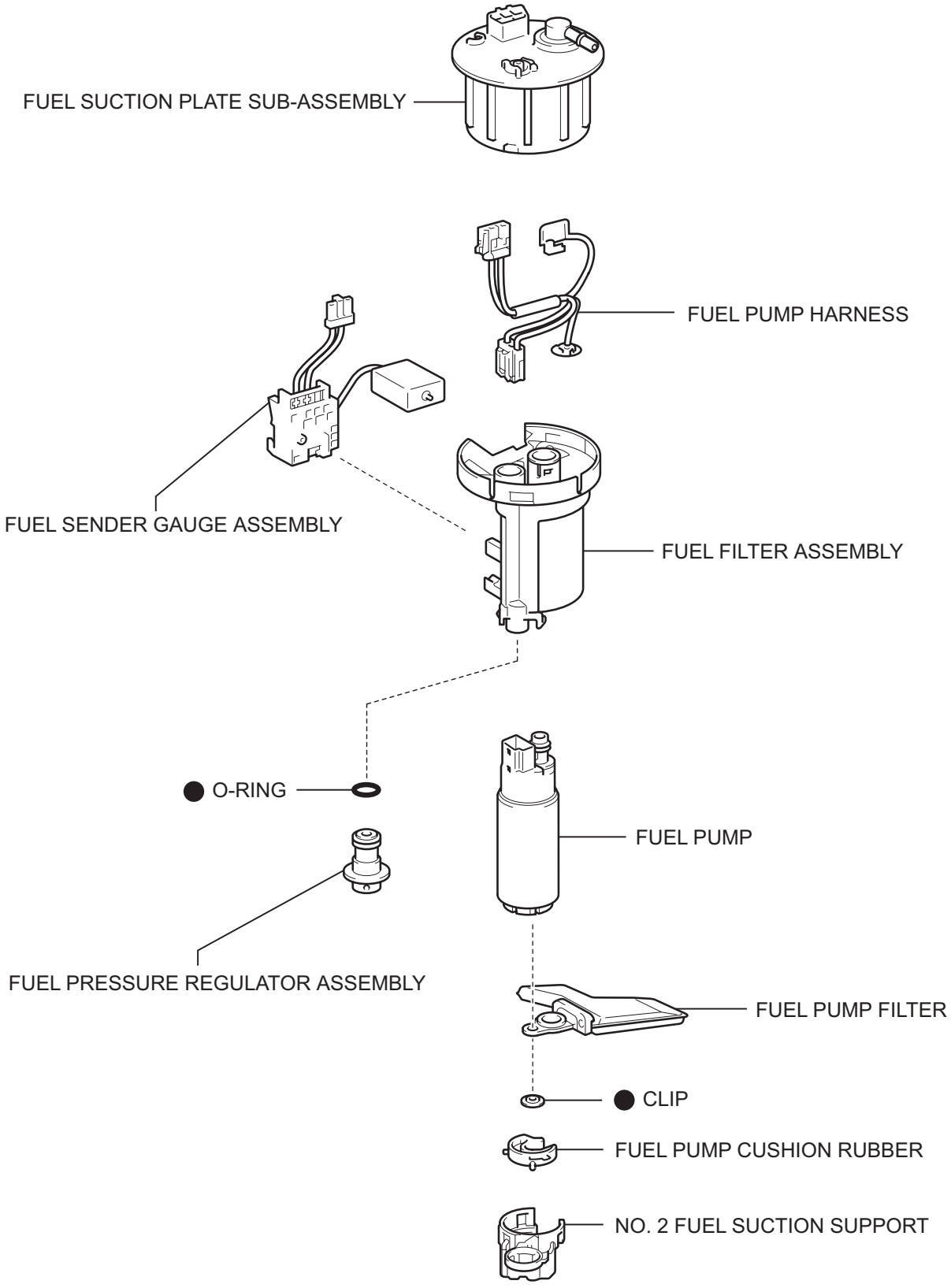
NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FUEL PUMP

COMPONENTS





T

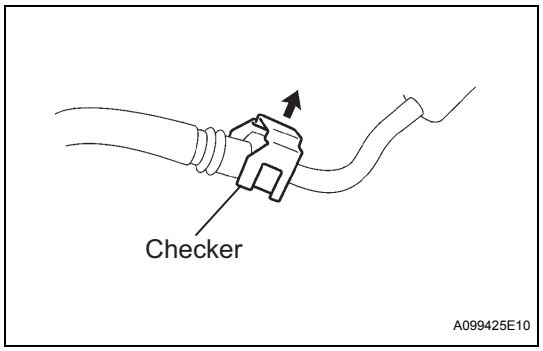
A114205E01

FU

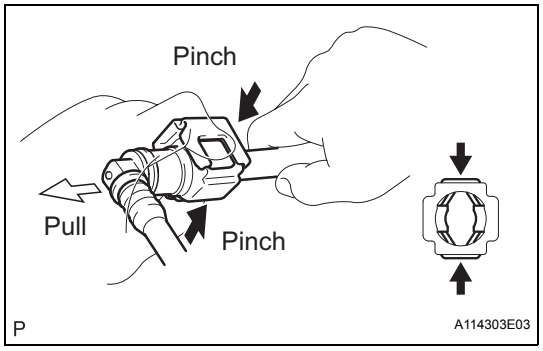
FU

REMOVAL

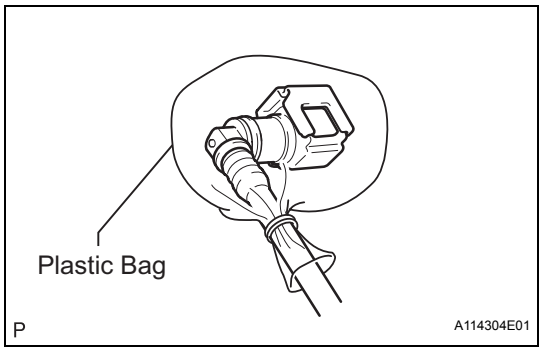
1. **DISCHARGE FUEL SYSTEM PRESSURE (See page FU-11)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-12)**
4. **REMOVE REAR SEAT CUSHION SUPPORT BRACKET (See page FU-18)**
5. **REMOVE REAR FLOOR SERVICE HOLE COVER (See page FU-18)**
6. **REMOVE FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-19)**
7. **REMOVE NO. 2 FUEL EVAPORATION TUBE SUB-ASSEMBLY (See page FU-19)**
8. **REMOVE EXHAUST PIPE ASSEMBLY**
   (a) Remove the exhaust pipe assembly (see page EX-3).
9. **DRAIN FUEL**
10. **DISCONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the 2 bolts and disconnect the cable clamp as shown in illustration A below.
11. **DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the 2 bolts and disconnect the cable clamp as shown in illustration B below.
12. **REMOVE NO. 1 FUEL TANK PROTECTOR**
    (a) Remove the 2 clips, fuel tank protector bracket and protector as shown in illustration G below.
13. **REMOVE FUEL TANK ASSEMBLY**
    (a) Disconnect the fuel tank to filler pipe hose from the fuel tank as shown in illustration C below.
    (b) Disconnect the fuel vapor hose from the fuel tank as shown in illustration C below.
    (c) Disconnect the fuel tank vent hose from the canister as shown in illustration D below.
    HINT:
    Pull up the retainer and pull out the vent hose.



(d) Disconnect the fuel pump tube as shown in illustration E below.
(1) Disengage the lock claw by lifting up the checker, as shown in the illustration.



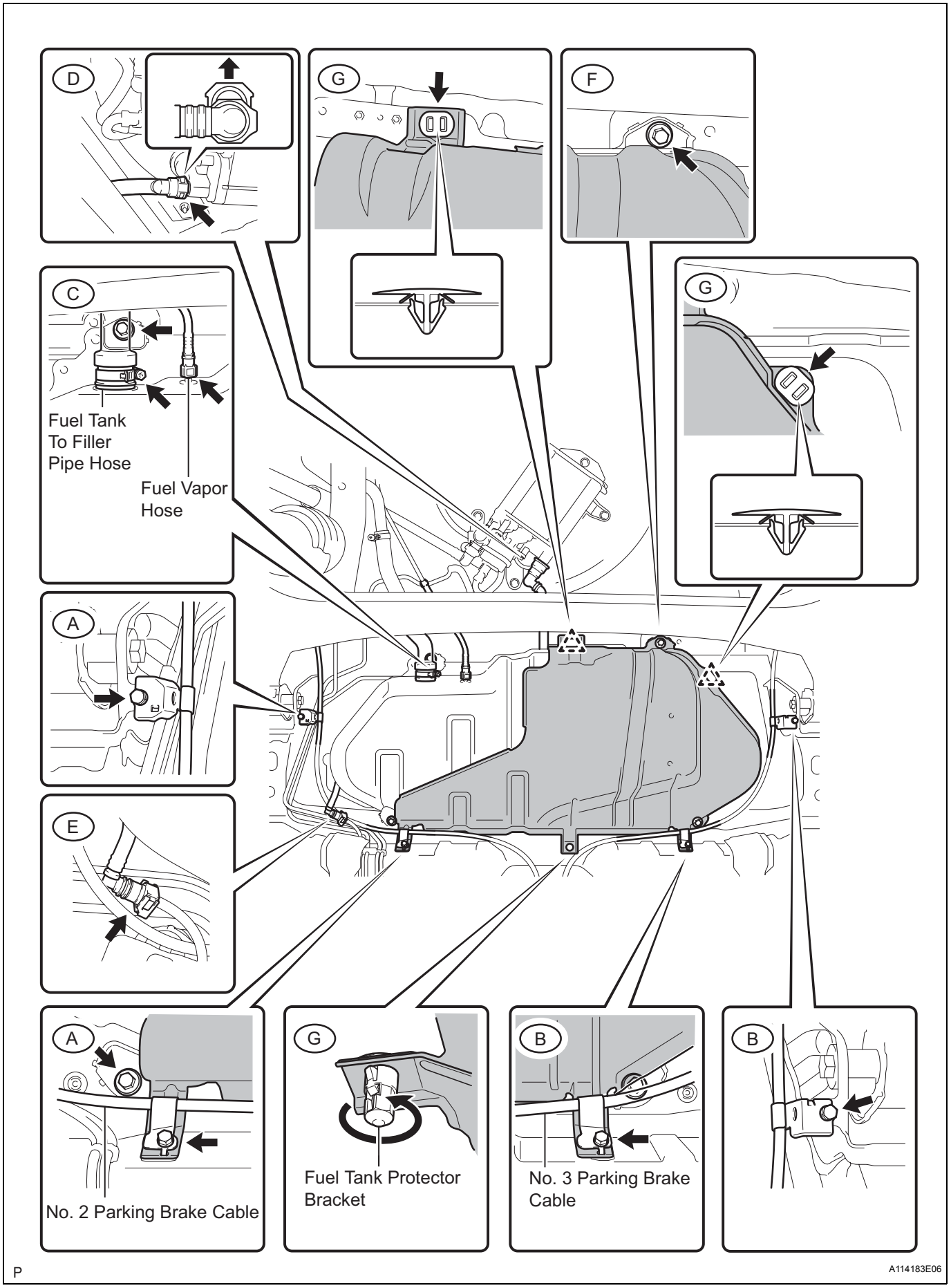
(2) Check for dirt or mud on the pipe and around the connector before disconnection. Clean as necessary.
(3) Disconnect the connector and pipe by hand.
(4) If the connector and the pipe are stuck, pinch the connector, and push and pull the pipe to disconnect it.
NOTICE:
Do not use any tools.
(5) Check for dirt or mud on the seal surface of the disconnected pipe. Clean as necessary.

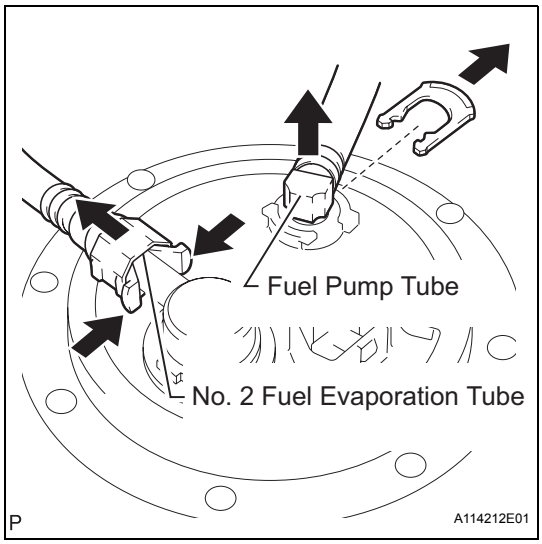


(6) To protect the disconnected pipe and connector from damage and contamination, cover it with a plastic bag.

FU

(e) Remove the 4 bolts and fuel tank as shown in illustration A, B, C and F below.


D
G
F
C
Fuel Tank
To Filler
Pipe Hose
Fuel Vapor
Hose
G
A
E
A
No. 2 Parking Brake Cable
G
Fuel Tank Protector
Bracket
B
No. 3 Parking Brake
Cable
B
P
A114183E06



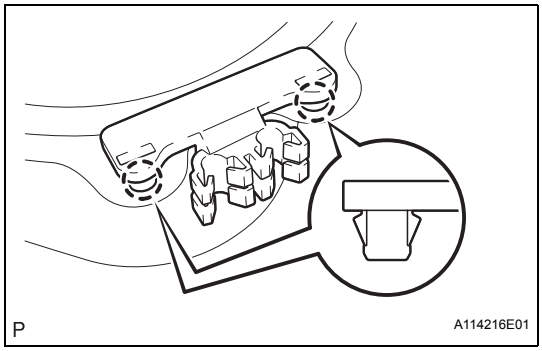
14. REMOVE FUEL PUMP TUBE SUB-ASSEMBLY

(a) Remove the tube joint clip, and then pull out the pump tube (see page FU-19).

15. REMOVE NO. 2 FUEL EVAPORATION TUBE SUB-ASSEMBLY

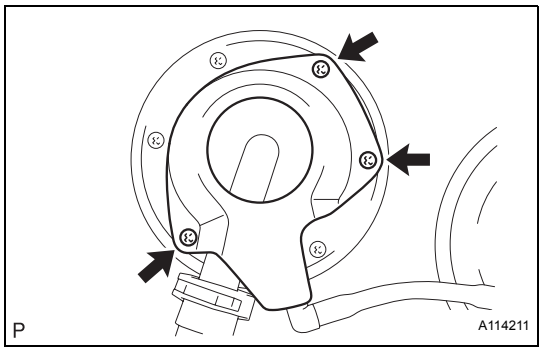
(a) Pinch the No. 2 fuel evaporation tube clip, and then pull out the No. 2 fuel evaporation tube (see page FU-19).

FU



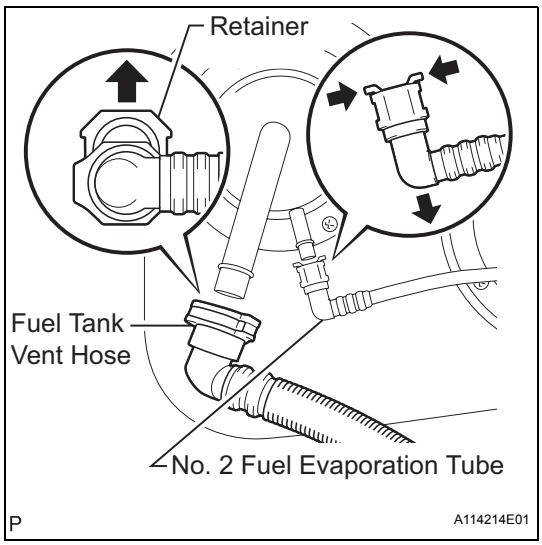
16. REMOVE NO. 3 FUEL TUBE CLAMP

(a) Detach the 2 claws and remove the clamp.



17. REMOVE CHECK VALVE PROTECTOR

(a) Remove the 3 bolts and protector.

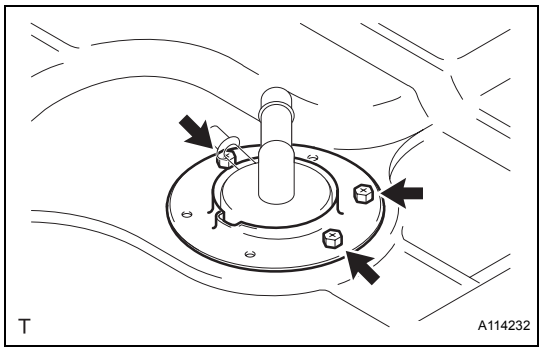


18. REMOVE NO. 2 FUEL EVAPORATION TUBE SUB-ASSEMBLY

(a) Pinch the tube connector clip, and then pull out the evaporation tube.

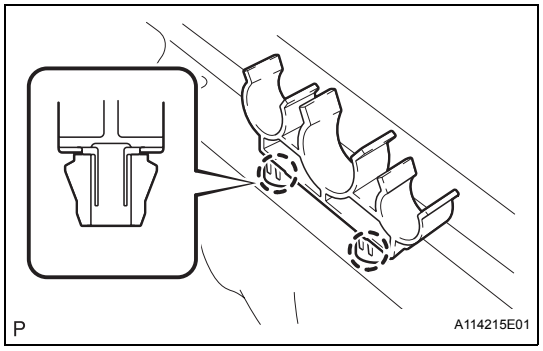
19. REMOVE FUEL TANK VENT HOSE

(a) Pull up the retainer and pull out the vent hose.

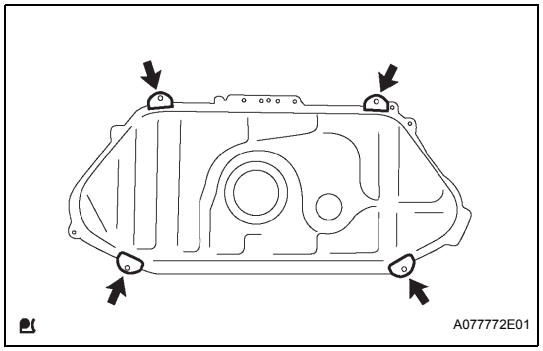


20. REMOVE CHECK VALVE SUPPORT
(a) Remove the 3 bolts and valve support.

21. REMOVE FUEL TANK INLET VALVE ASSEMBLY
(a) Remove the inlet valve from the fuel tank.



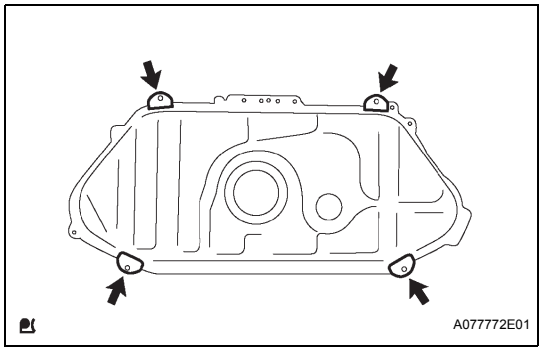
22. REMOVE NO. 1 FUEL TUBE CLAMP
(a) Detach the 2 claws and remove the clamp.



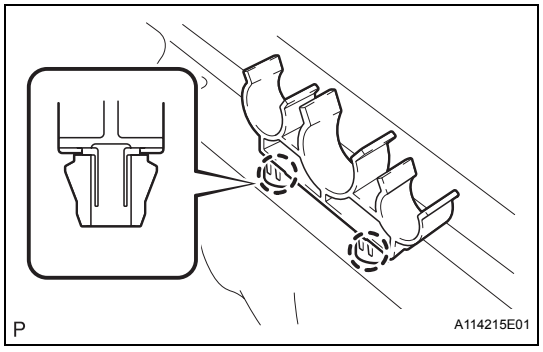
23. REMOVE FUEL TANK SIDE PLATE
(a) Remove the side 4 plates from the fuel tank.

24. REMOVE FUEL TANK TO FILLER PIPE HOSE
(a) Loosen the clamp.
(b) Remove the hose from the fuel tank inlet pipe.

INSTALLATION



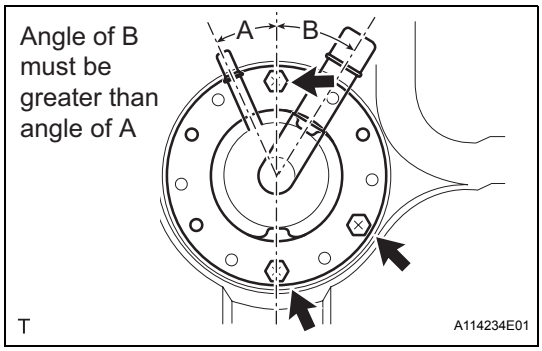
1. INSTALL FUEL TANK SIDE PLATE
(a) Install the side 4 plates to the fuel tank.



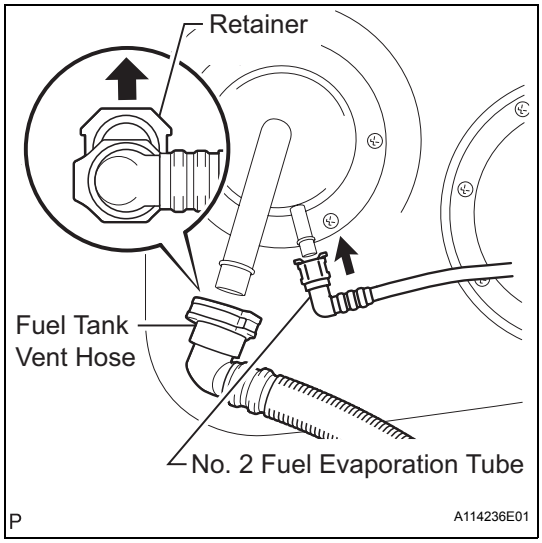
2. INSTALL NO. 1 FUEL TUBE CLAMP
(a) Attach the clamp to the fuel tank.

3. INSTALL FUEL TANK INLET VALVE ASSEMBLY
(a) Install a new gasket and the inlet valve to the fuel tank.

NOTICE:
When removing or installing the fuel tank inlet valve, be careful as it is made from resin and will be easily damaged.

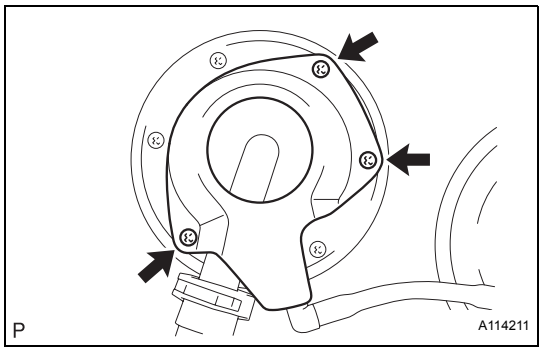


4. **INSTALL CHECK VALVE SUPPORT**
   (a) Install the valve support with the 3 bolts as shown in the illustration.
   Torque: 3.5 N*m (36 kgf*cm, 31 in.*lbf)
   HINT:
   - Angle of A: Approximately 20°
   - Angle of B: Approximately 25°

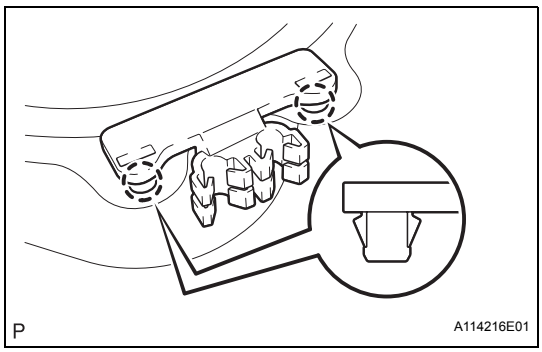


5. **INSTALL FUEL TANK VENT HOSE**
   (a) Pull up the retainer and install the vent hose.
   (b) Connect the retainer.

6. **INSTALL NO. 2 FUEL EVAPORATION TUBE SUB-ASSEMBLY**
   (a) Install the No. 2 fuel evaporation tube.



7. **INSTALL CHECK VALVE PROTECTOR**
   (a) Install the protector with the 3 bolts.
   Torque: 3.5 N*m (36 kgf*cm, 31 in.*lbf)



8. **INSTALL NO. 3 FUEL TUBE CLAMP**
   (a) Attach the clamp to the fuel tank.

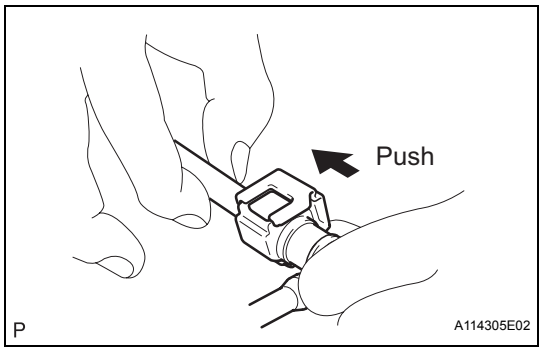
9. **INSTALL FUEL PUMP ASSEMBLY WITH FUEL SENDER GAUGE ASSEMBLY (See page FU-23)**

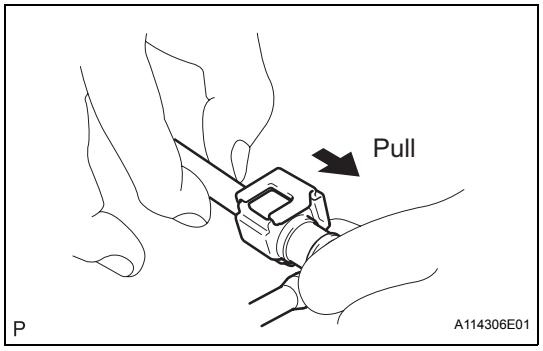
10. **INSTALL FUEL TANK VENT TUBE SET PLATE (See page FU-24)**

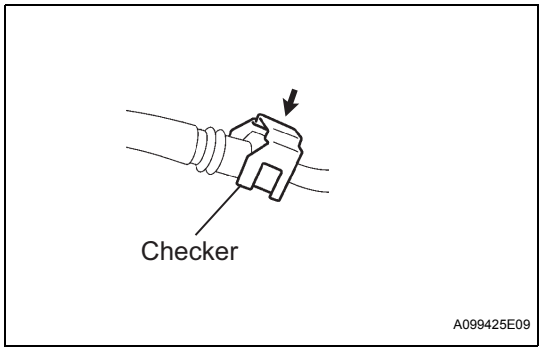
11. **CONNECT NO. 2 FUEL EVAPORATION TUBE SUB-ASSEMBLY (See page FU-23)**

12. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-24)**

13. **INSTALL FUEL TANK ASSEMBLY**
   (a) Install the fuel tank with the 4 bolts as shown in A, B, C and F in the illustration below.
   Torque: 14.3 N*m (146 kgf*cm, 11 ft.*lbf)







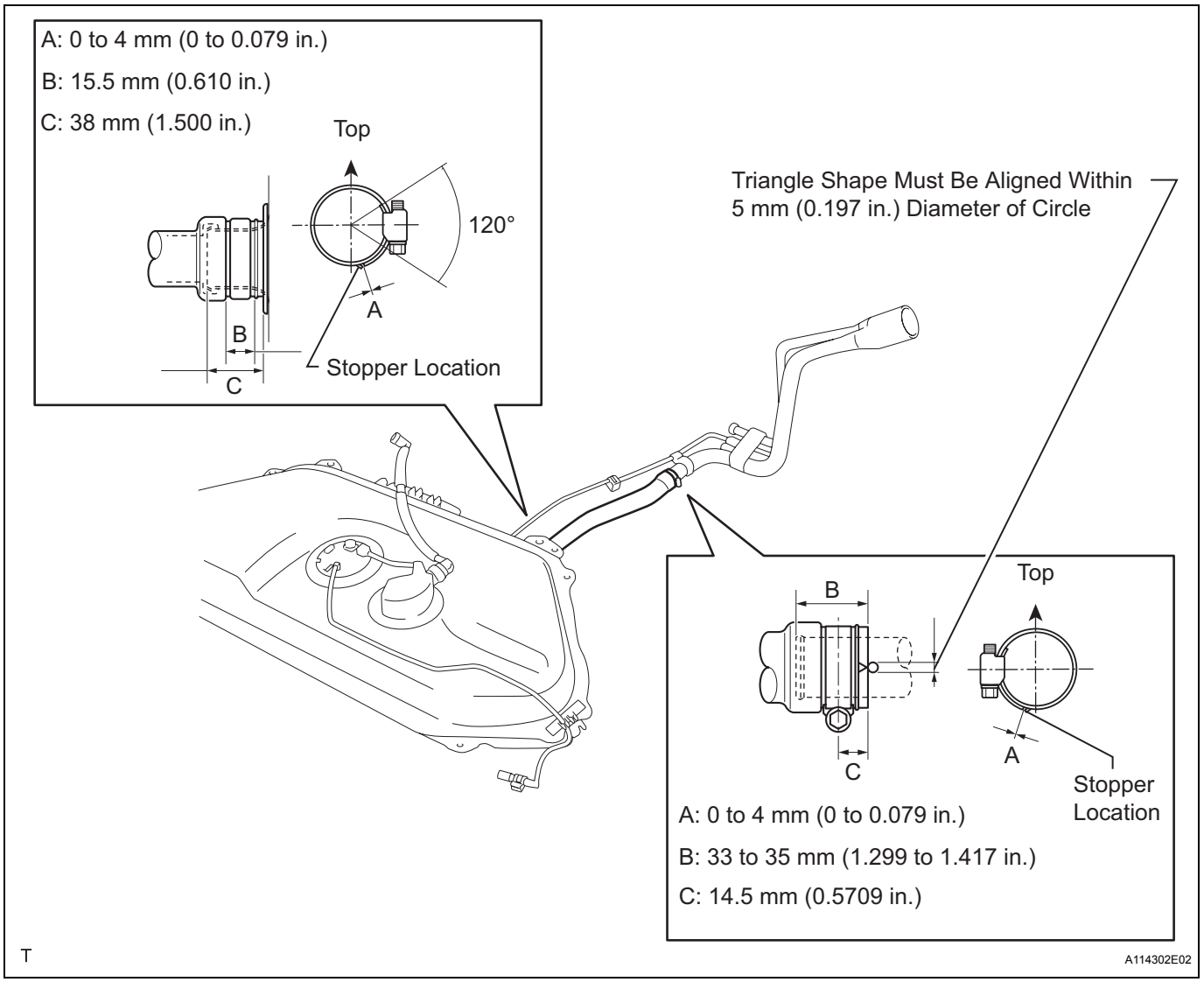
(b) Connect the fuel pump tube as shown in illustration E below.
  (1) Check that there is no damage or contamination in the connected part of the pipe.
  (2) Align the axis of the connector with the axis of the pipe, and push the pipe into the connector until the connector makes a "click" sound. if the connection is tight, apply a small amount of fresh engine oil to the tip of the pipe.
  (3) After having finished the connection, try to pull apart the pipe and the connector, and confirm that they are securely connected.
  (4) Attach the lock claws to the connector by pushing down on the checker, as shown in the illustration.

(c) Connect the fuel tank vent hose to the canister (see page) as shown in illustration D below.
HINT:
Pull up the retainer and install the vent hose, and then connect the retainer.

(d) Connect the fuel vapor hose to the fuel tank as shown in illustration C below.

FU

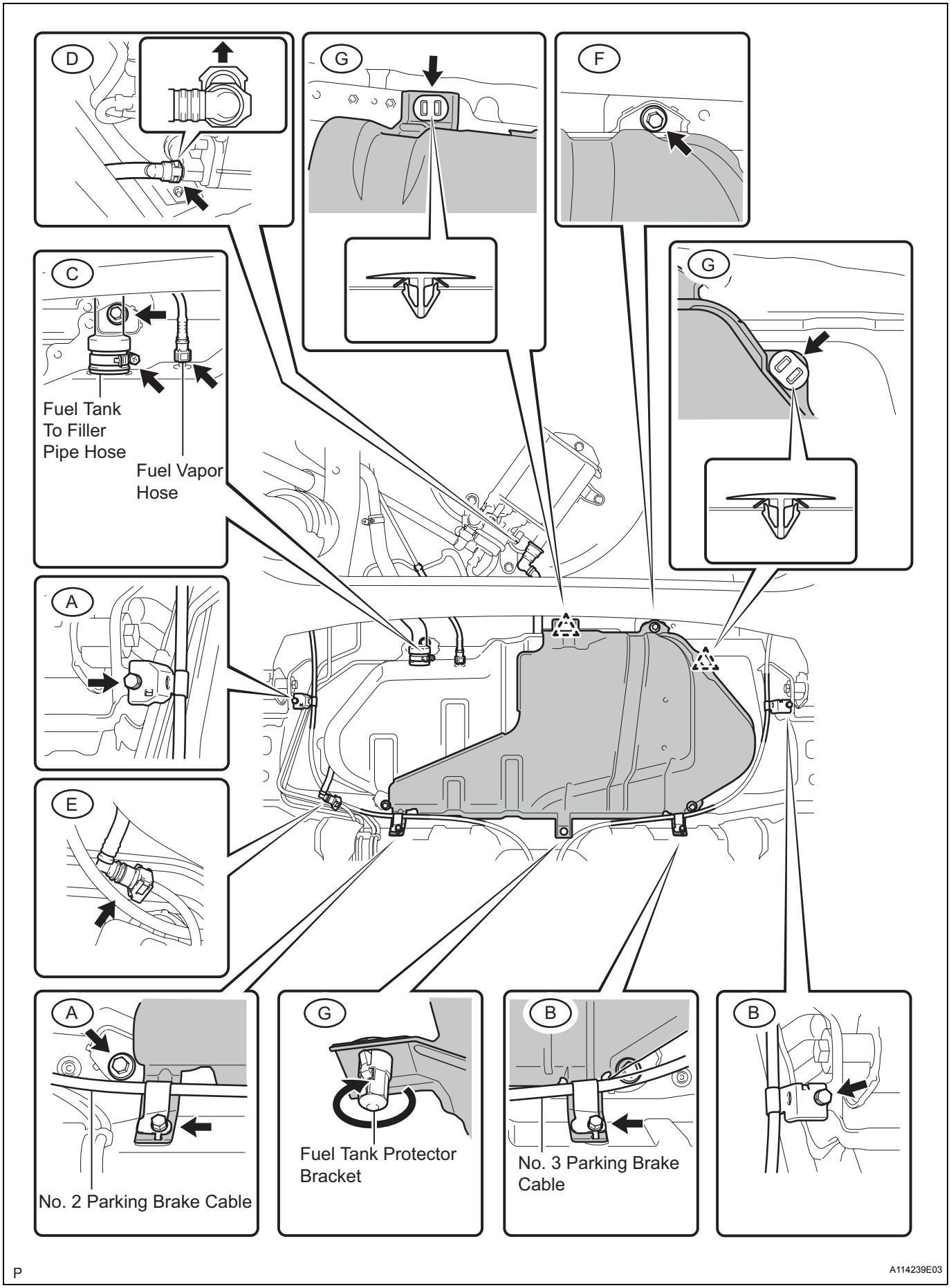
(e) Connect a new fuel tank to filler pipe hose to the fuel tank and fuel inlet pipe as shown in illustration C below.
(1) Tighten the 2 clamps of the fuel tank to filler pipe hose as shown in the illustration.



14. INSTALL NO. 1 FUEL TANK PROTECTOR
(a) Install the protector with the 2 clamps and fuel tank protector bracket as shown in illustration G below.

15. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY
(a) Connect the 2 cable clamps with the 2 bolts as shown in illustration B below.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

16. CONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY
(a) Connect the 2 cable clamps with the 2 bolts as shown in illustration A below.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

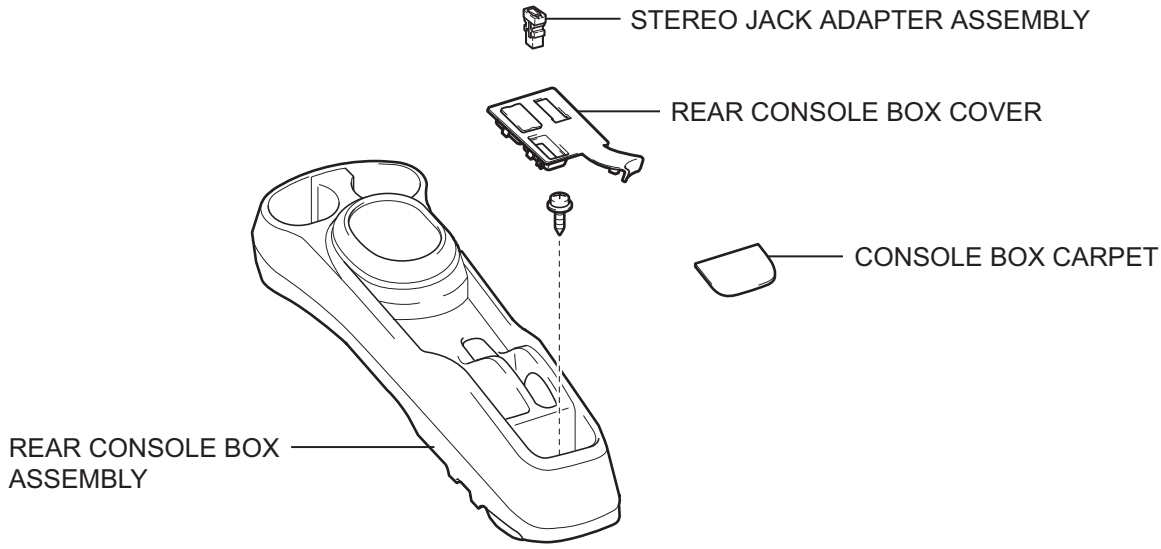

D
G
F
C
G
Fuel Tank
To Filler
Pipe Hose
Fuel Vapor
Hose
A
E
A
G
B
B
No. 2 Parking Brake Cable
Fuel Tank Protector
Bracket
No. 3 Parking Brake
Cable
P
A114239E03

17. **INSTALL EXHAUST PIPE ASSEMBLY**
    (a) Install the exhaust pipe (see page EX-5).
18. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
19. **ADD FUEL**
20. **CHECK FOR FUEL LEAKS (See page FU-8)**
21. **INSTALL REAR FLOOR SERVICE HOLE COVER (See page FU-24)**
22. **INSTALL REAR SEAT CUSHION SUPPORT BRACKET SUB-ASSEMBLY (See page FU-24)**
23. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-17)**
24. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
25. **CHECK FOR EXHAUST GAS LEAKS**

FUEL TANK

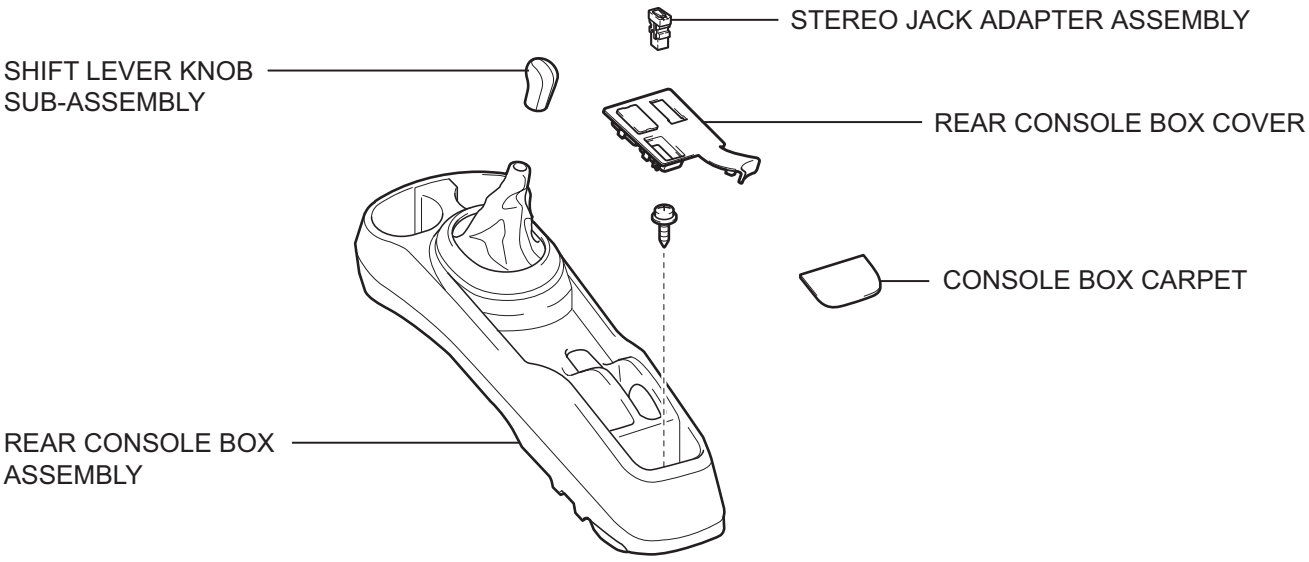
COMPONENTS

Automatic Transaxle

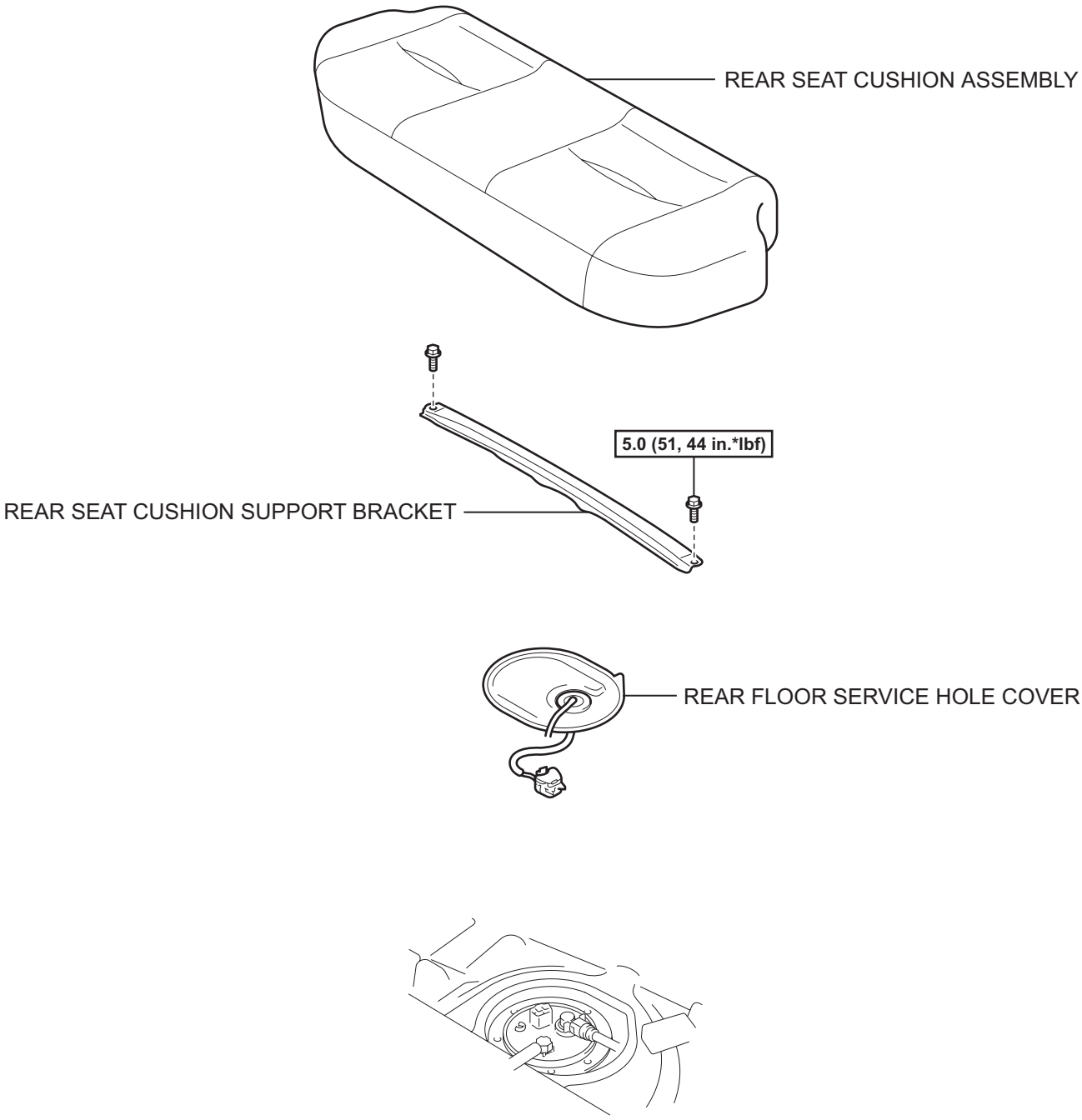


A118616E03

Manual Transaxle



A118617E02

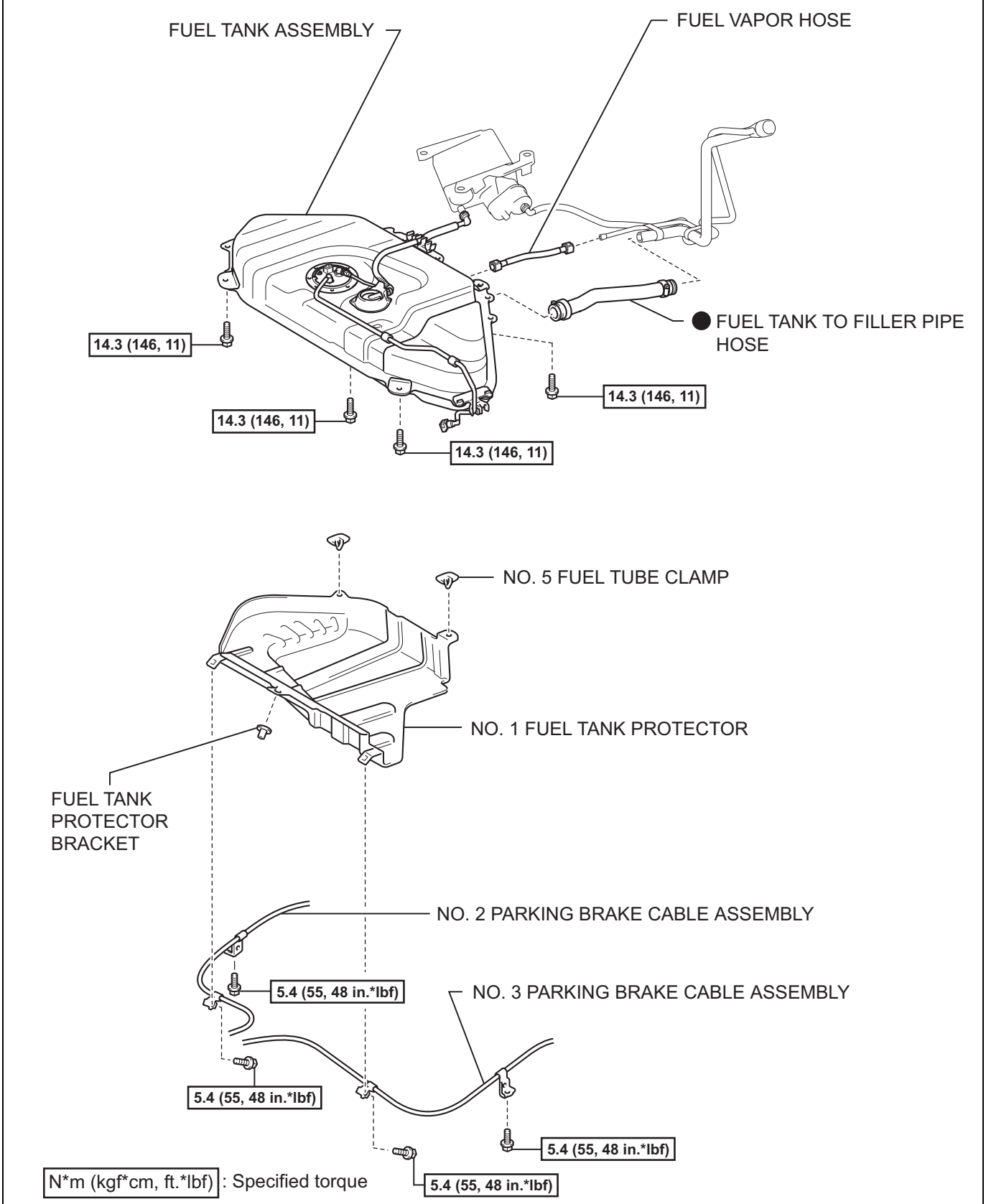


N*m (kgf*cm, ft.*lbf) : Specified torque

T

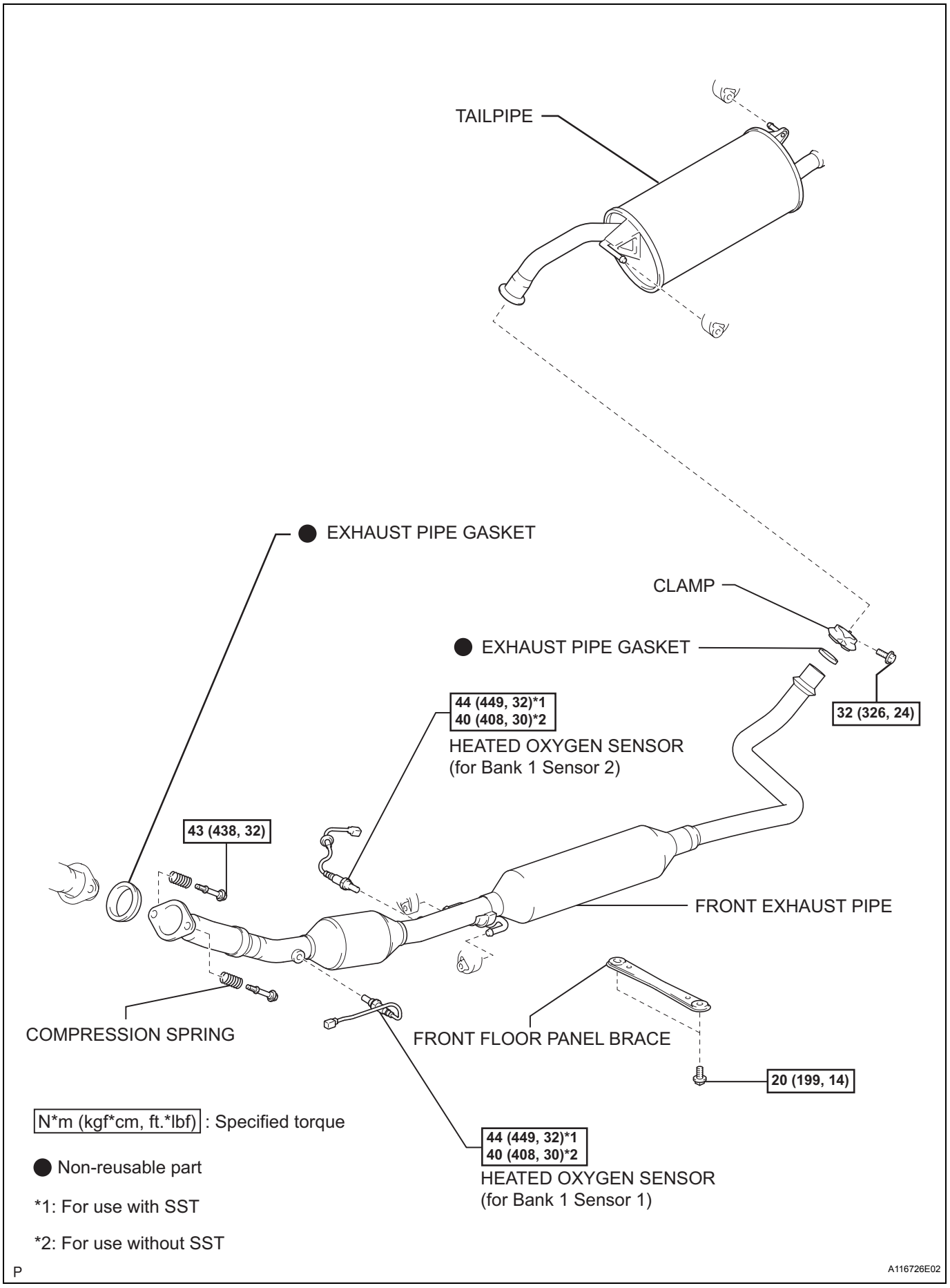
A114204E01

FU

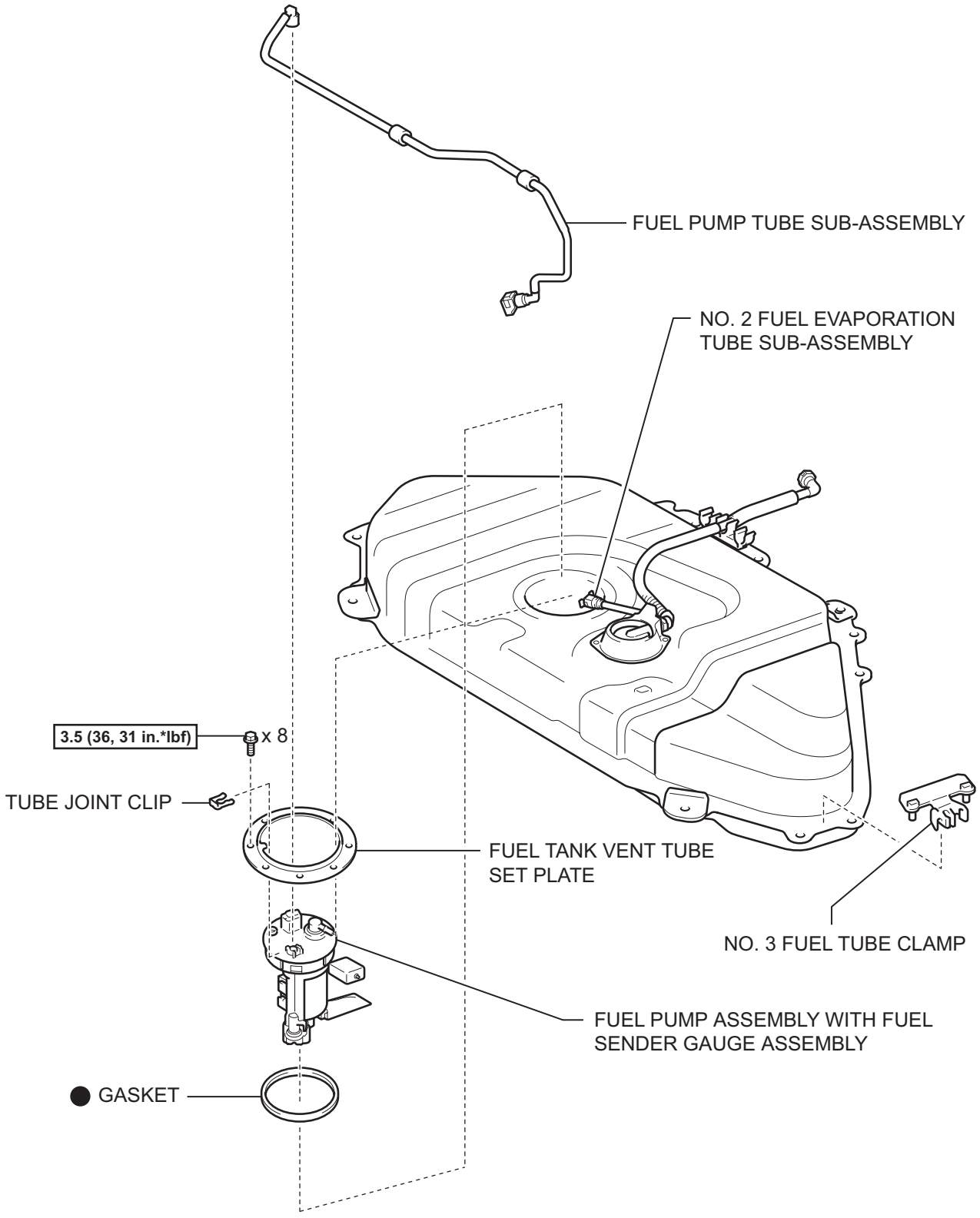


T

A114202E01

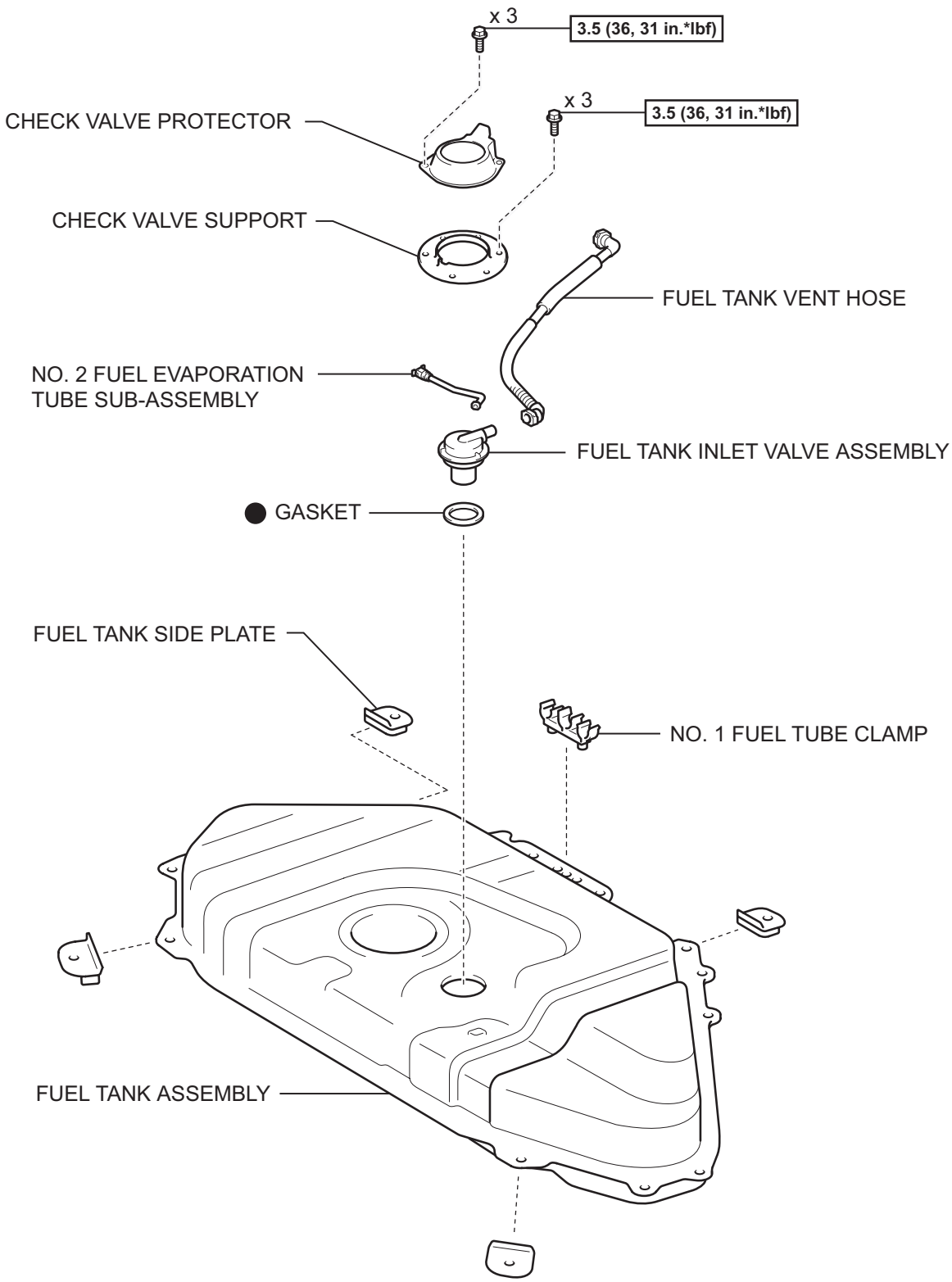

TAILPIPE
EXHAUST PIPE GASKET
CLAMP
EXHAUST PIPE GASKET
44 (449, 32)*1
40 (408, 30)*2
HEATED OXYGEN SENSOR
(for Bank 1 Sensor 2)
32 (326, 24)
43 (438, 32)
FRONT EXHAUST PIPE
COMPRESSION SPRING
FRONT FLOOR PANEL BRACE
20 (199, 14)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
*1: For use with SST
*2: For use without SST
44 (449, 32)*1
40 (408, 30)*2
HEATED OXYGEN SENSOR
(for Bank 1 Sensor 1)
P
A116726E02

FU



T

A114210E01



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

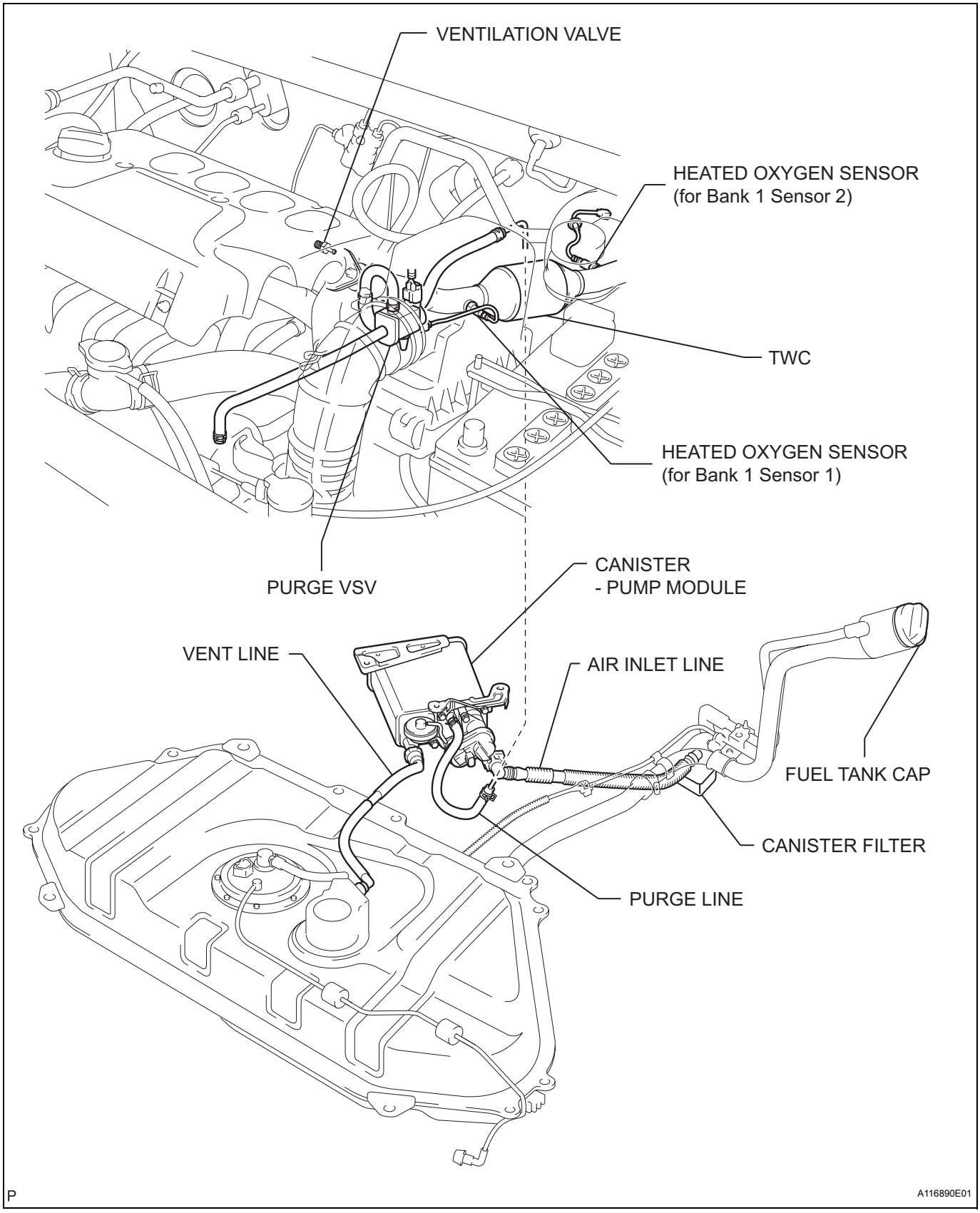
T

A114203E01

FU

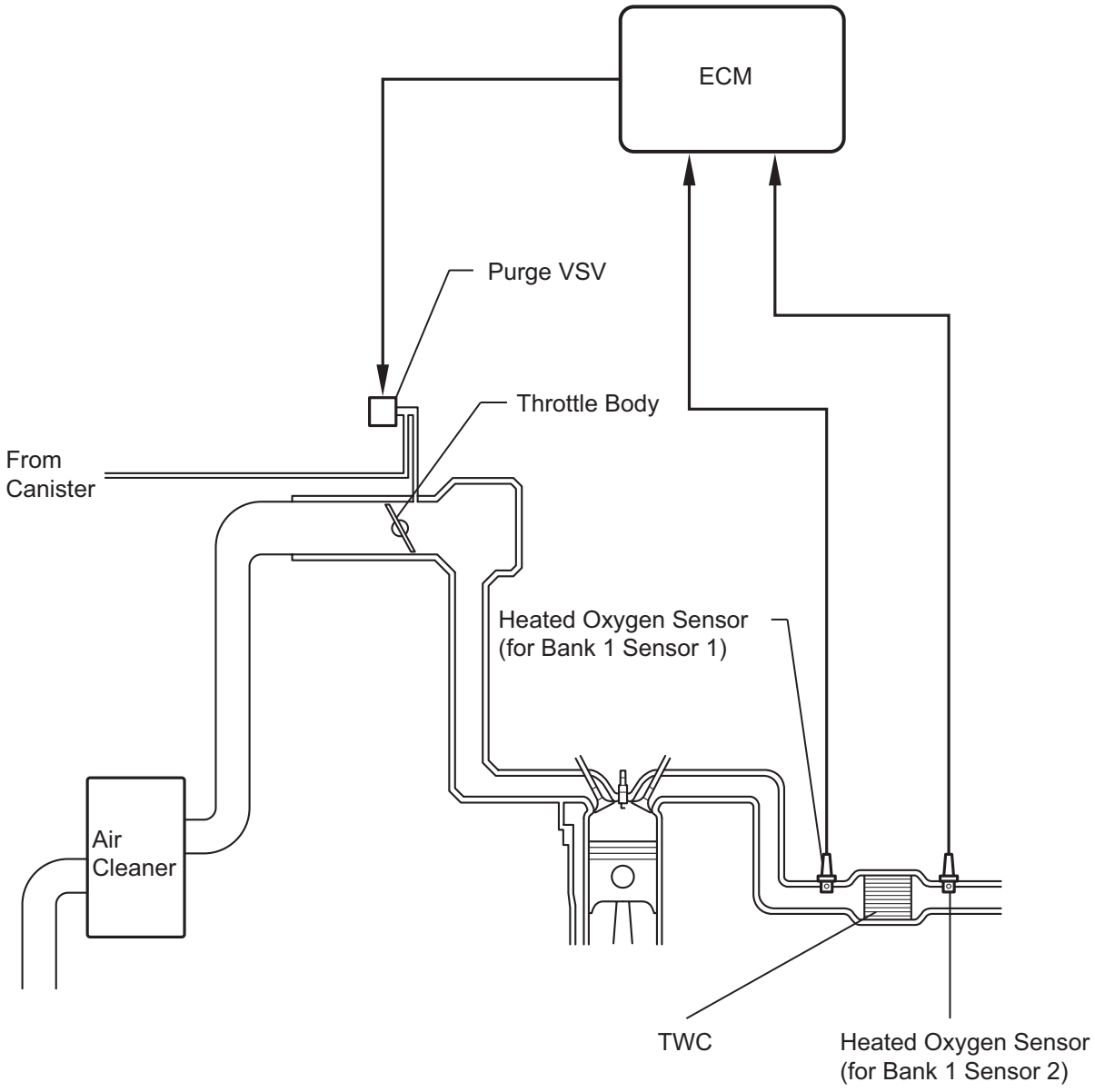
EMISSION CONTROL SYSTEM

PARTS LOCATION



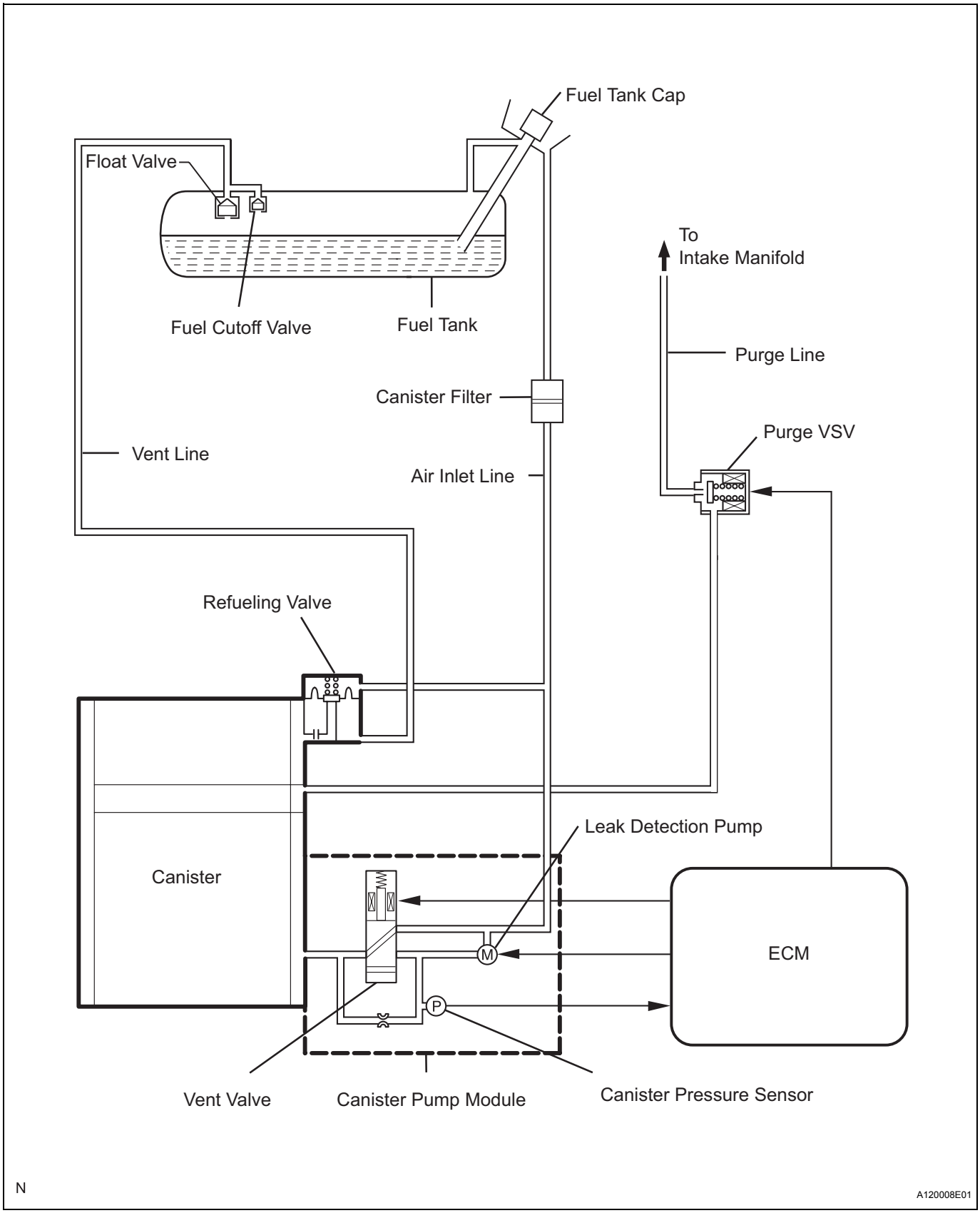
EC

SYSTEM DIAGRAM

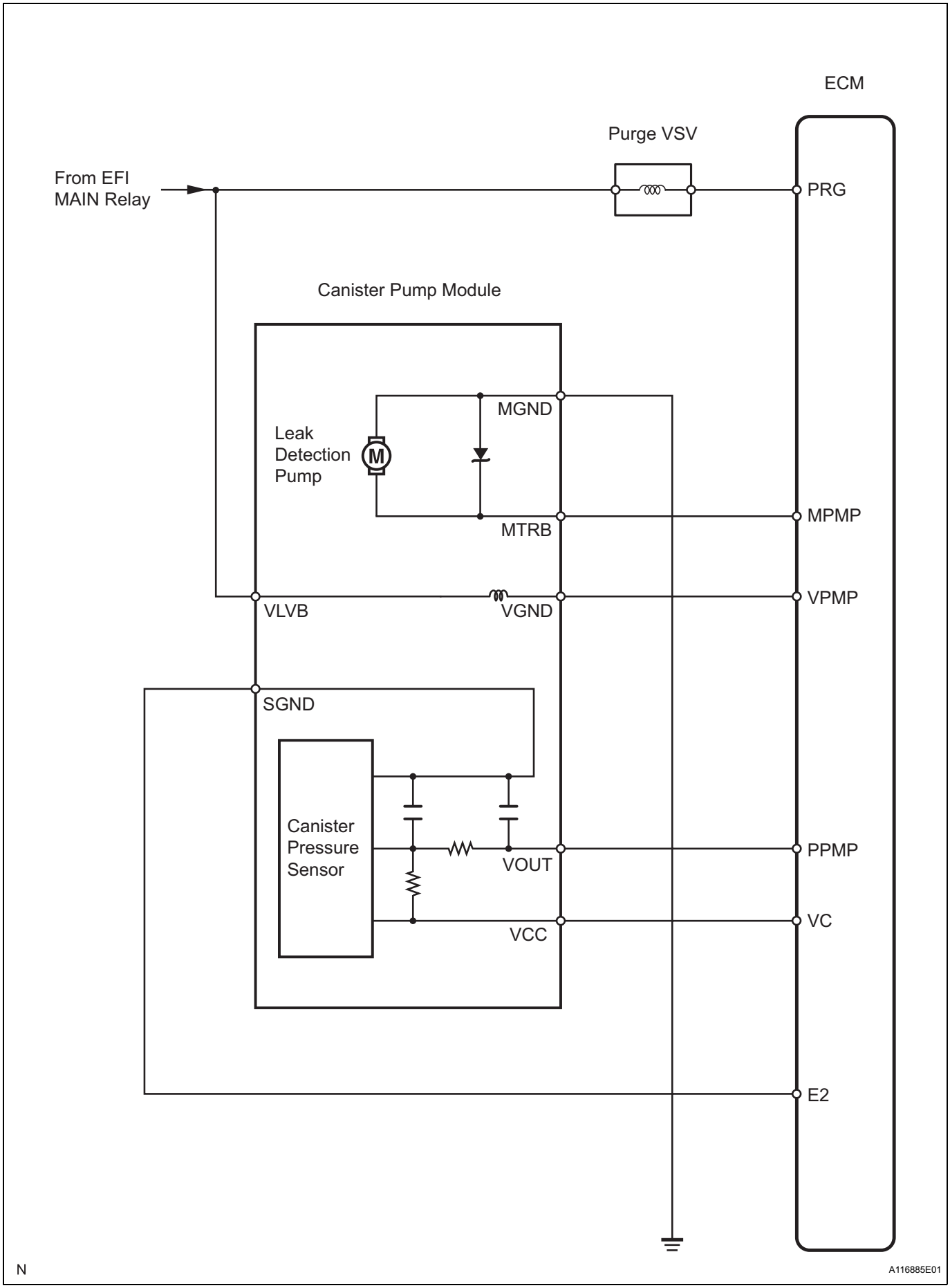


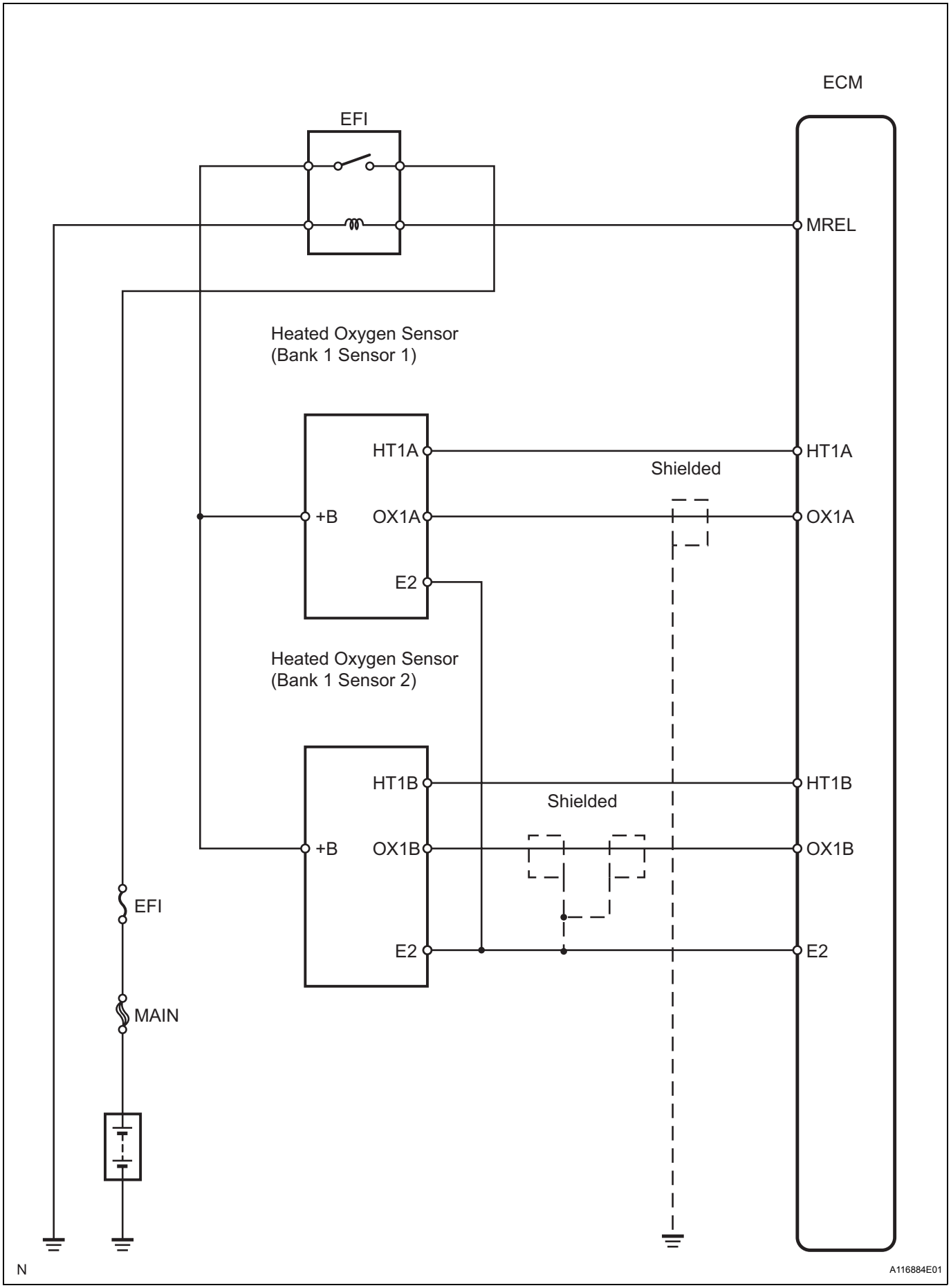
N

A116883E01

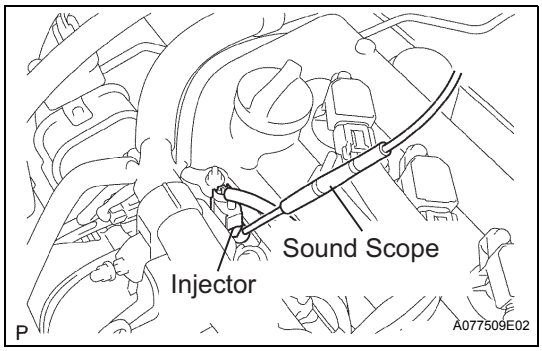

Fuel Tank Cap
Float Valve
To
Intake Manifold
Fuel Cutoff Valve
Fuel Tank
Purge Line
Canister Filter
Purge VSV
Vent Line
Air Inlet Line
Refueling Valve
Leak Detection Pump
Canister
ECM
M
P
Vent Valve
Canister Pump Module
Canister Pressure Sensor
N
A120008E01

EC


ECM
Purge VSV
From EFI
MAIN Relay
PRG
Canister Pump Module
MGND
Leak
Detection
Pump
M
MPMP
MTRB
VPMP
VLVB
VGND
SGND
Canister
Pressure
Sensor
PPMP
VOUT
VC
VCC
E2
N
A116885E01


ECM
EFI
MREL
Heated Oxygen Sensor
(Bank 1 Sensor 1)
HT1A
HT1A
Shielded
+B
OX1A
OX1A
E2
Heated Oxygen Sensor
(Bank 1 Sensor 2)
HT1B
HT1B
Shielded
+B
OX1B
OX1B
EFI
E2
E2
MAIN
N
A116884E01

EC



ON-VEHICLE INSPECTION

1. CHECK FUEL CUT RPM

(a) Increase the engine speed to at least 3,500 rpm.

(b) Use a sound scope to check for injector operating noise.

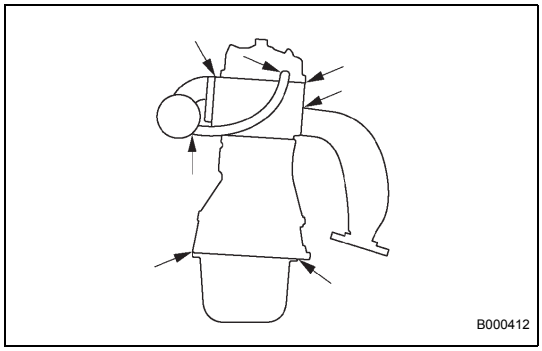
(c) Check that the operating sounds stop momentarily and then resume when the throttle lever is released.

HINT:

Measure with the A/C OFF.

Fuel return rpm:

1,400 rpm



2. VISUALLY CHECK HOSES, CONNECTORS, AND GASKETS

(a) Check that there are no cracks, leaks or damage.

NOTICE:

- **Detachment or other problems with the engine oil dipstick, filler cap, PCV hose and other components may cause the engine to run improperly.**
- **Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause an engine failure or engine malfunctions.**

If the result is not as specified, replace parts as necessary.

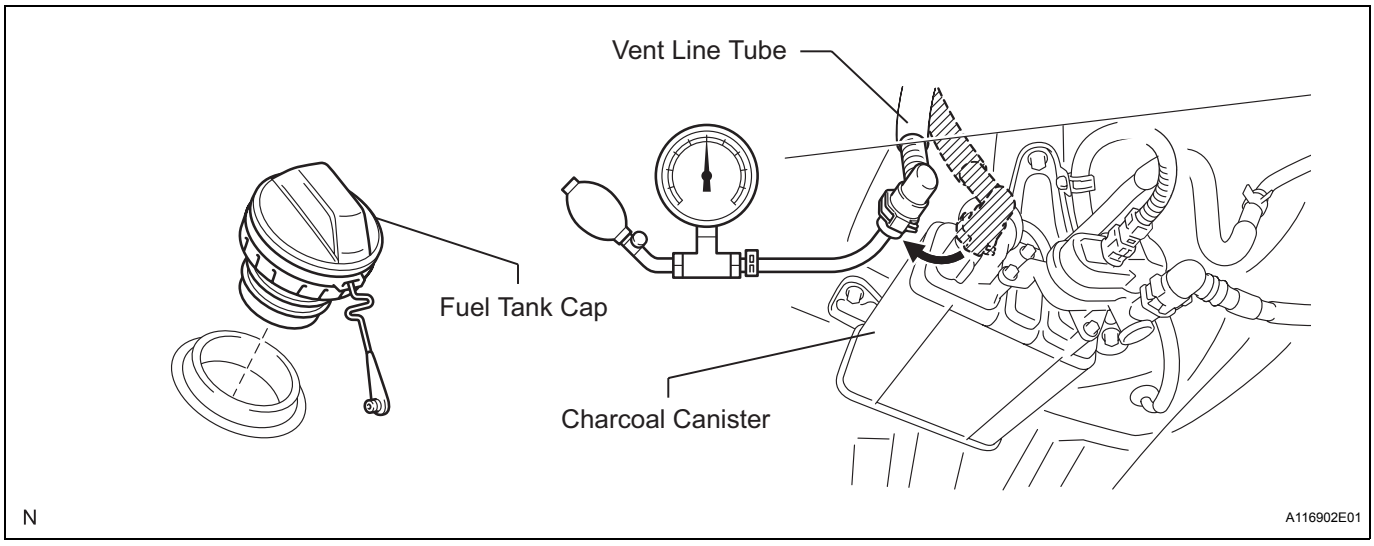
3. CHECK LINE AND CONNECTORS

(a) Visually check for loose connections, sharp bends or damage.

4. CHECK FUEL TANK ASSEMBLY

(a) Visually check for deformation, cracks or fuel leakage.

5. CHECK FUEL TANK AND VENT LINE



(a) Disconnect the vent line hose from the canister.

(b) Connect the pressure gauge to the vent line tube.

(c) Apply 4 kPa (41 kgf/cm^2, 30 mmHg) of pressure to the vent line of the fuel tank.
HINT:
Perform this inspection with the fuel tank less than 90% full. When the fuel tank is full, the fuel cutoff valve closes and pressure is released through the 1.5 mm orifice. As a result, when the fuel tank cap is removed, pressure does not decrease smoothly.

(d) Check that the fuel tank pressure is maintained for some time, and does not decrease immediately.
HINT:
If pressure decreases immediately, one of the following may be the cause:
- The fuel tank cap is not completely tightened.
- The fuel tank cap is damaged.
- Air is leaking from the vent line.
- The fuel tank is damaged.

(e) When the fuel tank cap is removed, check that pressure is released smoothly.
HINT:
If the pressure does not drop, replace the fuel tank assembly.

(f) Reconnect the vent line tube to the canister.

6. CHECK AIR INLET LINE

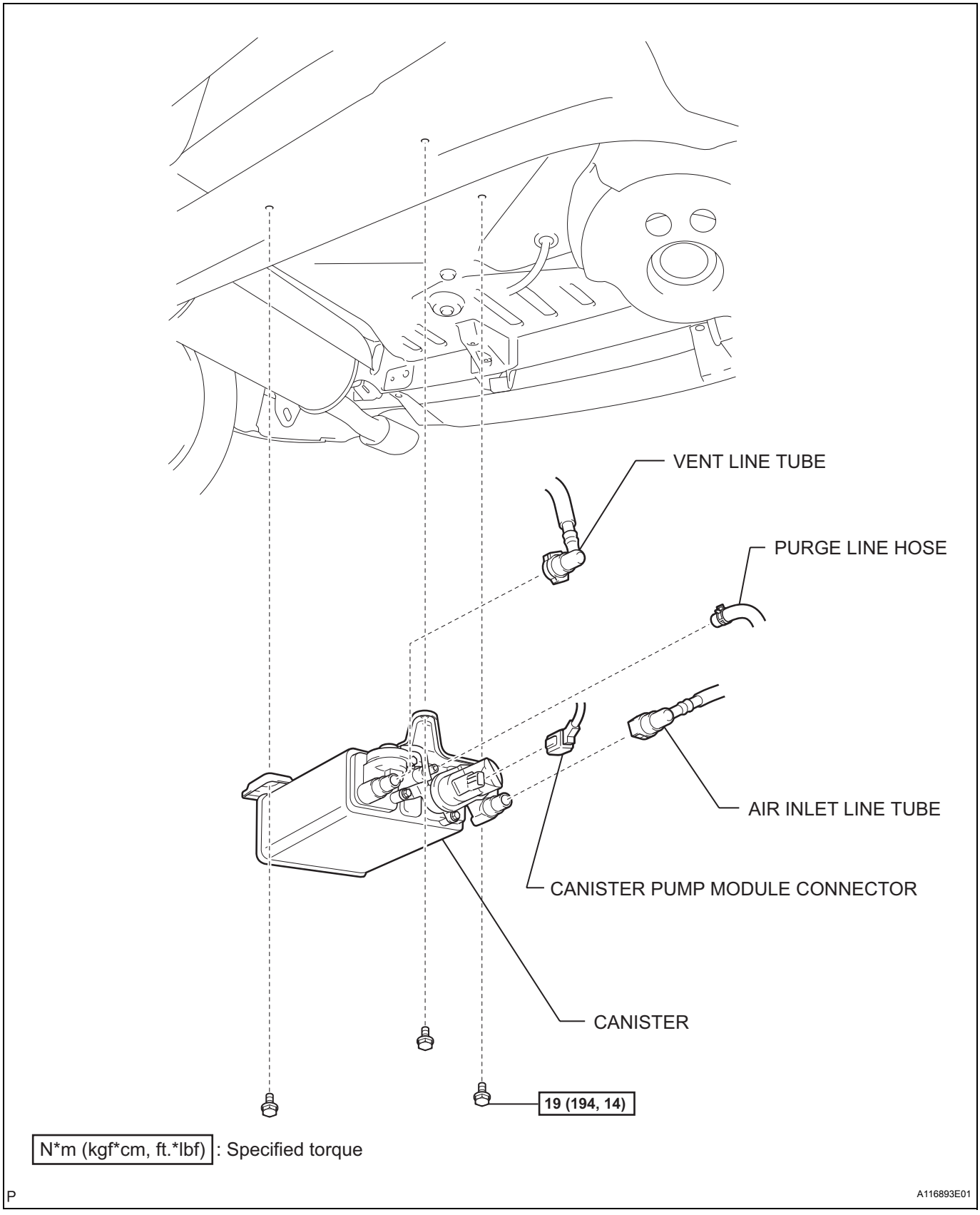
(a) Disconnect the air inlet line hose from the charcoal canister.

(b) Check that air flows freely into the air inlet line.
HINT:
If air does not flow freely into the air inlet line, repair or replace it.

(c) Reconnect the air inlet line hose to the charcoal canister.

CANISTER

COMPONENTS



REMOVAL

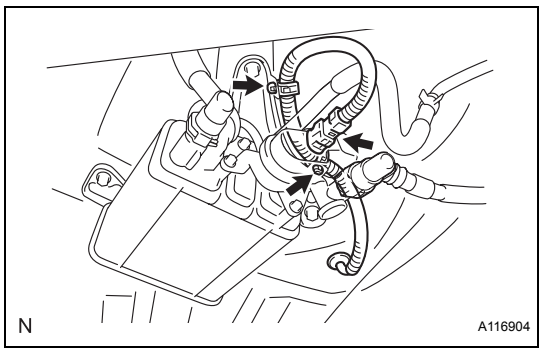
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE CANISTER

(a) Disconnect the connector and detach the 2 clamps.

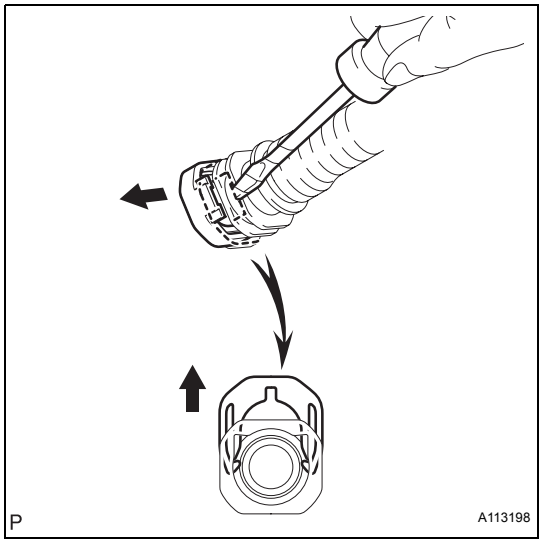


(b) Disconnect the 2 tubes and hose.

(1) Using a screwdriver, pry up the retainer.

HINT:

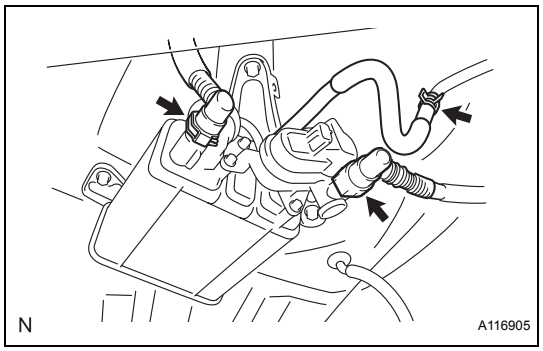
Do not remove the retainer.

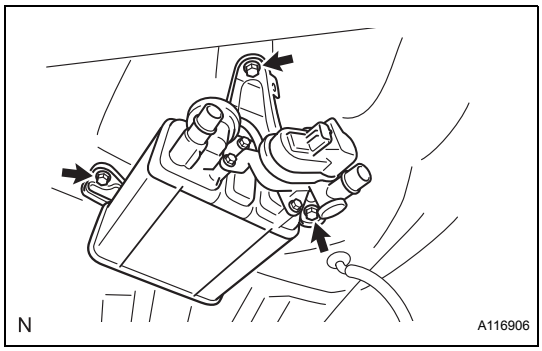


(2) Disconnect the purge line hose.

(3) Disconnect the air inlet line tube from the canister.

(4) Disconnect the vent line tube from the canister (leak detection pump).



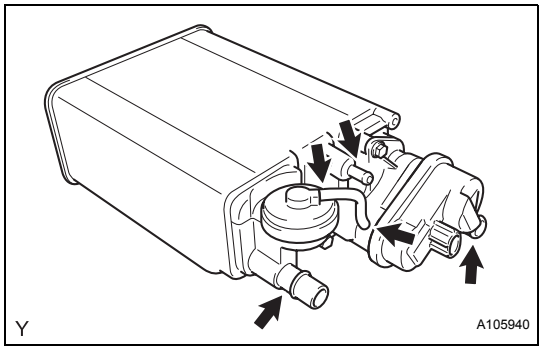


(c) Remove the 3 bolts and canister.

INSPECTION

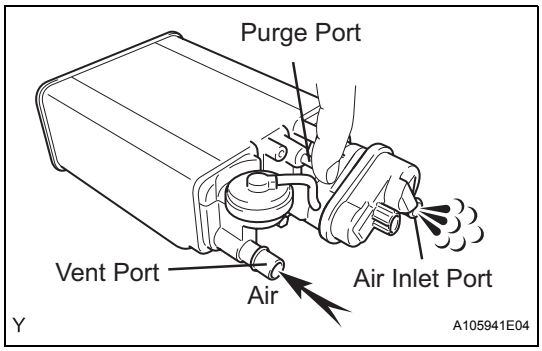
1. INSPECT CANISTER

(a) Visually check the canister for cracks or damage.
If cracks or damage are found, replace the canister.

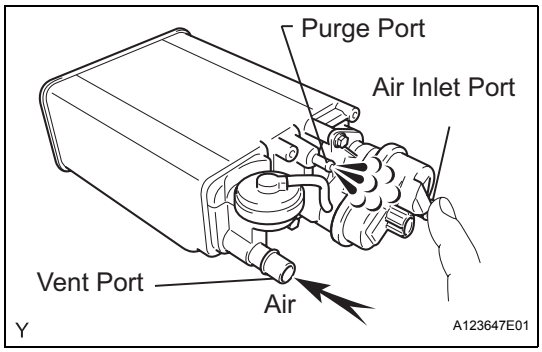


(b) Check the canister operation.

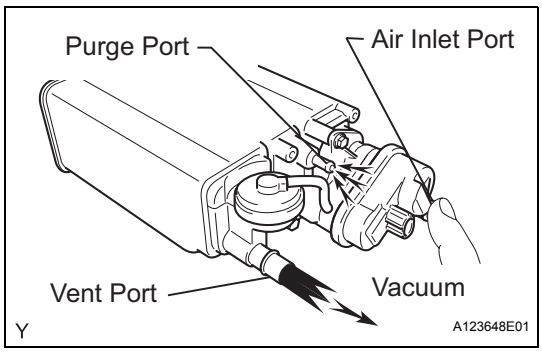
(1) While holding the purge port closed, blow air 0.39 kPa (4.0 kgf/cm^2, 3 mmHg) into the vent port, and check that air flows from the air inlet port.
If the result is not as specified, replace the canister.

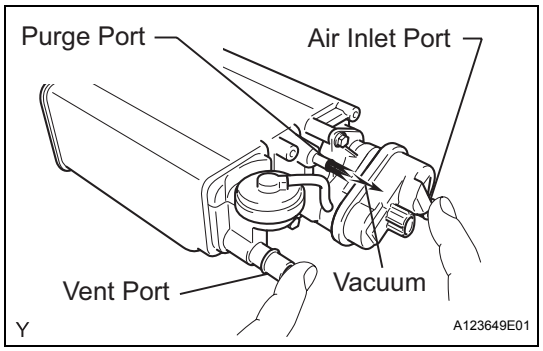


(2) While holding the air inlet port closed, blow air 0.39 kPa (4.0 kgf/cm^2, 3 mmHg) into the vent port, and check that air flows from the purge port.
If the result is not as specified, replace the canister.

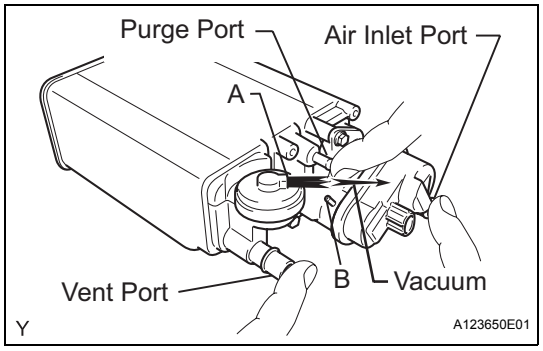


(3) While holding the air inlet port closed, apply vacuum 3.43 kPa (35.0 kgf/cm^2, 25.7 mmHg) to the vent port, and check that air is sucked into the purge port.
If the result is not as specified, replace the canister.



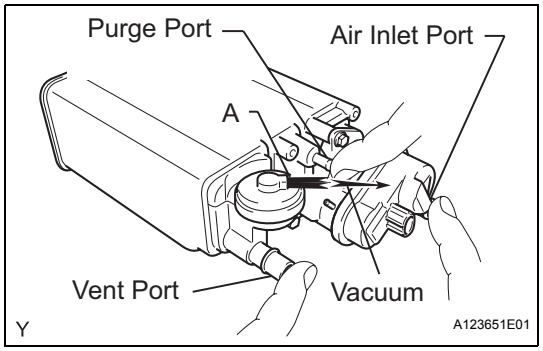


(c) Check the air tightness.
(1) While holding the vent and air inlet ports closed, apply vacuum 3.43 kPa (35.0 kgf/cm^2, 25.7 mmHg) to the purge port, and check that the vacuum is maintained for 1 minute.
If the result is not as specified, replace the canister.

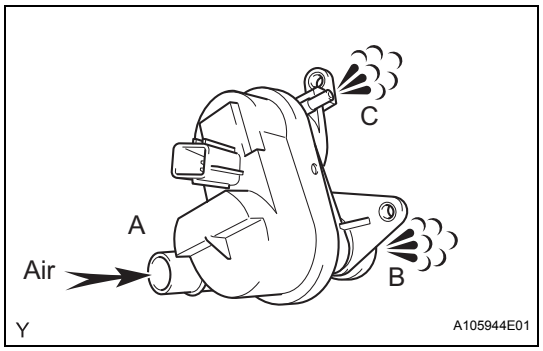


(d) Check the diaphragm.
(1) Remove the air hose between ports A and B.
(2) While holding the vent, purge and air inlet ports closed, apply vacuum 1.42 kPa (14.5 kgf/cm^2, 10.6 mmHg) port A, and check that air is not sucked into port B.

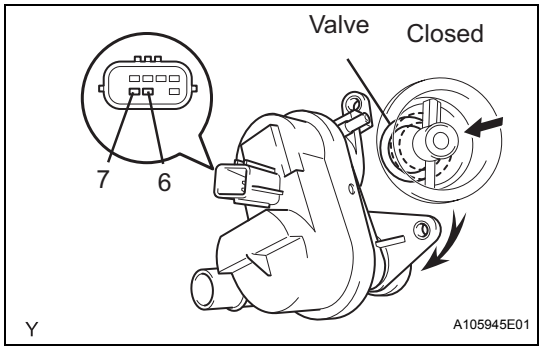
EC



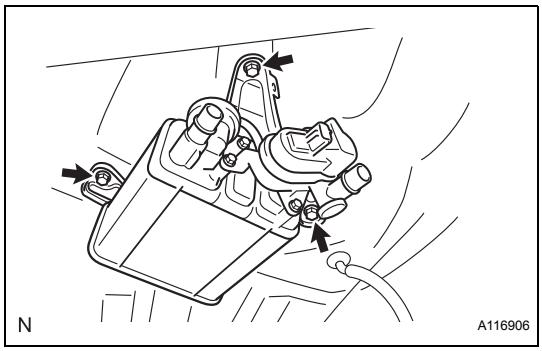
(3) While holding the vent, purge and air inlet ports closed, apply vacuum 1.42 kPa (14.5 kgf/cm^2, 10.6 mmHg) into port A, and measure how long it takes for the vacuum to drop.
Vacuum drop time:
10 seconds or more
If the result is not as specified, replace the canister.



(e) Check leak detection pump.
(1) Check that air flows from port A to port B and C.
If the result is not as specified, replace the canister.



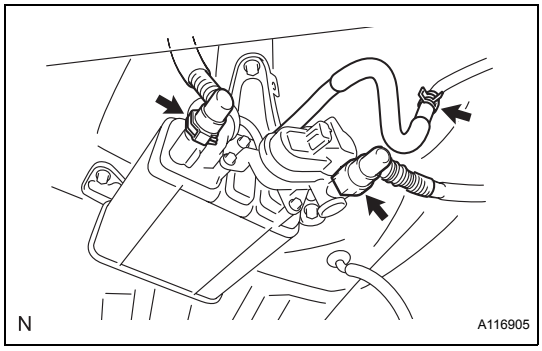
(2) Connect the positive (+) lead of the battery to terminal 7 and the negative (-) lead to terminal 6.
(3) Check that the valve is closed.
If the result is not as specified, replace the canister.
(4) Install the canister pump module.



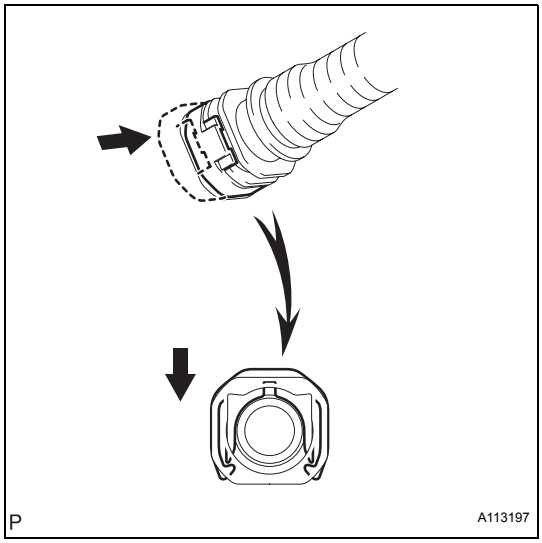
INSTALLATION

1. INSTALL CANISTER

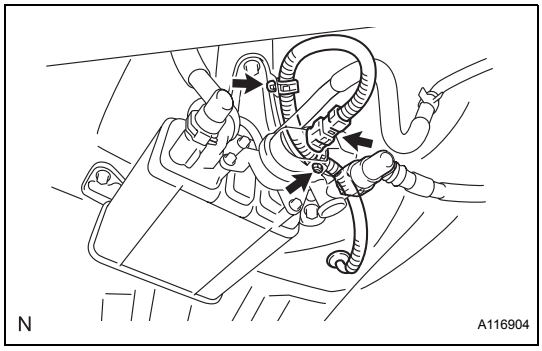
(a) Install the canister with the 3 bolts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



(b) Connect the 2 tubes and hose.



(1) Connect the air inlet line tube to the canister (leak detection pump).
(2) Connect the vent line tube to the canister.
(3) Connect the purge line hose.
HINT:
Install the hose to the canister, and then attach the retainer.



(c) Connect the connector and attach the 2 clamps.

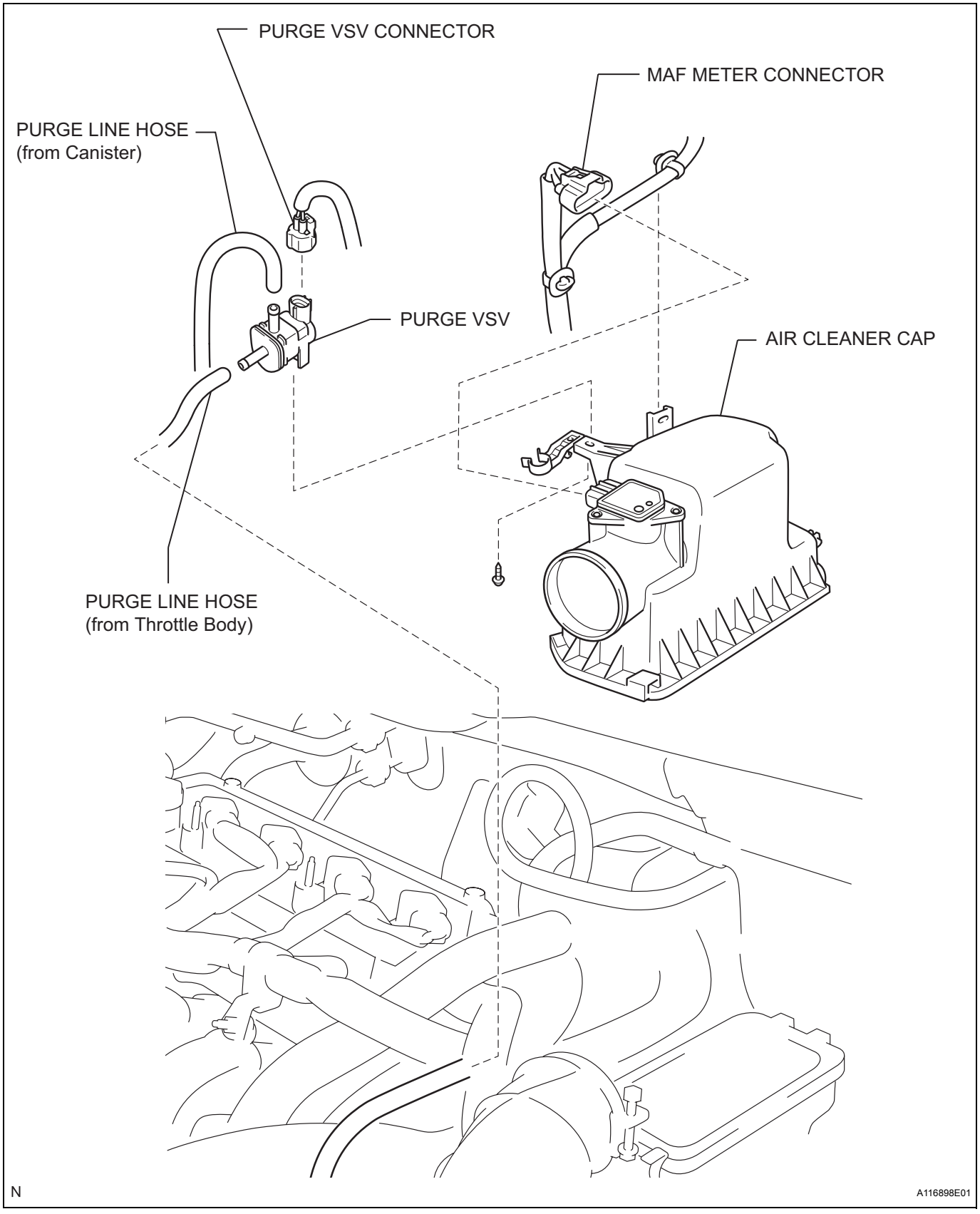
2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

3. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

VACUUM SWITCHING VALVE

COMPONENTS

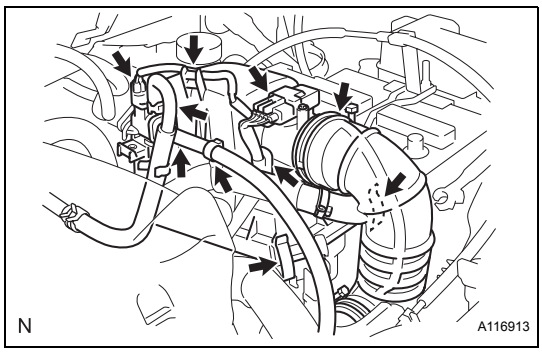


REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

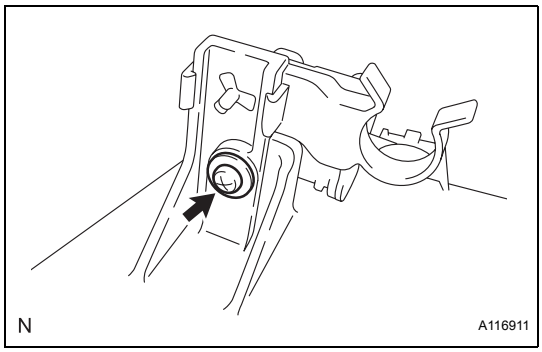
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



2. REMOVE AIR CLEANER CAP

(a) Disconnect the MAF meter connector.
(b) Disconnect the purge VSV connector.
(c) Disconnect the 2 wire harness clamps from the air cleaner cap.
(d) Disconnect the 2 purge line hoses.
(e) Disconnect the purge line hose from the hose clamp.
(f) Unlock the 2 clamps holding the air cleaner cap to the air cleaner case.
(g) Loosen the hose clamp and remove the air cleaner cap.



3. REMOVE PURGE VSV

(a) Remove the screw and purge VSV.

INSPECTION

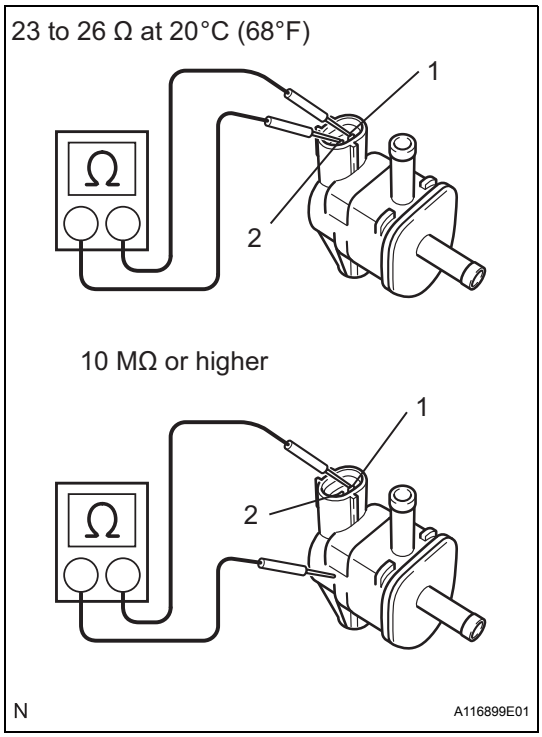
1. INSPECT PURGE VSV

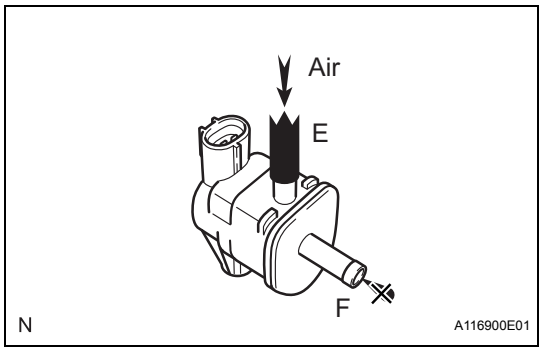
(a) Measure the resistance of the purge VSV.

Standard resistance

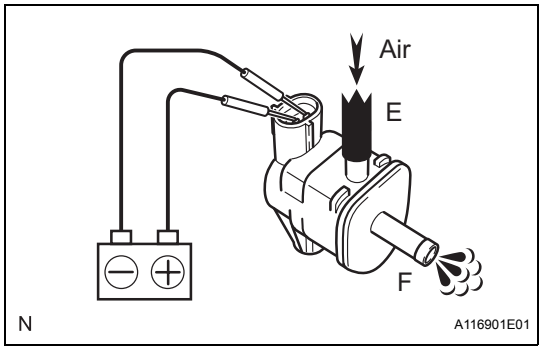
Tester Connection	Specified Condition
1 - 2	23 to 26 Ω at 20°C (68°F)
1 - Body ground 2 - Body ground	10 MΩ or higher

If the result is not as specified, replace the purge VSV.





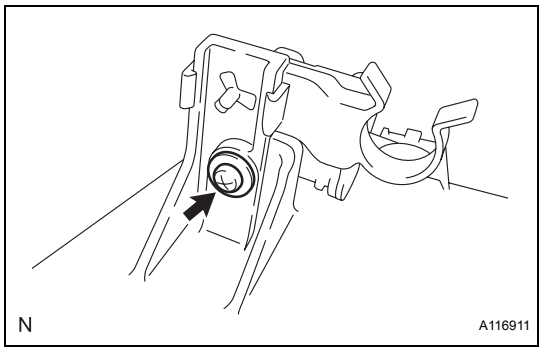
(b) Check operation of the purge VSV.
(1) Check that air does not flow from port E to port F.



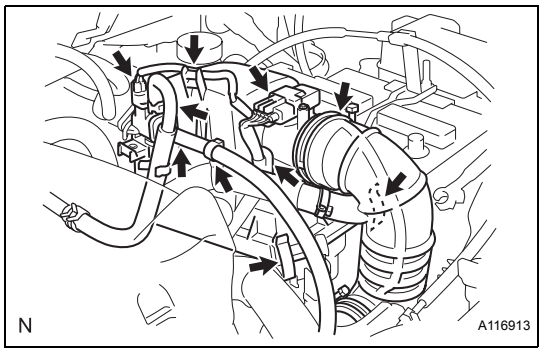
(2) Apply battery voltage across terminals 1 and 2.
(3) Check that air flows from port E to port F.
If the result is not as specified, replace the purge VSV.

EC

INSTALLATION



1. INSTALL PURGE VSV
(a) Install the purge VSV with the screw.



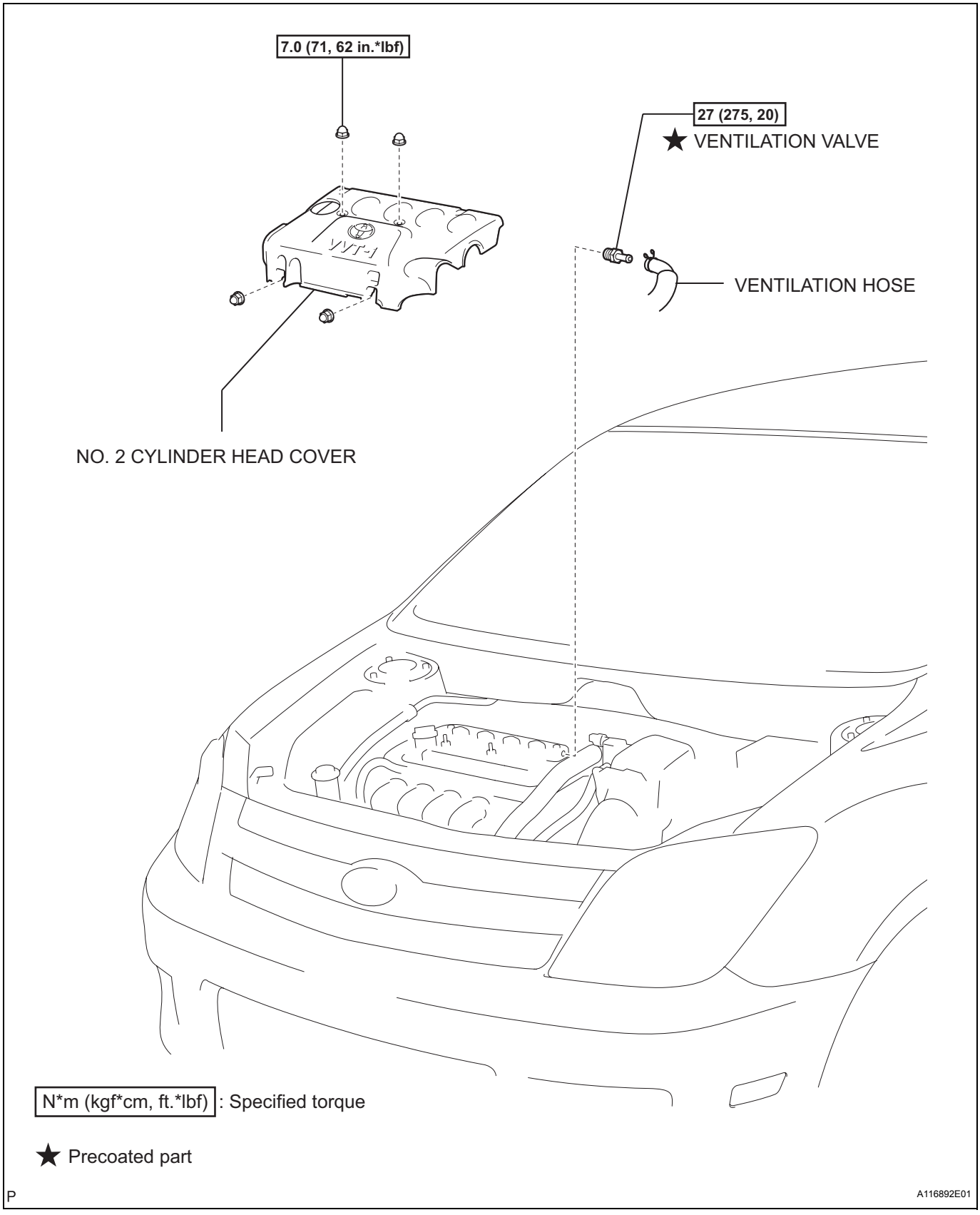
2. INSTALL AIR CLEANER CAP
(a) Install the air cleaner cap and tighten the hose clamp.
(b) Lock the 2 clamps holding the air cleaner cap to the air cleaner case.
(c) Connect the purge line hose to the hose clamp.
(d) Connect the 2 purge line hoses.
(e) Connect the 2 wire harness clamps to the air cleaner cap.
(f) Connect the purge VSV connector.
(g) Connect the MAF meter connector.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

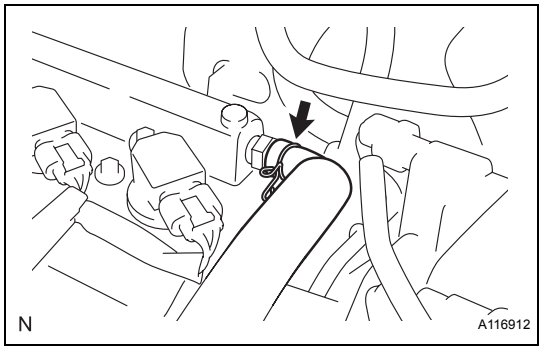
VENTILATION VALVE

COMPONENTS



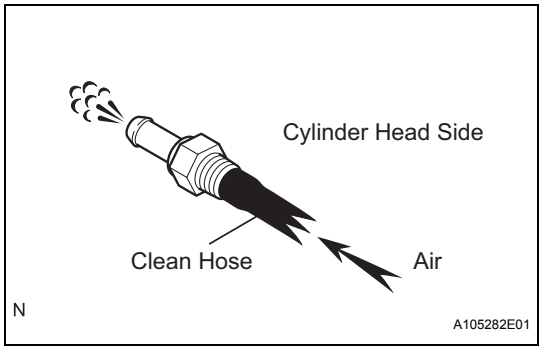
REMOVAL

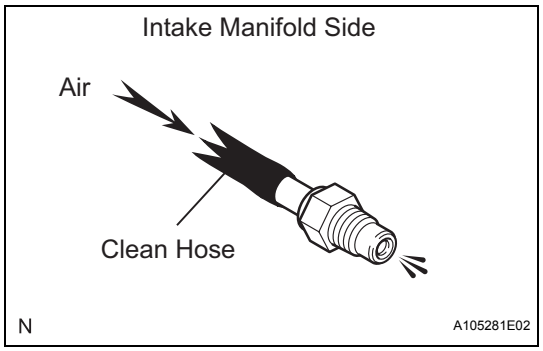
1. **REMOVE NO. 2 CYLINDER HEAD COVER (See page FU-11)**
2. **DISCONNECT VENTILATION HOSE**
   (a) Disconnect the ventilation hose from the ventilation valve.
3. **REMOVE VENTILATION VALVE**
   (a) Remove the ventilation valve.



INSPECTION

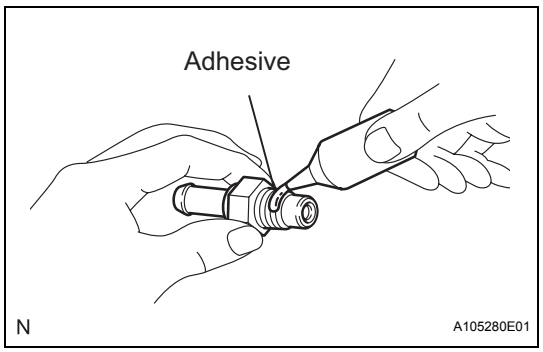
1. **INSPECT VENTILATION VALVE**
   (a) Install a clean hose to the ventilation valve.
   (b) Check the ventilation valve operation.
      (1) Blow air into the cylinder head side, and check that air passes through easily.
      CAUTION:
      Do not suck air through the valve. Petroleum substances inside the valve are hazardous to your health.
      (2) Blow air into the intake manifold side, and check that air passes through with difficulty. If the result is not as specified, replace the ventilation valve.
   (c) Remove the clean hose from the ventilation valve.



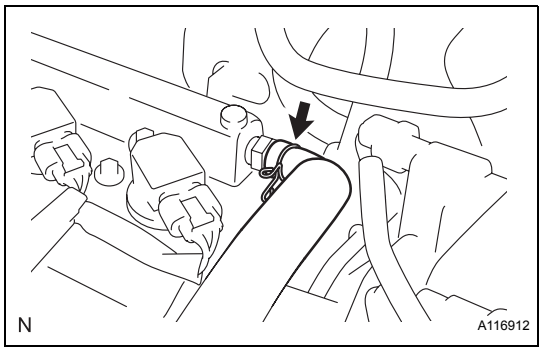


INSTALLATION

1. **INSTALL VENTILATION VALVE**
   (a) Apply adhesive to 2 or 3 threads of the valve.
   Adhesive:
   Part No. 08833-00070, THREE BOND 1324 or equivalent.
   (b) Install the ventilation valve.
   Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



EC

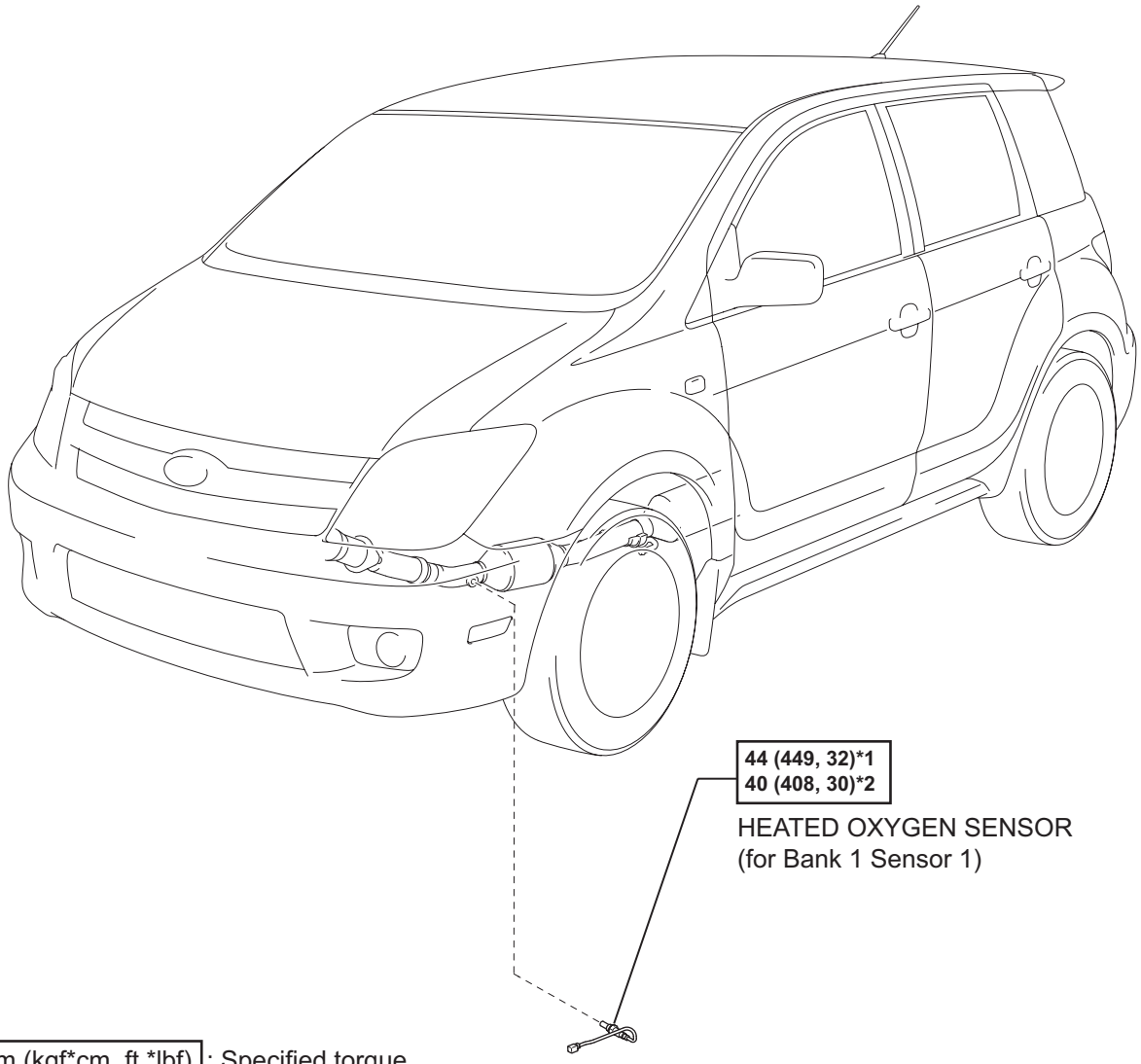


2. **CONNECT VENTILATION HOSE**
   (a) Connect the ventilation hose to the ventilation valve.

3. **INSTALL NO. 2 CYLINDER HEAD COVER (See page FU-15)**

HEATED OXYGEN SENSOR (for Bank 1 Sensor 1)

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

*1: For use with SST

*2: For use without SST

P

A116914E01

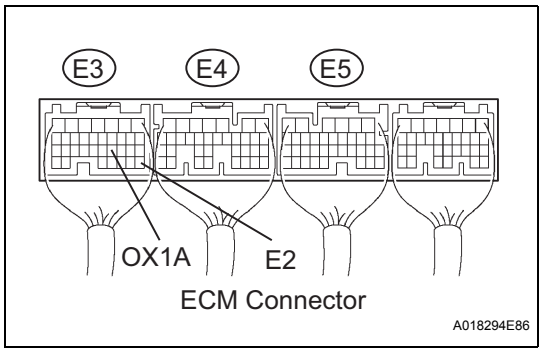
EC

ON-VEHICLE INSPECTION

1. CHECK AIR-FUEL RATIO COMPENSATION SYSTEM

HINT:

The system can also be checked by choosing "DATA MONITOR/O_2SENSOR OUTPUT VOLTAGE" on the intelligent tester monitor.



(a) Connect the intelligent tester to terminals E3-21 (OX1A) and E3-28 (E2) of the ECM.

NOTICE:

Connect test leads from the backside of the connector with the ECU connected.

(b) Warm up the heated oxygen sensor at an engine speed of 2,500 rpm for approximately 2 minutes.

(c) Check that the voltage varies between approximately 0 V and 1 V at an engine speed of 2,500 rpm.

OK:

The voltage varies more than 8 times in 10 seconds.

NOTICE:

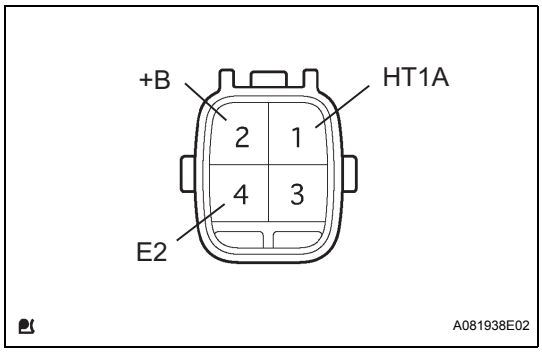
- **Perform the check immediately after warming up the heated oxygen sensor.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again.**

2. INSPECT HEATED OXYGEN SENSOR

(a) Disconnect the sensor connector.

(b) Measure the resistance of the sensor.

Standard resistance



Tester Connection	Specified Condition
1 (HT1A) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
1 (HT1A) - 4 (E2)	10 kΩ or higher

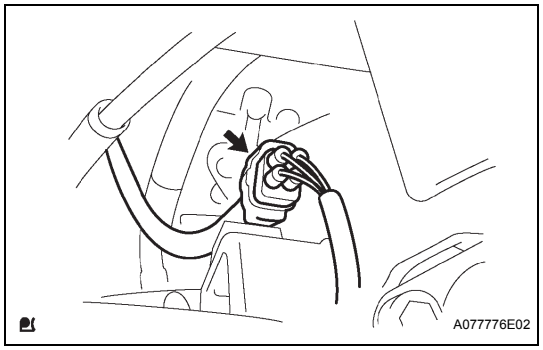
If the result is not as specified, replace the sensor.

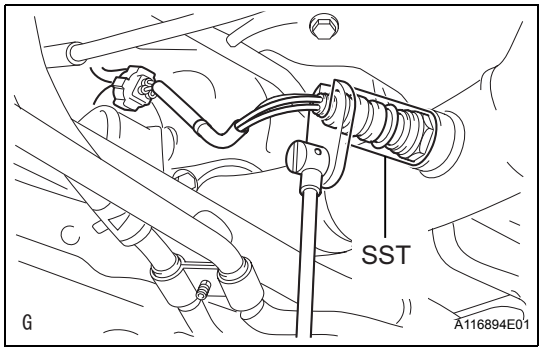
(c) Connect the sensor connector.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE HEATED OXYGEN SENSOR**
   (a) Disconnect the sensor connector.

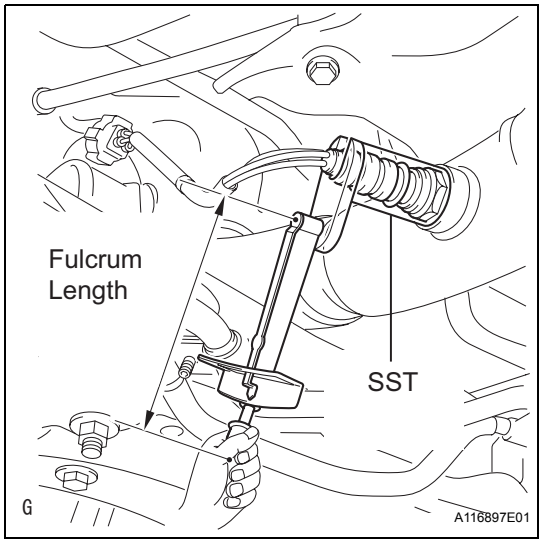




   (b) Using SST, remove the sensor.
   SST 09224-00010

INSTALLATION

1. **INSTALL HEATED OXYGEN SENSOR**
   (a) Using SST, install the sensor.
   SST 09224-00010
   Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf) for use with SST
   40 N*m (408 kgf*cm, 30 ft.*lbf) for use without SST
   HINT:
   Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).
   (b) Connect the sensor connector.



2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting the cable from the negative (-) battery terminal.

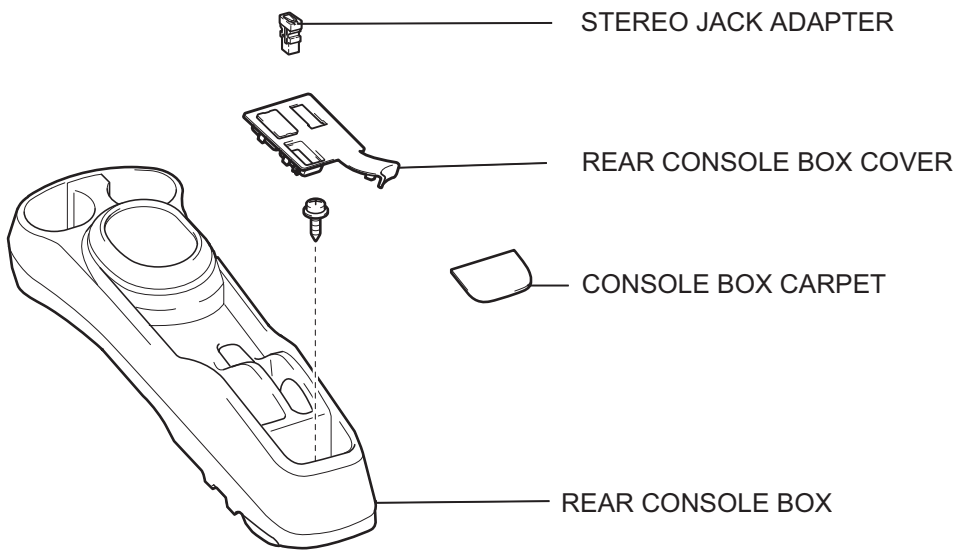
4. **CHECK FOR EXHAUST GAS LEAKS**
   If gas is leaking, tighten the problem areas to stop the leak. Replace damaged parts as necessary.

EC

HEATED OXYGEN SENSOR (for Bank 1 Sensor 2)

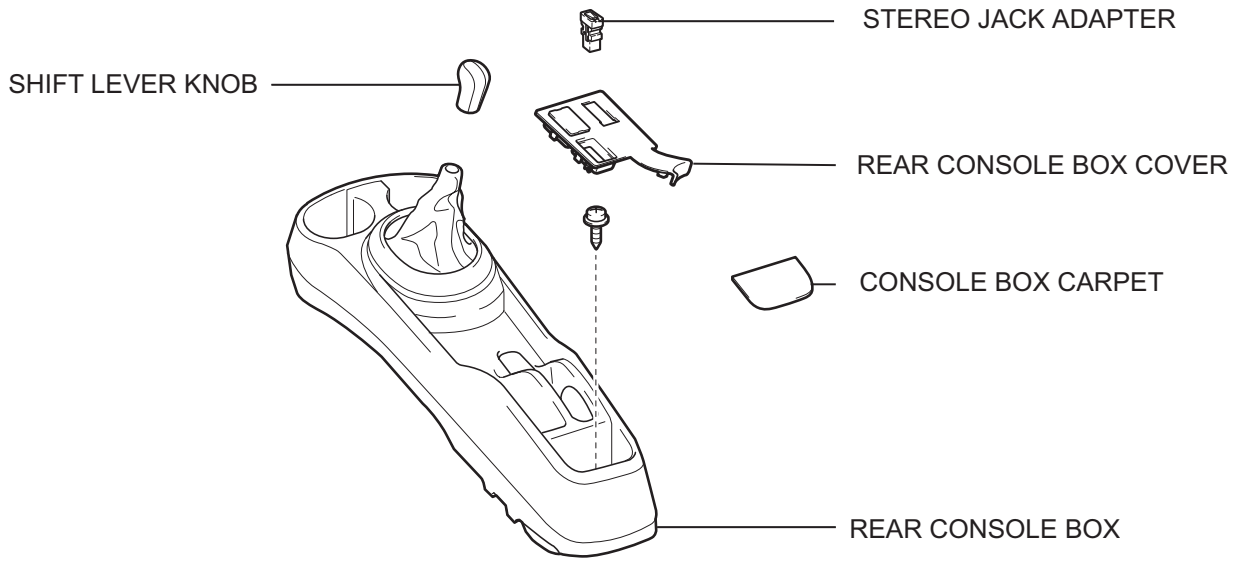
COMPONENTS

Automatic Transaxle

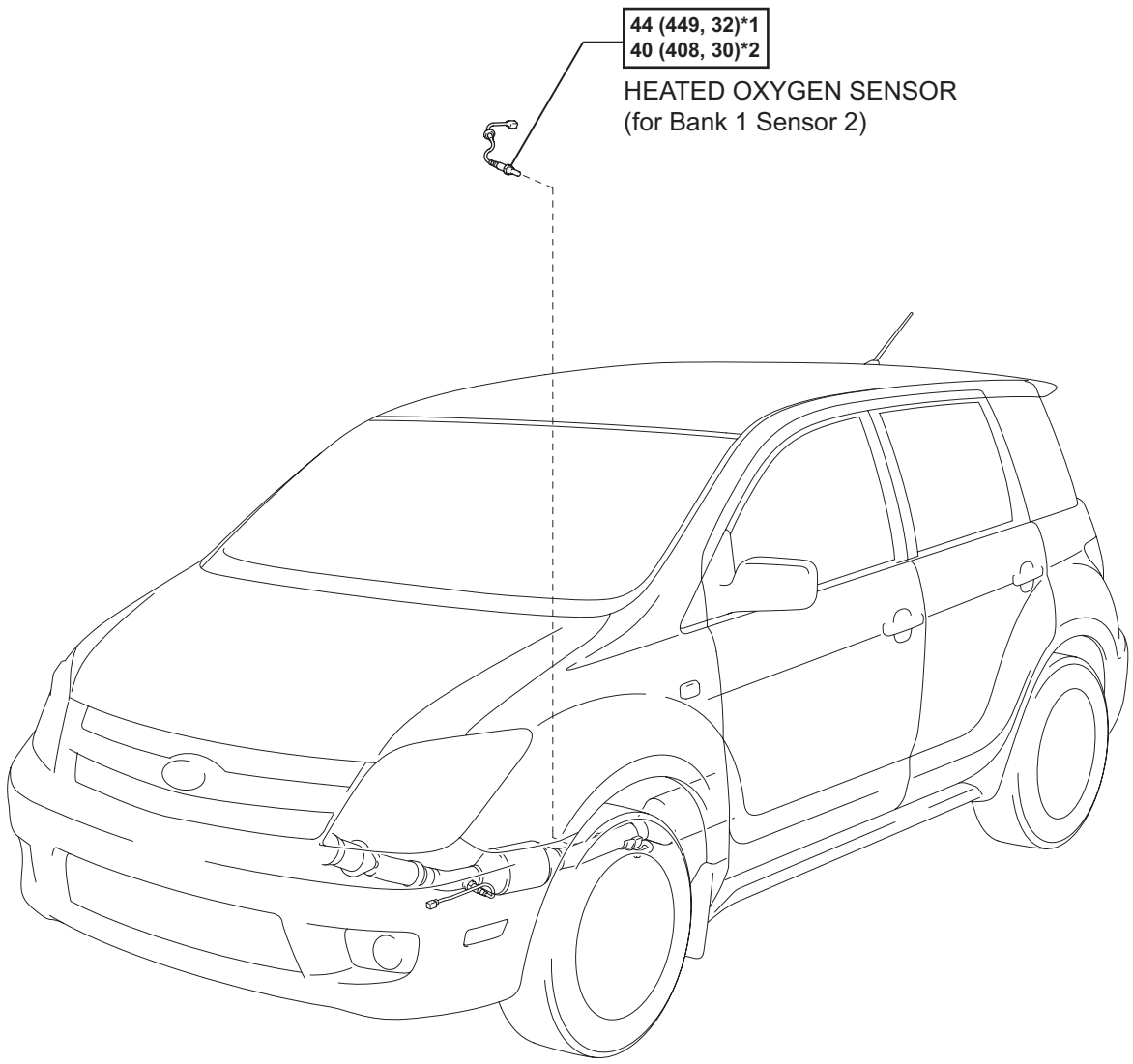


A118616E05

Manual Transaxle



A118617E05



EC

N*m (kgf*cm, ft.*lbf) : Specified torque

*1: For use with SST

*2: For use without SST

P

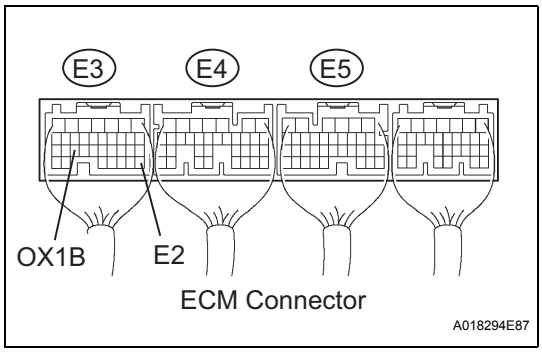
A116915E01

ON-VEHICLE INSPECTION

1. CHECK AIR-FUEL RATIO COMPENSATION SYSTEM

HINT:

The system can also be checked by choosing "DATA MONITOR/O_2SENSOR OUTPUT VOLTAGE" on the intelligent tester monitor.



(a) Connect the intelligent tester to terminals E3-25 (OX1B) and E3-28 (E2) of the ECM.

NOTICE:

Connect test leads from the backside of the connector with the ECU connected.

(b) Warm up the heated oxygen sensor at an engine speed of 2,500 rpm for approximately 2 minutes.

(c) Check that the voltage varies between approximately 0 V and 1 V at an engine speed of 2,500 rpm.

OK:

The voltage varies more than 8 times in 10 seconds.

NOTICE:

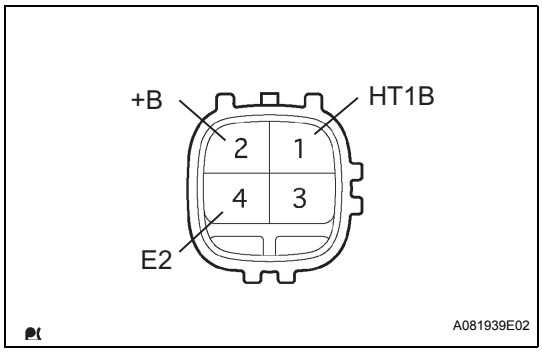
- **Perform the check immediately after warming up the heated oxygen sensor.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again.**

2. INSPECT HEATED OXYGEN SENSOR

(a) Disconnect the sensor connector.

(b) Measure the resistance of the sensor.

Standard resistance



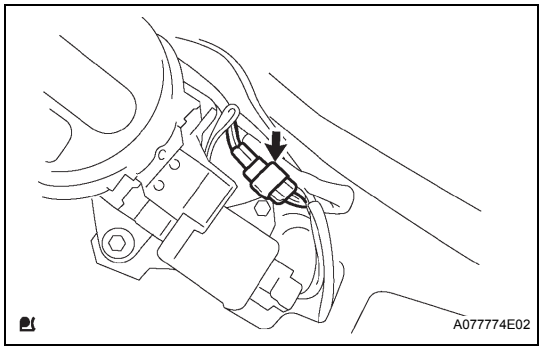
Tester Connection	Specified Condition
1 (HT1B) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
1 (HT1B) - 4 (E2)	10 kΩ or higher

If the result is not as specified, replace the sensor.

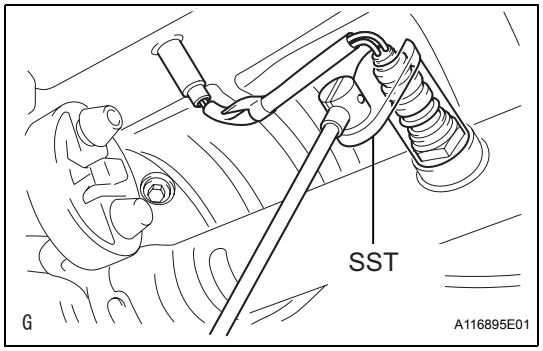
(c) Connect the sensor connector.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE SHIFT LEVER KNOB (for Manual Transaxle)**
3. **REMOVE REAR CONSOLE BOX (See page IP-26)**
4. **REMOVE HEATED OXYGEN SENSOR**
   (a) Disconnect the sensor connector.

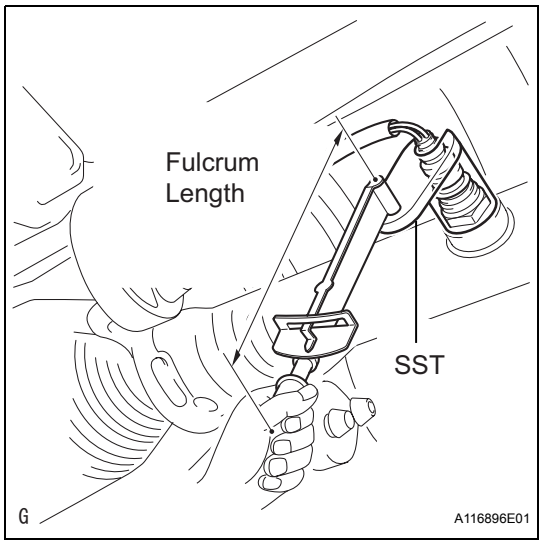


   (b) Using SST, remove the sensor.
   SST 09224-00010



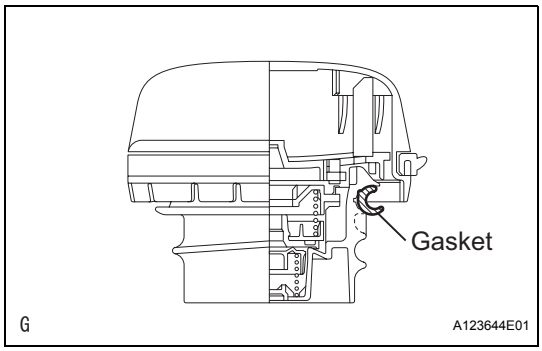
INSTALLATION

1. **INSTALL HEATED OXYGEN SENSOR**
   (a) Using SST, install the sensor.
   SST 09224-00010
   Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf) for use with SST
   40 N*m (408 kgf*cm, 30 ft.*lbf) for use without SST
   HINT:
   Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).
   (b) Connect the sensor connector.
2. **INSTALL REAR CONSOLE BOX (See page IP-27)**
3. **INSTALL SHIFT LEVER KNOB (for Manual Transaxle)**
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**



5. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting the cable from the negative (-) battery terminal.

6. **CHECK FOR EXHAUST GAS LEAKS**
   If gas is leaking, tighten the problem areas to stop the leak. Replace damaged parts as necessary.



FUEL TANK CAP

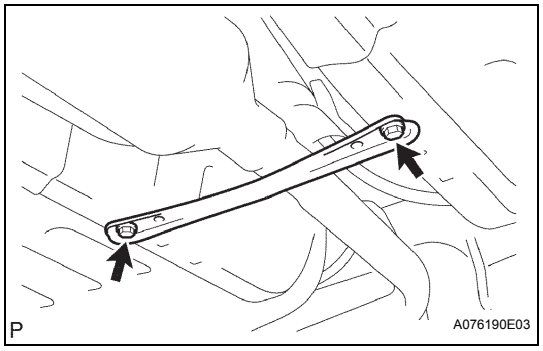
ON-VEHICLE INSPECTION

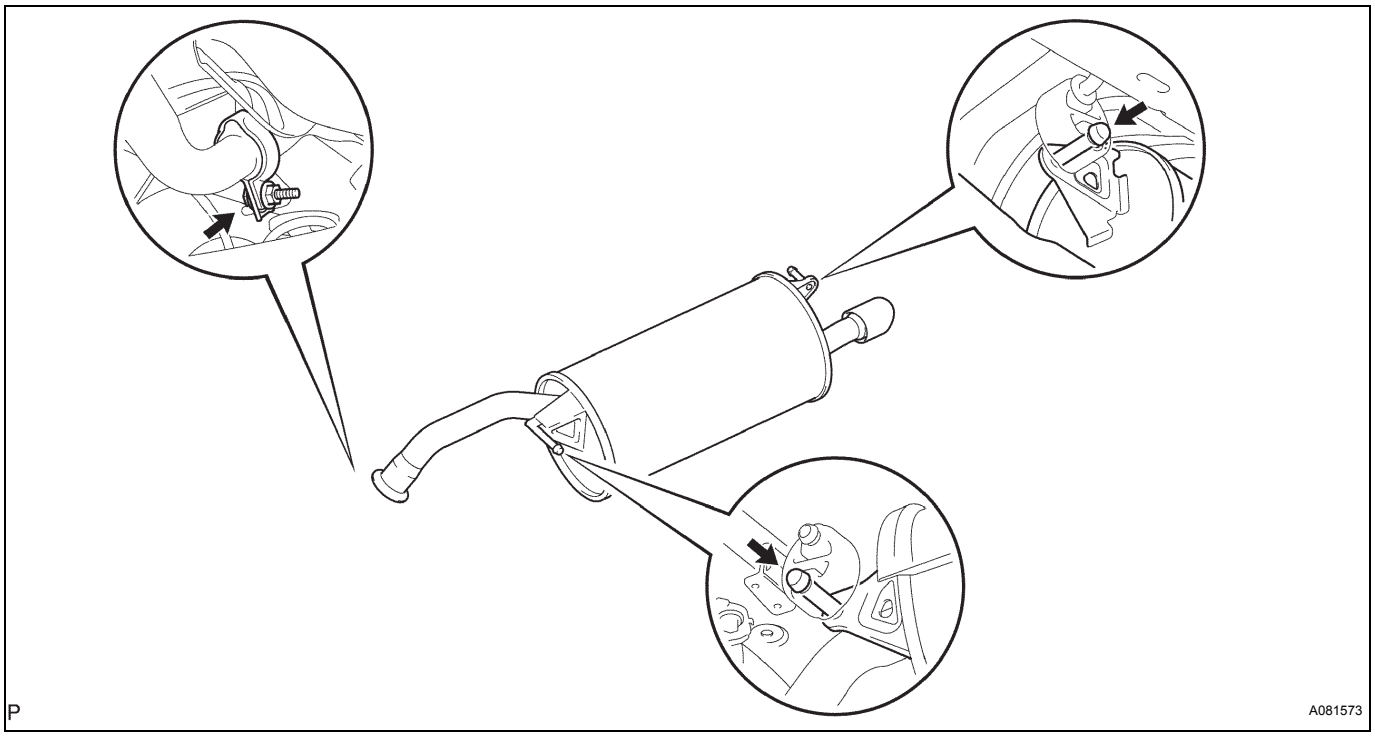
1. CHECK FUEL TANK CAP ASSEMBLY

(a) Visually check if the cap or gasket is deformed or damaged.

REMOVAL

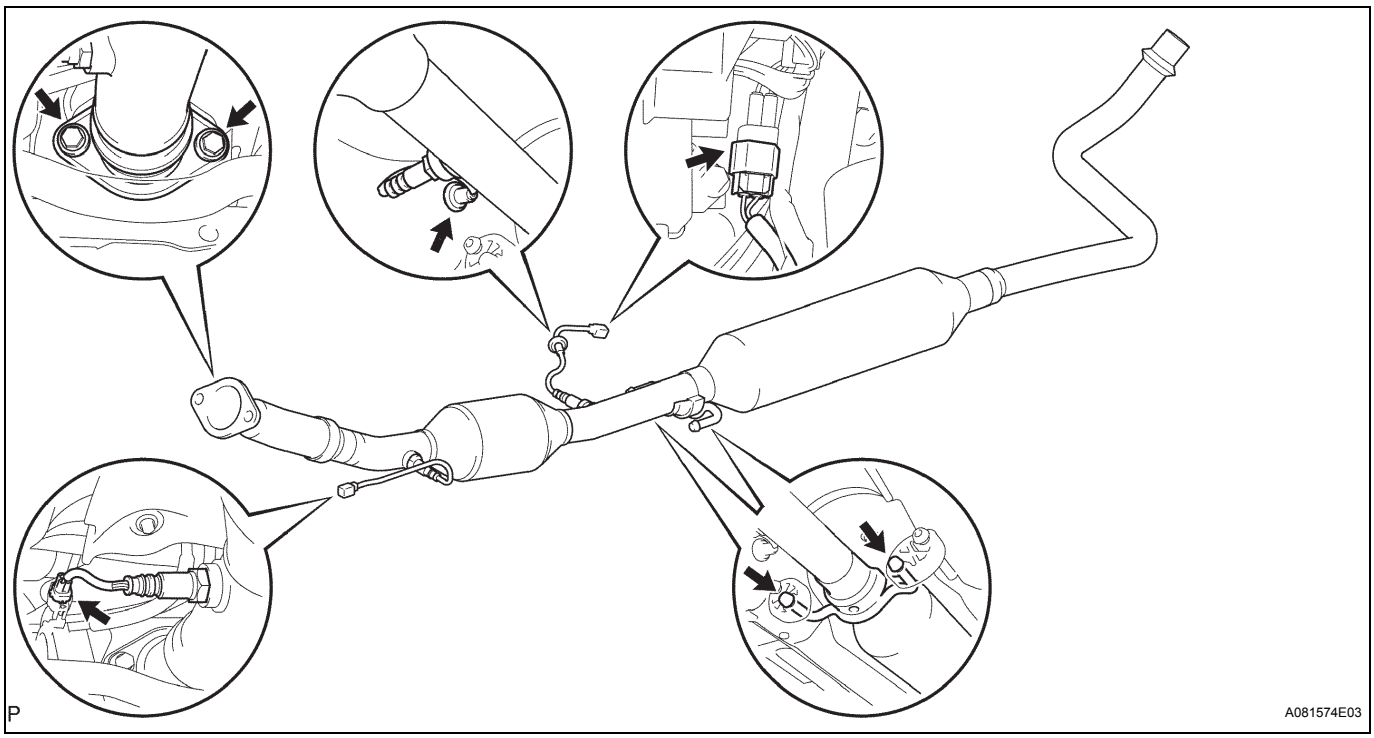
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE SHIFT LEVER KNOB (for Manual Transaxle)**
3. **REMOVE REAR CONSOLE BOX (See page IP-26)**
4. **REMOVE FRONT FLOOR PANEL BRACE**
   (a) Remove the 2 bolts and floor panel brace.
5. **REMOVE TAILPIPE**
   (a) Remove the bolt and clamp.
   (b) Disconnect the 2 exhaust pipe supports, and remove the tailpipe and gasket.

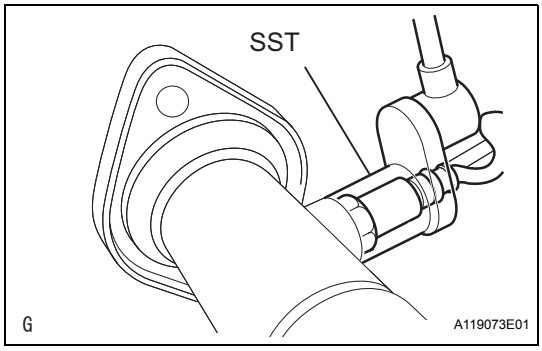




6. **REMOVE FRONT EXHAUST PIPE**
   (a) Disconnect the 2 heated oxygen sensor connectors.
   (b) Remove the grommet.
   (c) Remove the 2 bolts and 2 compression springs.
   (d) Disconnect the 2 exhaust pipe supports, and remove the front exhaust pipe.

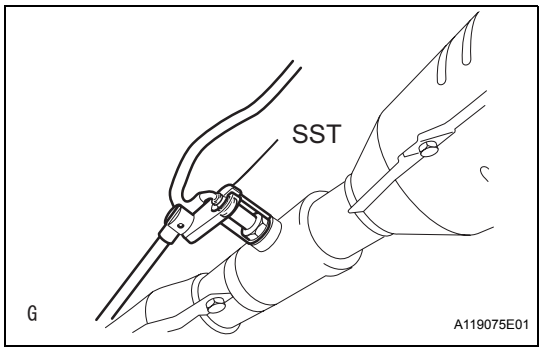
(e) Remove the gasket from the exhaust manifold.





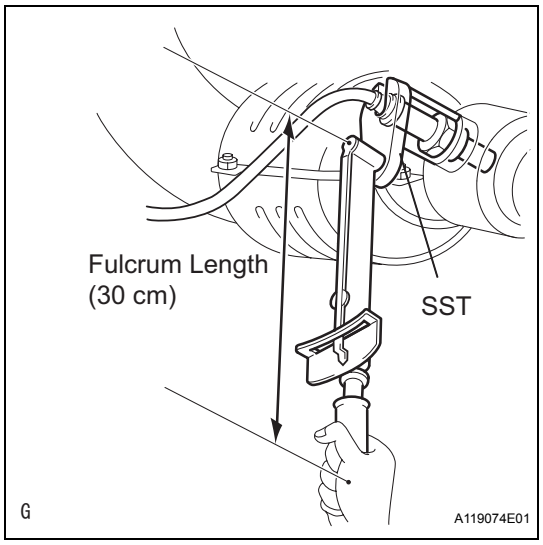
7. REMOVE HEATED OXYGEN SENSOR (for Bank 1 Sensor 1)

(a) Using SST, remove the sensor from the front exhaust pipe.
SST 09224-00010



8. REMOVE HEATED OXYGEN SENSOR (for Bank 1 Sensor 2)

(a) Using SST, remove the sensor from the front exhaust pipe.
SST 09224-00010



INSTALLATION

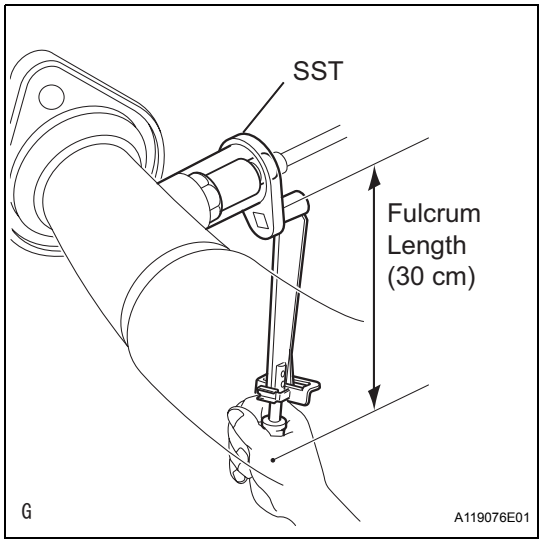
1. INSTALL HEATED OXYGEN SENSOR (for Bank 1 Sensor 2)

(a) Using SST, install the sensor to the front exhaust pipe.

SST 09224-00010

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf) for use with SST
44 N*m (449 kgf*cm, 32 ft.*lbf) for use without SST

HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



2. REMOVE HEATED OXYGEN SENSOR (for Bank 1 Sensor 1)

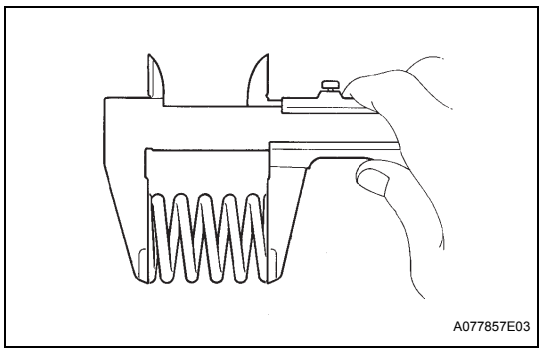
(a) Using SST, install the sensor to the front exhaust pipe.

SST 09224-00010

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf) for use with SST
44 N*m (449 kgf*cm, 32 ft.*lbf) for use without SST

HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

EX

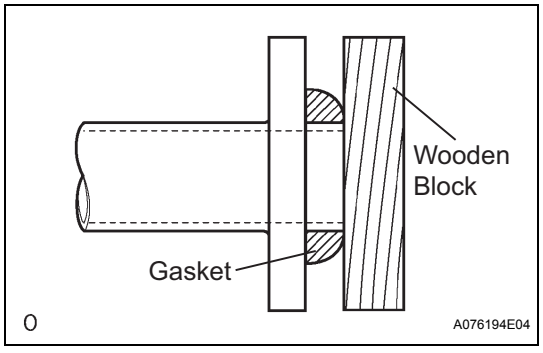


3. INSTALL FRONT EXHAUST PIPE

(a) Using a vernier caliper, measure the free length of the compression spring.

Minimum length:
40.5 mm (1.594 in.)

If the length is less than the minimum, replace the compression spring.



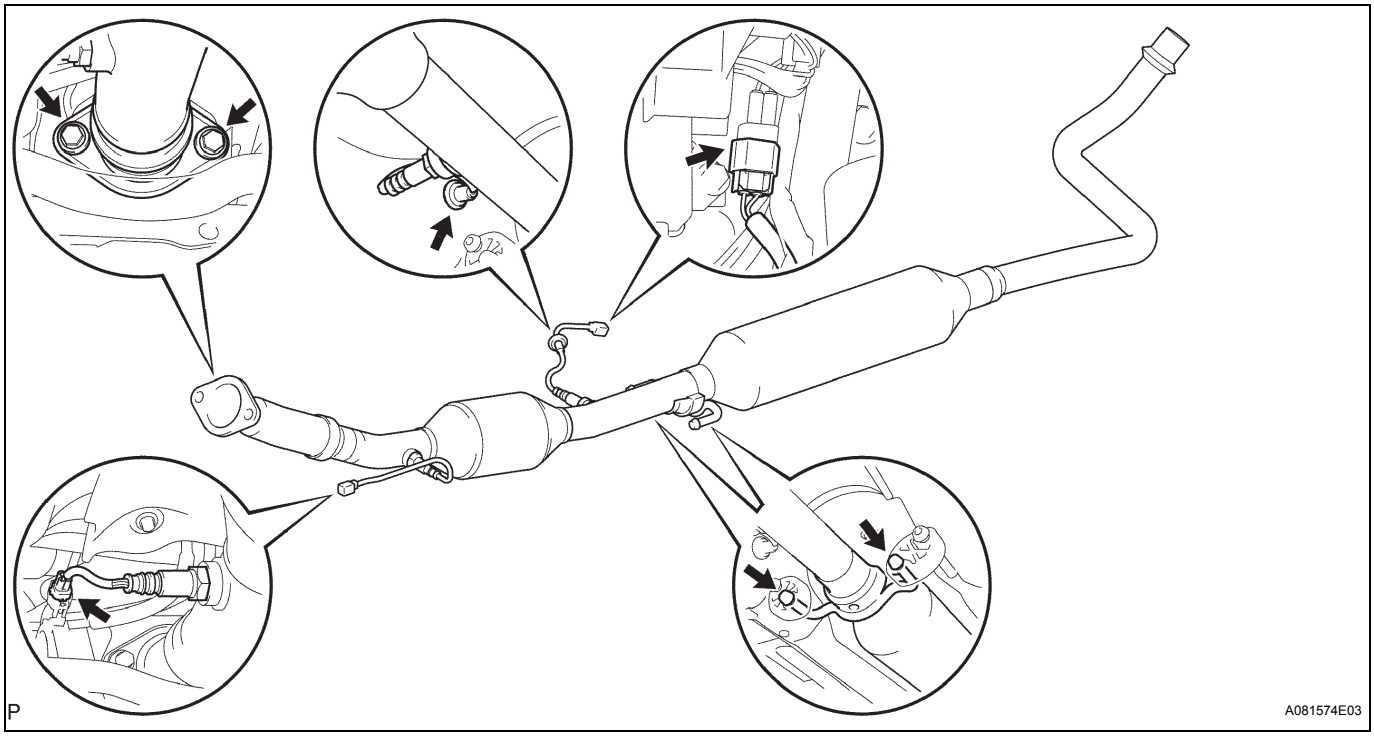
(b) Using a plastic-faced hammer and wooden block, tap in a new gasket until its surface is flush with the exhaust manifold.

NOTICE:

- **Tap in the gasket in the correct direction.**
- **Do not reuse the removed gasket.**
- **Do not to push in the gasket while installing the exhaust pipe.**

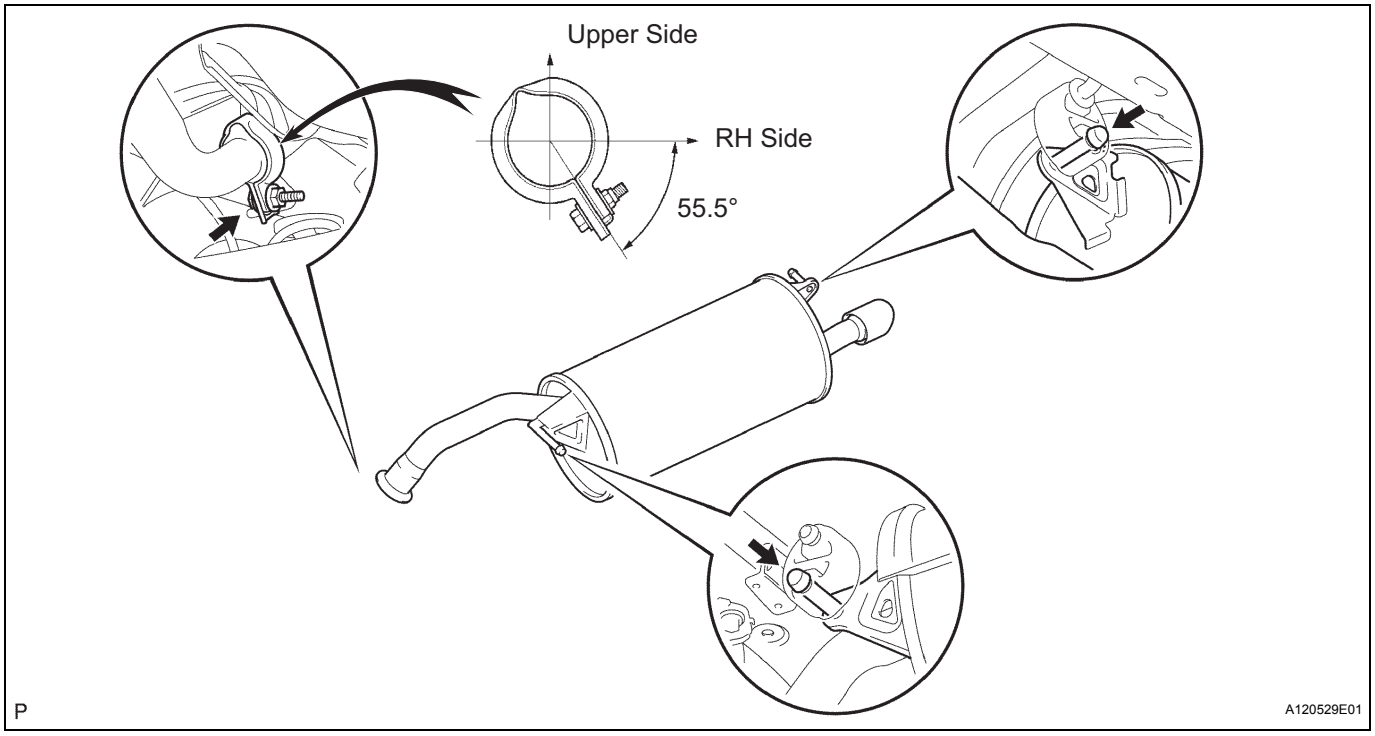
(c) Connect the 2 exhaust pipe supports, and install the exhaust pipe.

(d) Install the 2 compression springs and 2 bolts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)
(e) Connect the 2 heated oxygen sensor connectors.
(f) Install the grommet.

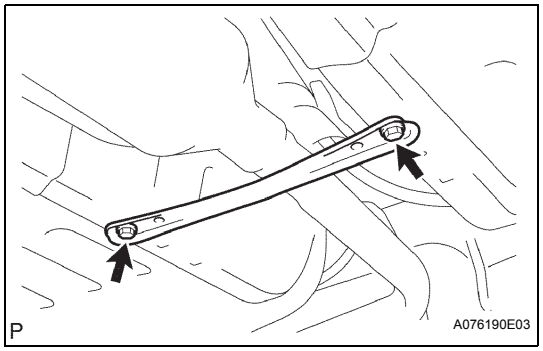


4. INSTALL TAILPIPE

(a) Install a new gasket onto the front exhaust pipe.
(b) Connect the 2 exhaust pipe supports, and install the tailpipe.
(c) Install the clamp with the bolt as shown in the illustration.
Torque: 32 N*m (326 kgf*cm, 24 ft.*lbf)



EX



5. **CHECK FOR EXHAUST GAS LEAKS**

6. **INSTALL FRONT PANEL BRACE**
   (a) Install the floor panel brace with the 2 bolts.
   Torque: 20 N*m (204 kgf*cm, 14 ft.*lbf)

7. **INSTALL REAR CONSOLE BOX (See page IP-27)**

8. **INSTALL SHIFT LEVER KNOB (for Manual Transaxle)**

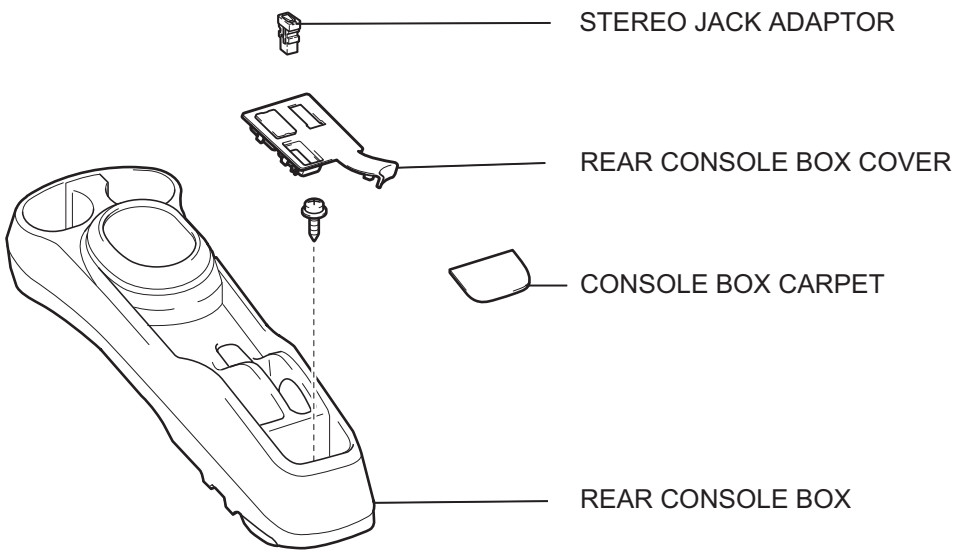
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

10. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting the cable from the negative (-) battery terminal.

EXHAUST PIPE

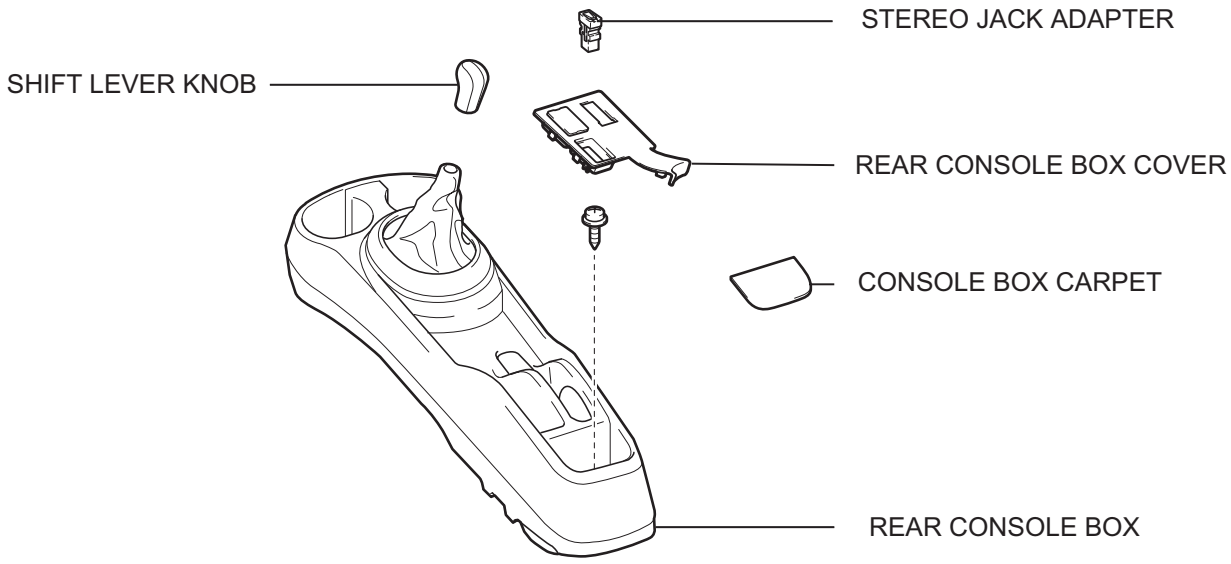
COMPONENTS

Automatic Transaxle



A118616E02

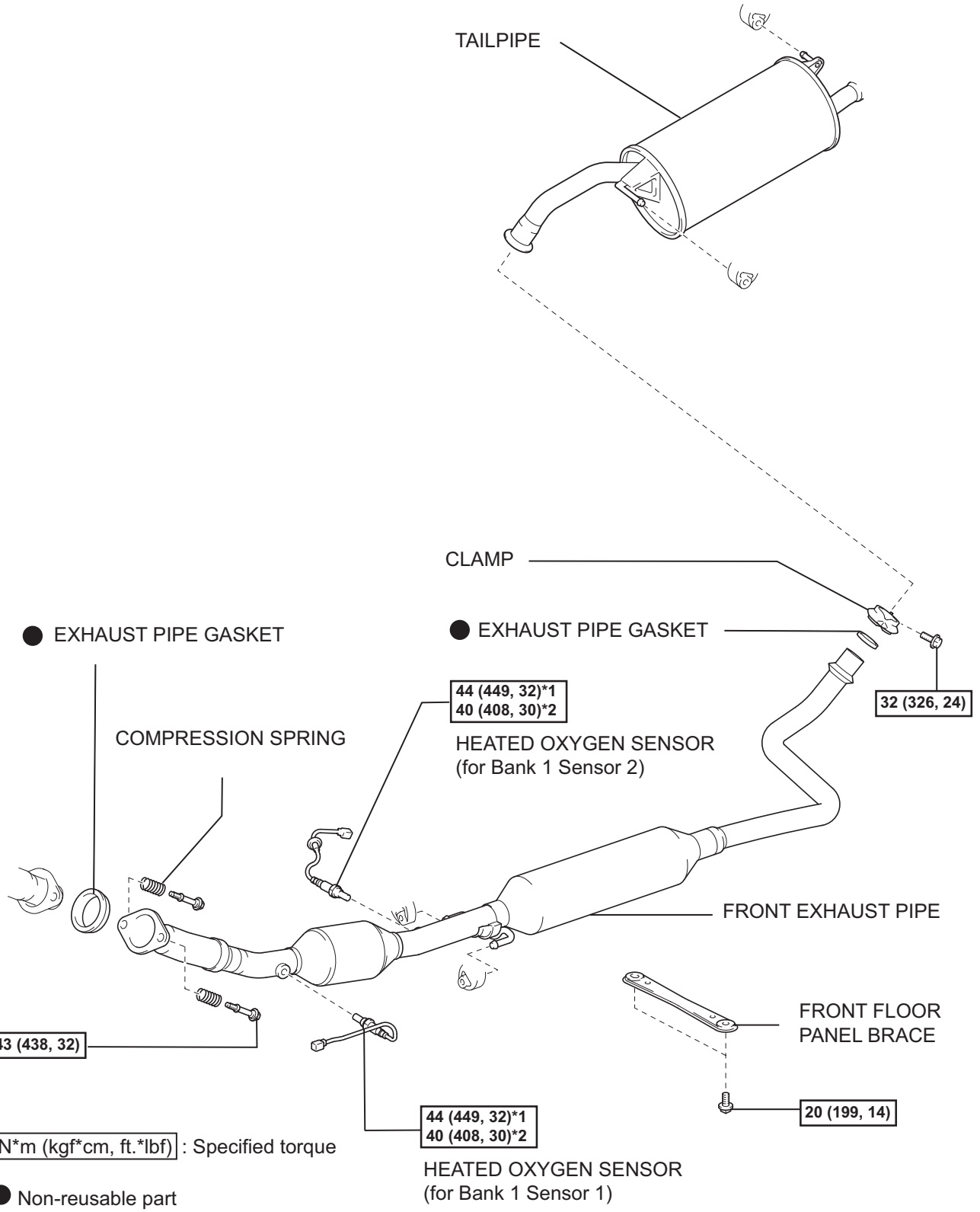
Manual Transaxle



A118617E01

EX

EX



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

*1: For use with SST

*2: For use without SST

P

A116726E01

ON-VEHICLE INSPECTION

HINT:
It is normal for the cooling fan to sometimes rotate when the ignition switch is turned from ACC to ON.

1. CHECK COOLING FAN OPERATION AT LOW TEMPERATURES (Below 83°C (181°F))

(a) Turn the ignition switch ON with the A/C switch OFF.
(b) Check that the cooling fan stops.
If it does not, check the cooling fan relay and engine coolant temperature sensor, and check if there is disconnection or circuit open between them.
(c) Disconnect the engine coolant temperature sensor connector.
(d) Check that the cooling fan rotates.
If it does not, check the fuses, cooling fan relay, ECM and cooling fan, and check for short in circuit between the cooing fan relay and engine coolant temperature sensor.
(e) Reconnect the engine coolant temperature sensor connector.

2. CHECK COOLING FAN OPERATION AT HIGH TEMPERATURES (Above 93°C (199°F))

(a) Start the engine, and raise the coolant temperature to above 93°C (199°F).
HINT:
Coolant temperature is the value detected by the engine coolant temperature sensor on the cylinder head.
(b) Check that the A/C switch is OFF.
(c) Check that the cooling fan rotates.
If it does not, check the fuses, cooling fan relay, ECM, cooling fan and engine coolant temperature sensor.

3. CHECK COOLING FAN

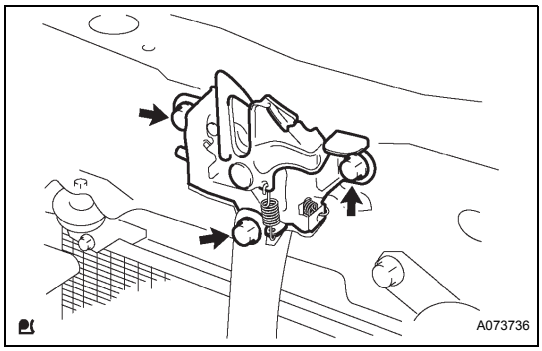
(a) Disconnect the cooling fan connector.
(b) Connect the battery and an ammeter to the cooling fan.
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.
Standard amperage:
11.7 to 14.7 A
(d) Reconnect the cooling fan connector.

INSTALLATION

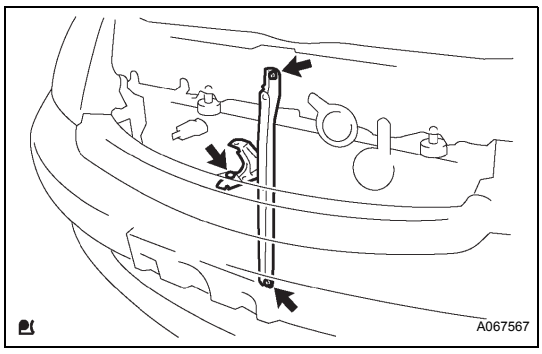
1. **INSTALL WATER PUMP ASSEMBLY**
   (a) Install a new gasket and the water pump with the 3 bolts and 2 nuts.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
2. **INSTALL WATER PUMP PULLEY**
   (a) Using SST, install the pump pulley with the 3 bolts.
   SST 09960-10010 (09962-01000, 09963-00600)
   Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)
3. **INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH (See page EM-30)**
4. **INSTALL GENERATOR V BELT (See page EM-7)**
5. **ADJUST GENERATOR V BELT (See page EM-7)**
6. **ADD ENGINE COOLANT (See page CO-5)**
7. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-7)**

REMOVAL

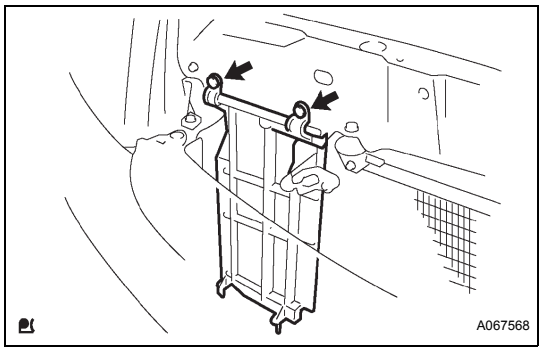
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **DRAIN ENGINE COOLANT (See page CO-5)**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **DISCONNECT RADIATOR HOSE OUTLET**
5. **DISCONNECT OIL COOLER INLET HOSE (for Automatic Transaxle)**
6. **DISCONNECT OIL COOLER OUTLET HOSE (for Automatic Transaxle)**
7. **REMOVE RADIATOR GRILLE (See page ET-13)**
8. **REMOVE HOOD LOCK ASSEMBLY**
   (a) Remove the 3 bolts and hood lock.

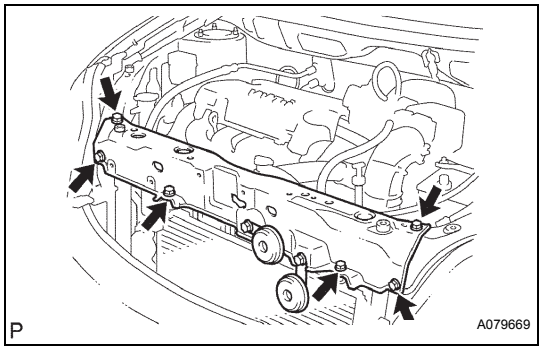


9. **REMOVE HOOD LOCK SUPPORT SUB-ASSEMBLY**
   (a) Remove the 2 bolts, clip and hood lock support.



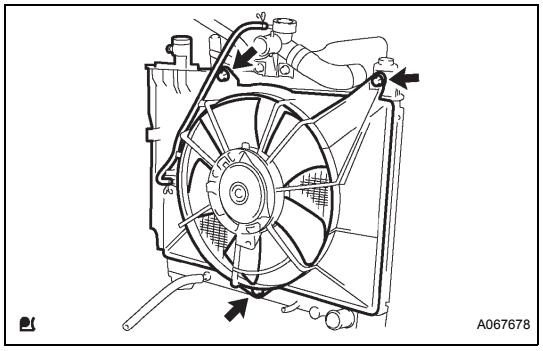
10. **REMOVE RADIATOR SUPPORT OPENING COVER**
    (a) Remove the 2 clips and radiator support opening cover.





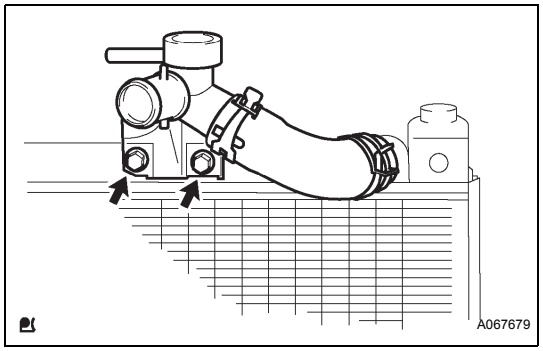
11. REMOVE RADIATOR SUPPORT SUB-ASSEMBLY UPPER

(a) Disconnect the 2 connectors from the 2 horns.
(b) Remove the 2 bolts and disconnect the condenser from the radiator support upper.
(c) Remove the 4 bolts and radiator support upper.



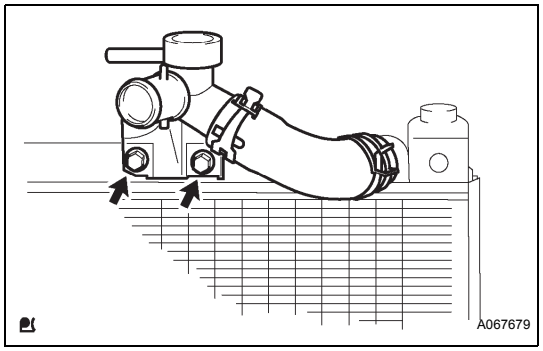
12. REMOVE RADIATOR ASSEMBLY

(a) Disconnect the connector from the cooling fan motor and remove the radiator from the engine compartment.
(b) Remove the 3 bolts and detach the fan shroud with fan.



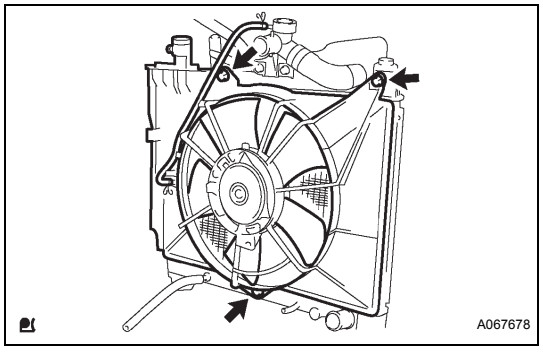
(c) Remove the 2 bolts and water filler.
(d) Remove the 2 radiator support cushions and radiator support lower.

INSTALLATION

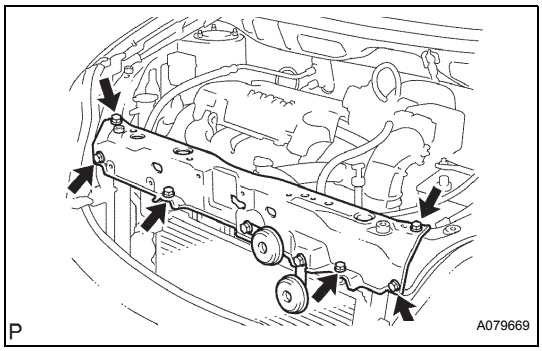


1. INSTALL RADIATOR ASSEMBLY

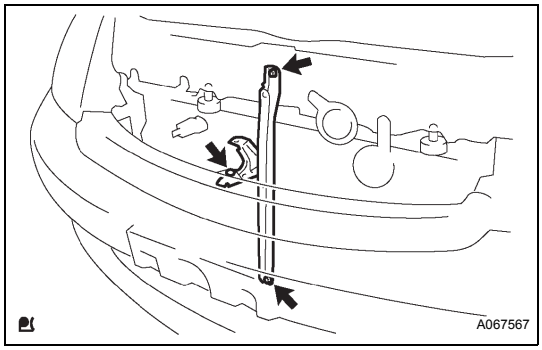
(a) Install the 2 radiator support cushions and radiator support lower onto the radiator.
(b) Install the water filler with the 2 bolts.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)



(c) Install the fan shroud with fan with the 3 bolts.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)
(d) Install the radiator, and connect the connector to the cooling fan motor.

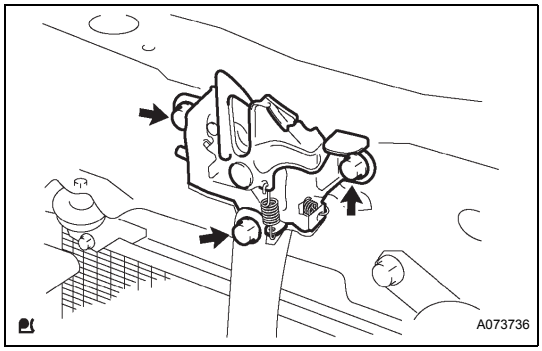


2. **INSTALL RADIATOR SUPPORT SUB-ASSEMBLY UPPER**
   (a) Install the radiator support upper with the 4 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
   (b) Install the condenser to the radiator support upper with the 2 bolts.
   (c) Connect the 2 connectors to the 2 horns.
3. **INSTALL RADIATOR SUPPORT OPENING COVER**



4. **INSTALL HOOD LOCK SUPPORT SUB-ASSEMBLY**
   (a) Install the hood lock support with the 2 bolts and clip.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

CO



5. **INSTALL HOOD LOCK ASSEMBLY**
   (a) Temporarily install the hood lock with the 3 bolts.
6. **ADJUST HOOD LOCK ASSEMBLY (See page ED-1)**
7. **INSTALL RADIATOR GRILLE (See page ET-14)**
8. **CONNECT OIL COOLER OUTLET HOSE (for Automatic Transaxle)**
9. **CONNECT OIL COOLER INLET HOSE (for Automatic Transaxle)**
10. **CONNECT RADIATOR HOSE OUTLET**
11. **CONNECT RADIATOR HOSE INLET**
12. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
13. **ADD ENGINE COOLANT (See page CO-5)**
14. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-7)**
15. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

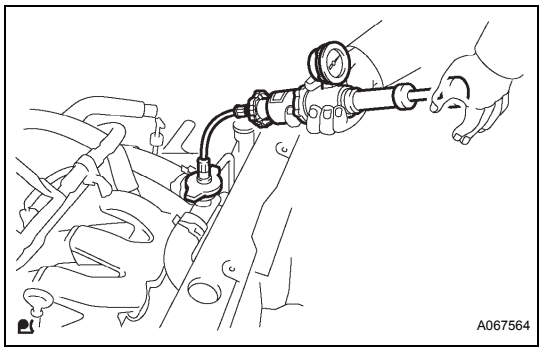
COOLING SYSTEM

ON-VEHICLE INSPECTION

1. CHECK COOLING SYSTEM FOR LEAKS

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.



(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Using a radiator cap tester, increase the pressure inside the radiator to 137 kPa (1.4 kgf/cm^2, 19.9 psi), and check that the pressure does not drop.
If the pressure drops, check the hoses, radiator and water pump for leaks. If no external leaks are found, check the cylinder block and head.

2. CHECK ENGINE COOLANT LEVEL IN RESERVOIR

(a) The engine coolant should be between the low and full lines when the engine is cold.
If low, check for leaks and add TOYOTA Super Long Life Coolant (SLLC) or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology up to the full line.

NOTICE:

Never use water as a substitute for engine coolant.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

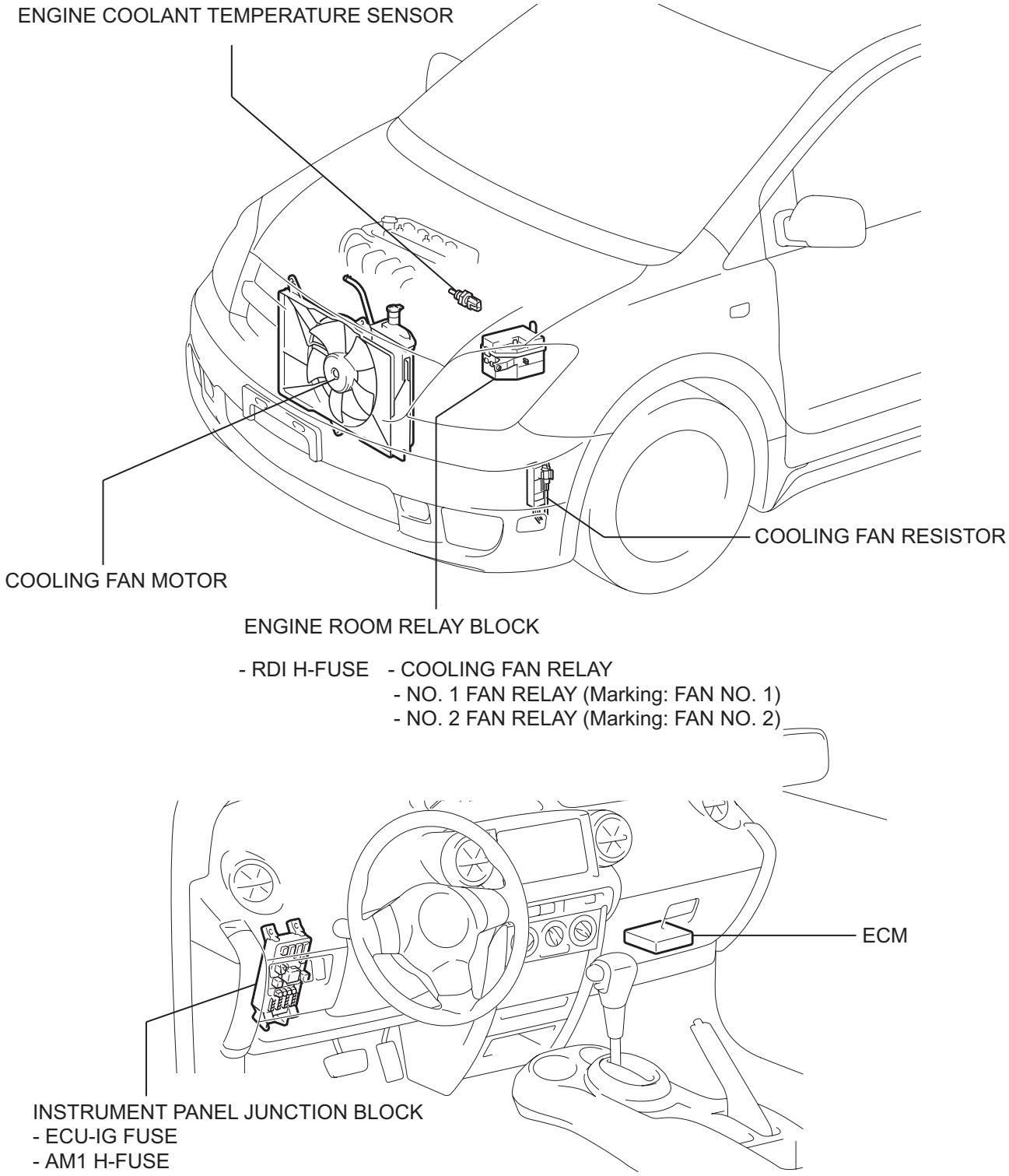
Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

(b) Check if there are excessive deposits of rust or scale around the radiator cap and radiator filler hole. Also, the coolant should be free of oil.
If excessively dirty, replace the coolant.

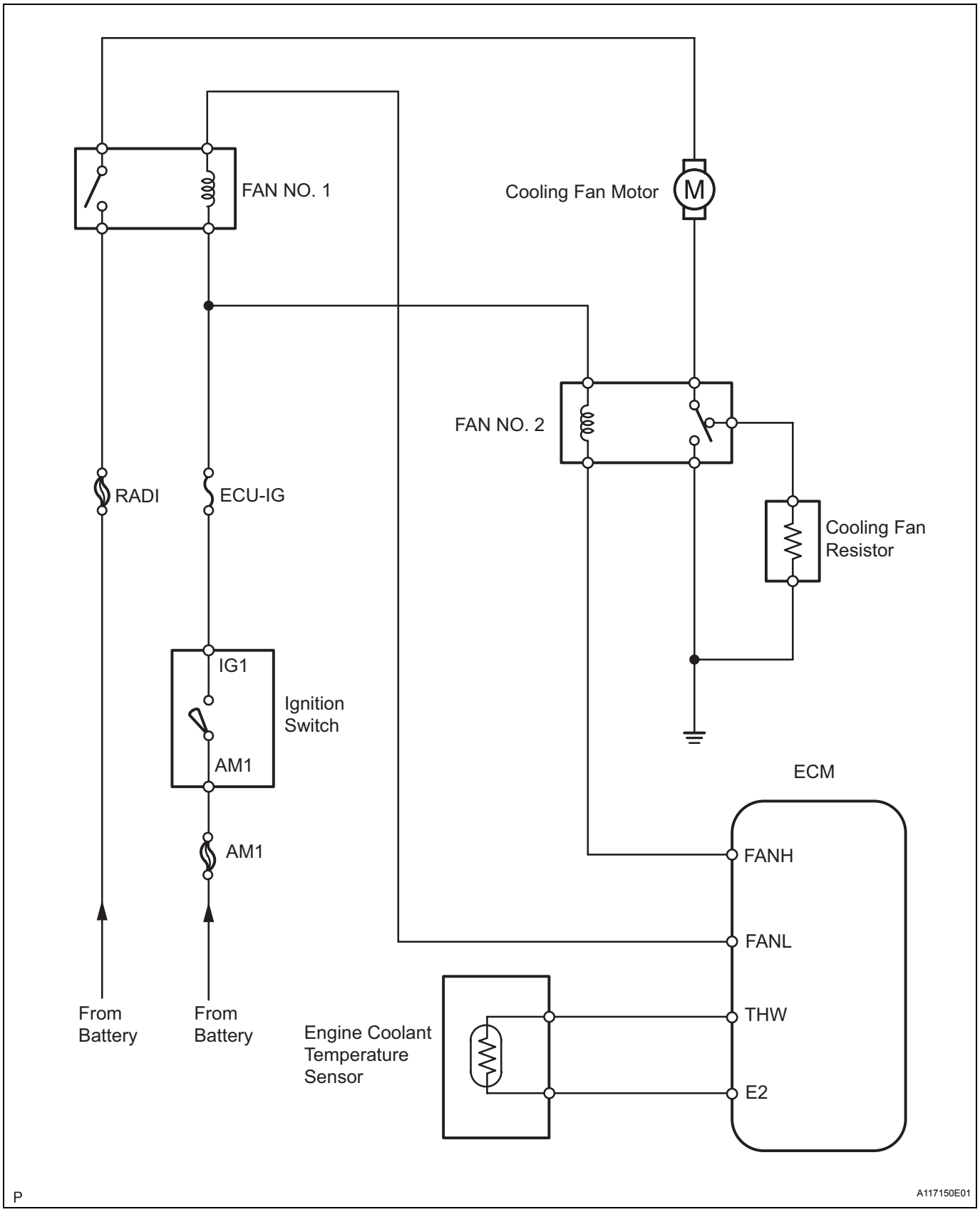
(c) Install the radiator cap.

COOLING FAN SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM



CO

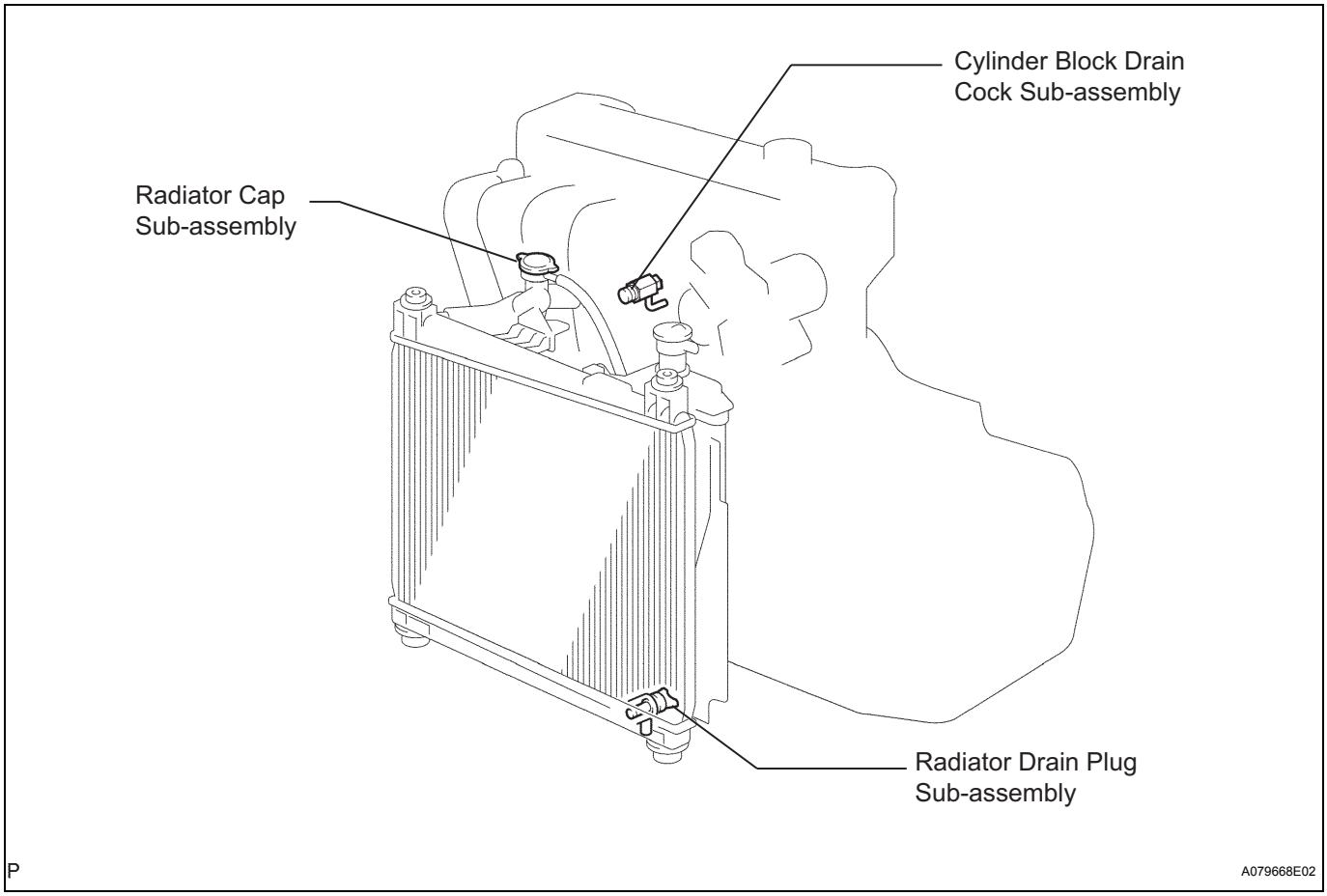
COOLANT

ON-VEHICLE INSPECTION

CAUTION:
Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

1. DRAIN ENGINE COOLANT

(a) Loosen the radiator drain plug.
(b) Remove the radiator cap and drain the coolant.
(c) Loosen the cylinder block drain cock.
HINT:
Dispose of the coolant according to the regulations in your area.



2. ADD ENGINE COOLANT

(a) Tighten all the plugs and fill the radiator with TOYOTA Super Long Life Coolant (SLLC).
Torque: 13 N*m (129 kgf*cm, 9.4 ft.*lbf)
Standard capacity

Item	Specified Condition
M/T	4.4 liters (4.6 US qts, 3.9 Imp. qts)
A/T	4.3 liters (4.5 US qts, 3.8 Imp. qts)

(b) Fill the radiator reservoir with TOYOTA Super Long Life Coolant (SLLC) to the full line.
HINT:
- The use of improper coolant may damage the engine cooling system.
- Only use TOYOTA Super Long Life Coolant or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).
- New TOYOTA vehicles are filled with TOYOTA Super Long Life Coolant (color is pink, premixed ethylene glycol; concentration is approximately 50%; and freezing temperature is -35°C (-31°F)). When replacing the coolant, TOYOTA Super Long Life Coolant is recommended.

NOTICE:
Never use water as a substitute for engine coolant.

(c) Check the coolant level inside the radiator by pressing the inlet and outlet radiator hoses several times by hand.
If the coolant level goes down, add coolant.

(d) Install the radiator cap securely.

(e) Slowly pour coolant into the radiator reservoir until it reaches the full line.

(f) Warm up the engine until the cooling fan operates.
(1) Set the air conditioning as follows while warming up the engine.

Manual air conditioning system	Automatic air conditioning system
Fan speed - Any setting except "OFF" Temperature - Toward WARM Air conditioning switch "OFF"	Fan speed - Any setting except "OFF" Temperature - To the highest temperature Air conditioning switch "OFF"

(2) Maintain the engine speed at 2,000 to 2,500 rpm and warm up the engine until the cooling fan operates.

(g) Press the inlet and outlet radiator hoses several times by hand while warming up the engine.
NOTICE:
When pressing the radiator hoses:
- **Wear protective gloves.**
- **Be careful as the radiator hoses are hot.**
- **Keep your hands away from the radiator fan.**

(h) Stop the engine and wait until the coolant cools down.

(i) Remove the radiator cap and check the coolant level inside the radiator.

(j) Check the coolant level in the radiator reservoir.
If the coolant level is low, add SLLC to the reservoir full line.

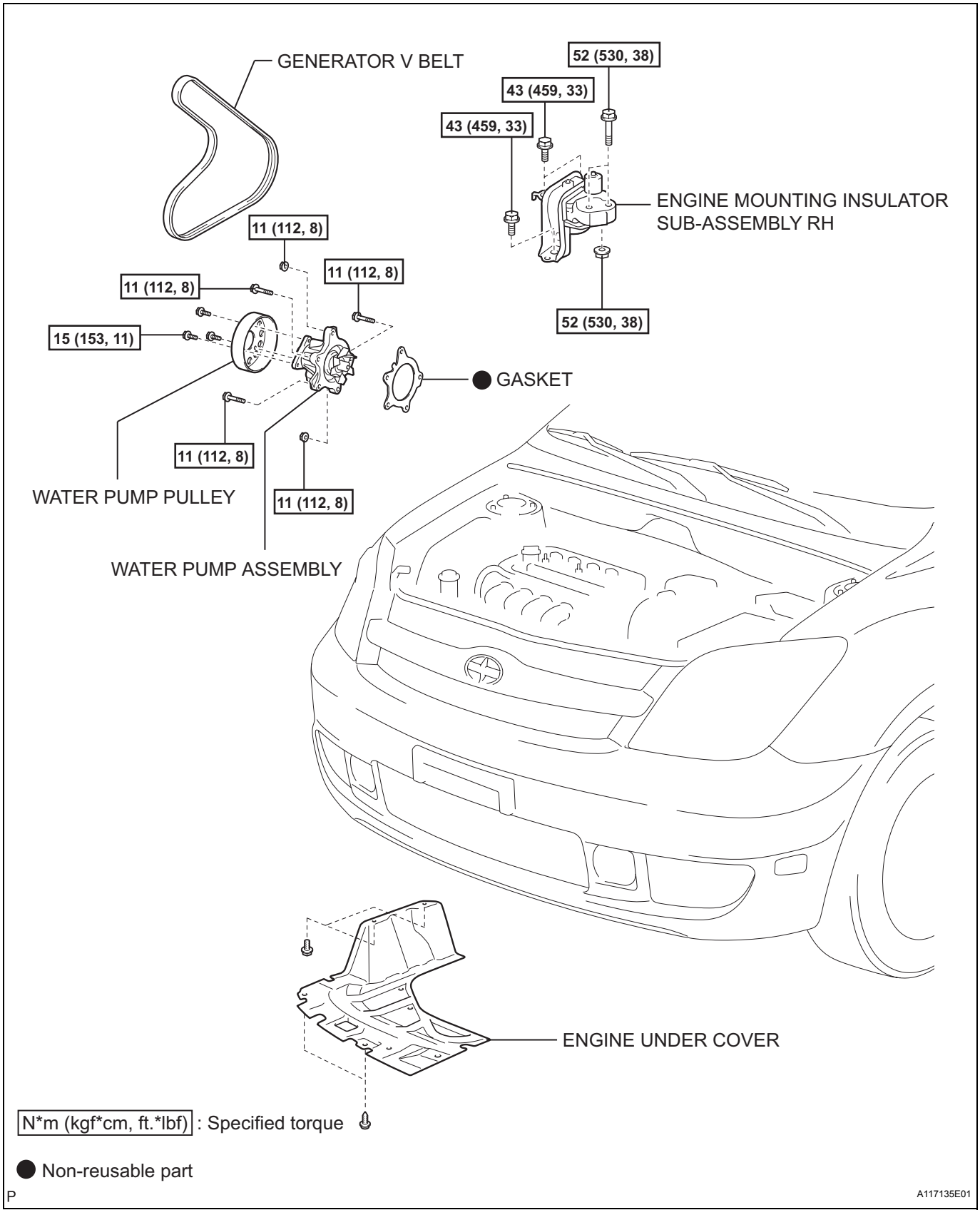
3. CHECK FOR ENGINE COOLANT LEAKS

(a) Fill the radiator with engine coolant and attach a radiator cap tester.

(b) Pump the tester to 137 kPa (1.4 kgf/cm^2, 19.9 psi) and check for leakage.

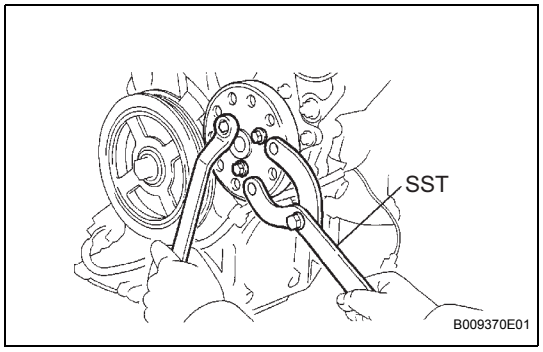
WATER PUMP

COMPONENTS

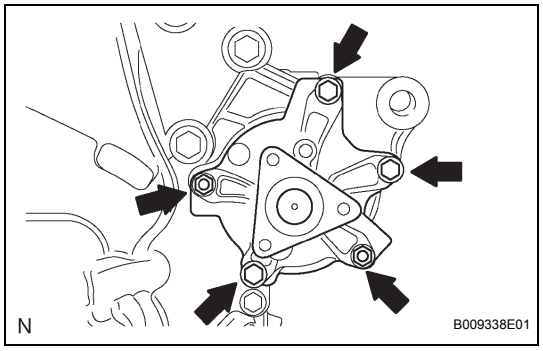


REMOVAL

1. **DRAIN ENGINE COOLANT (See page CO-5)**
2. **REMOVE GENERATOR V BELT (See page EM-7)**
3. **REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH (See page EM-27)**
4. **REMOVE WATER PUMP PULLEY**
   (a) Using SST, hold the pump pulley.
   SST 09960-10010 (09962-01000, 09963-00600)
   (b) Remove the 3 bolts and pump pulley.

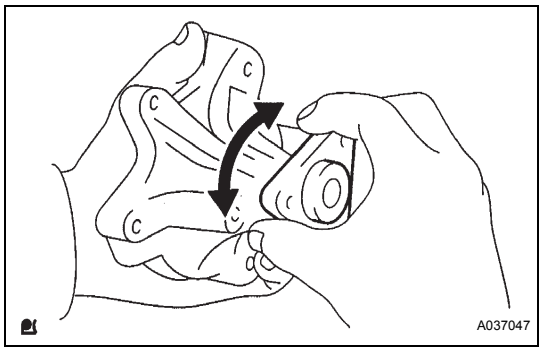


5. **REMOVE WATER PUMP ASSEMBLY**
   (a) Remove the 3 bolts and 2 nuts.
   (b) Remove the water pump and gasket.



INSPECTION

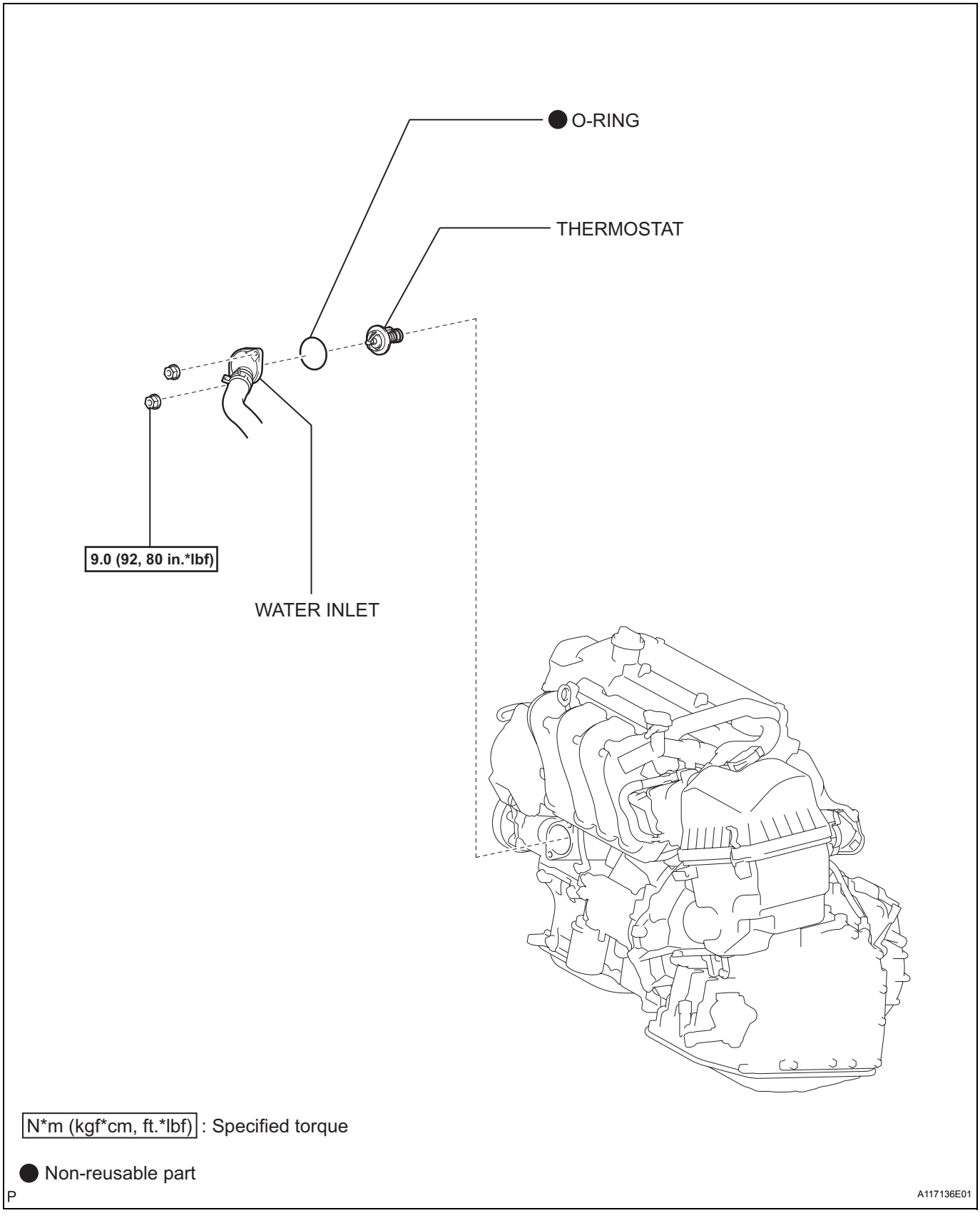
1. **INSPECT WATER PUMP ASSEMBLY**
   (a) Visually check the water hole and air hole for coolant leakage.
   If leakage is found, replace the water pump assembly.
   (b) Turn the pulley, and check that the pump bearing moves smoothly and quietly.
   If it moves roughly or noisily, replace the water pump assembly.



CO

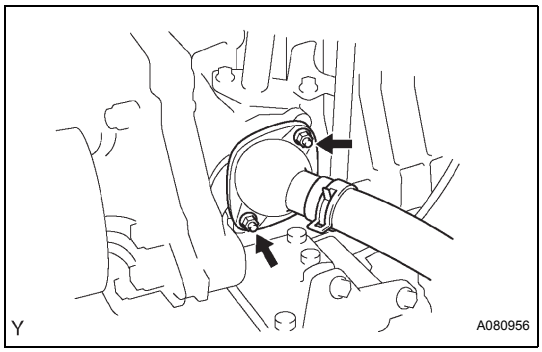
THERMOSTAT

COMPONENTS



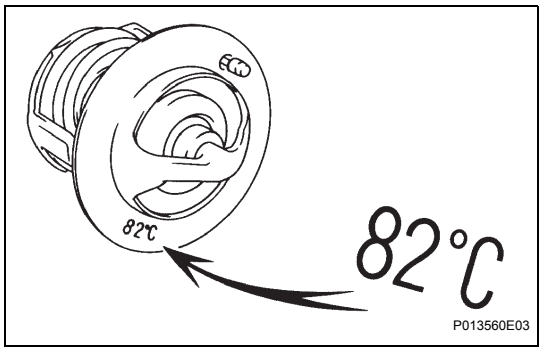
REMOVAL

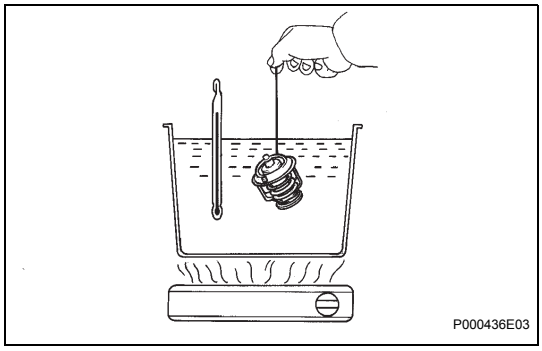
1. **DRAIN ENGINE COOLANT (See page CO-5)**
2. **REMOVE WATER INLET**
   (a) Remove the 2 nuts and disconnect the water inlet from the cylinder block.
3. **REMOVE THERMOSTAT**



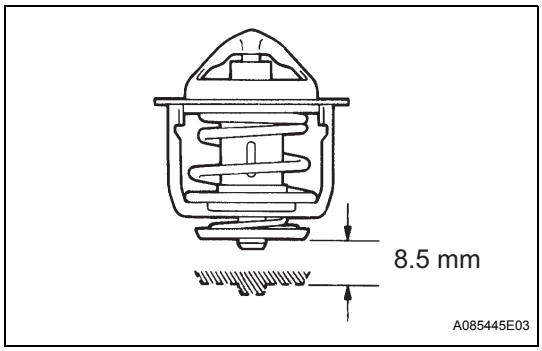
INSPECTION

1. **INSPECT THERMOSTAT**
   HINT:
   The valve opening temperature is inscribed on the thermostat.



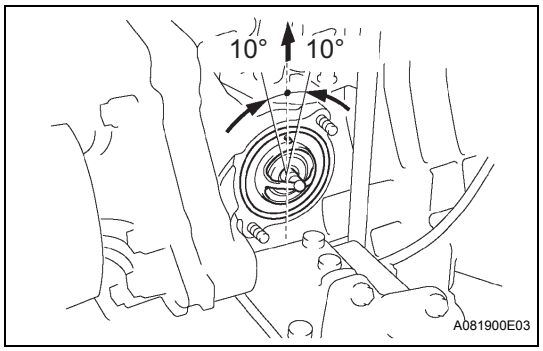


(a) Immerse the thermostat in the water and then gradually heat the water.
(b) Check the valve opening temperature of the thermostat.
Standard valve opening temperature:
80 to 84°C (176 to 183°F)
If the valve opening temperature is not as specified, replace the thermostat.



(c) Check the valve lift.
Standard valve lift:
8.5 mm (0.33 in.) or more at 95°C (203°F)
If the valve lift is not as specified, replace the thermostat.
(d) Check that the valve is fully closed when the thermostat temperature is below 77°C (171°F).
If not fully closed, replace the thermostat.

CO



INSTALLATION

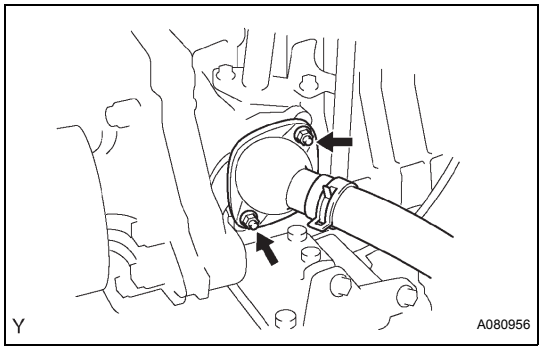
1. INSTALL THERMOSTAT

(a) Install a new gasket onto the thermostat.

(b) Install the thermostat with the jiggle valve facing upward.

HINT:

The jiggle valve may be set within 10° of either side as shown in the illustration.



2. INSTALL WATER INLET

(a) Install the water inlet to the cylinder block with the 2 nuts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

NOTICE:

Ensure that the gasket is not stuck between the water inlet and cylinder block.

3. ADD ENGINE COOLANT (See page CO-5)

4. CHECK FOR ENGINE COOLANT LEAKS (See page CO-7)

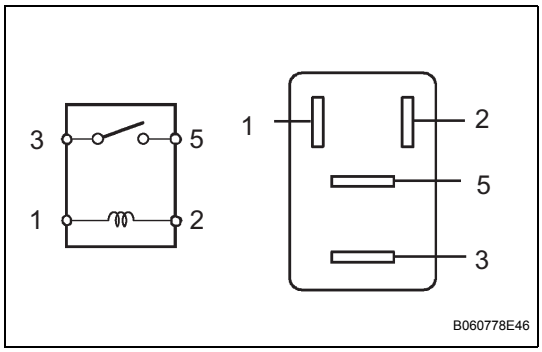
COOLING FAN RELAY

ON-VEHICLE INSPECTION

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE ENGINE ROOM RELAY BLOCK COVER**

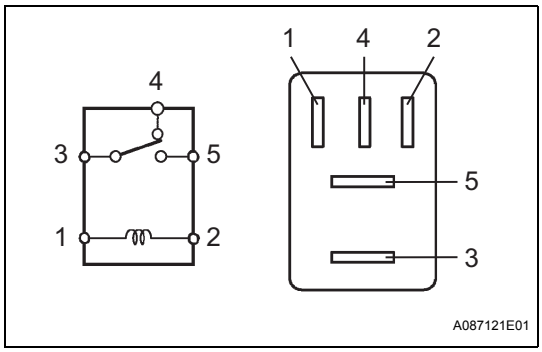
3. **INSPECT NO. 1 FAN RELAY (Marking: FAN NO. 1)**
   (a) Remove the relay from the engine room relay block.
   (b) Measure the resistance between the terminals of the relay.
   Standard resistance



Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

   If the result is not as specified, replace the relay.
   (c) Install the relay.

4. **INSPECT NO. 2 FAN RELAY (Marking: FAN NO. 2)**
   (a) Remove the relay from the engine room relay block.
   (b) Measure the resistance between each terminal of the relay.
   Standard resistance



Tester Connection	Specified Condition
3 - 4	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 4	10 kΩ or higher (when battery voltage is applied to terminals 1 and 2)
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

   If the result is not as specified, replace the relay.
   (c) Install the relay.

5. **INSTALL ENGINE ROOM RELAY BLOCK COVER**

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

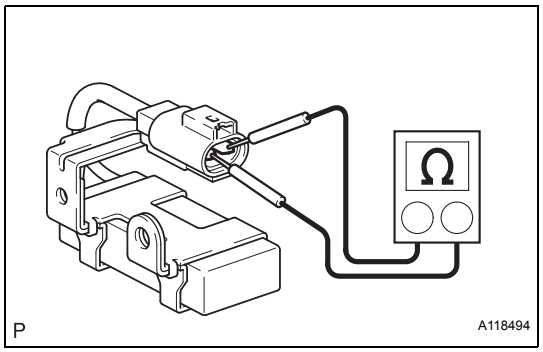
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

CO

COOLING FAN RESISTOR

ON-VEHICLE INSPECTION

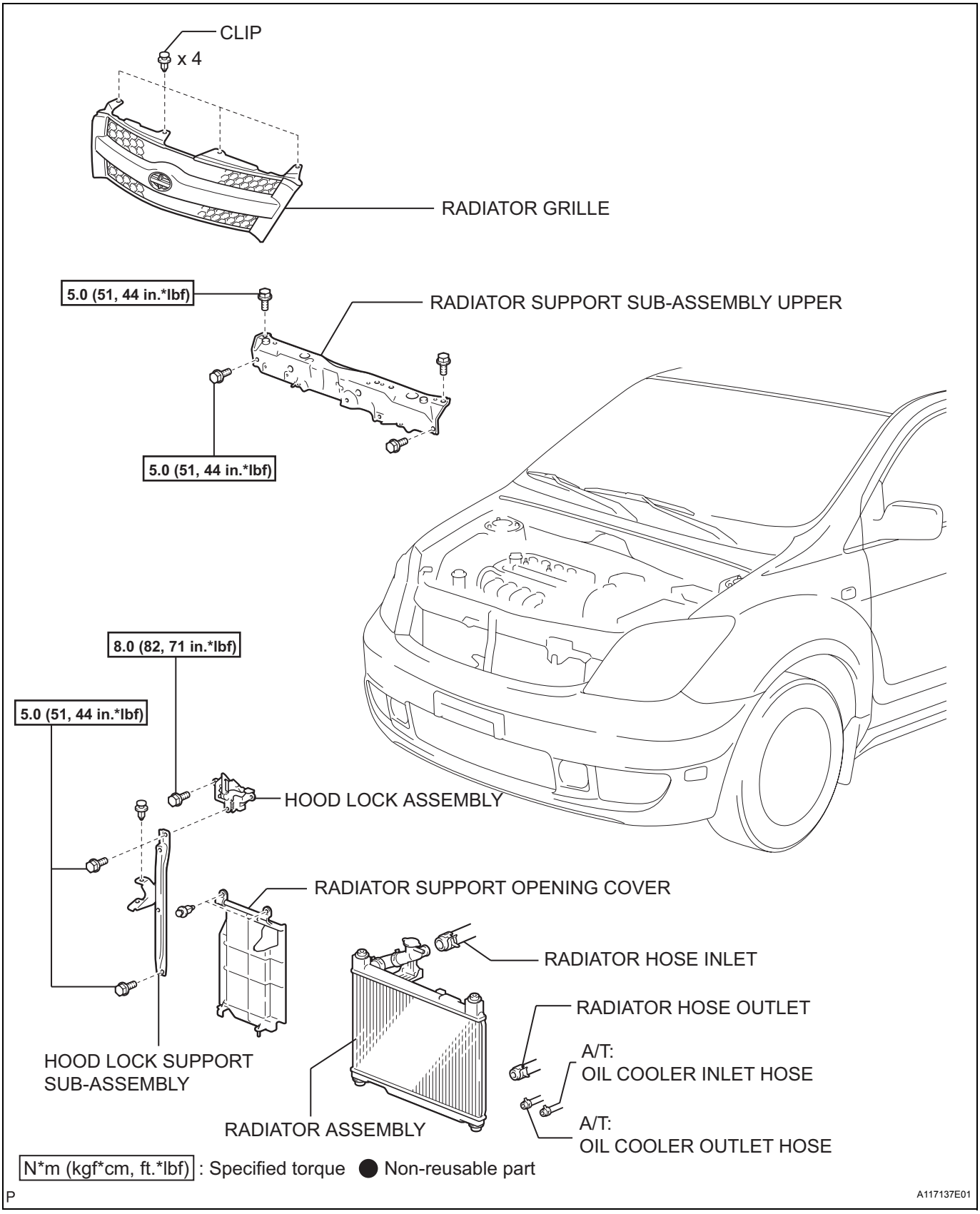
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE COOLING FAN RESISTOR**
3. **INSPECT COOLING FAN RESISTOR**
   (a) Measure the resistance between the terminals.
   Standard resistance:
   1.17 to 1.43 Ω at 20°C (68°F)
   If the result is not as specified, replace the resistor.

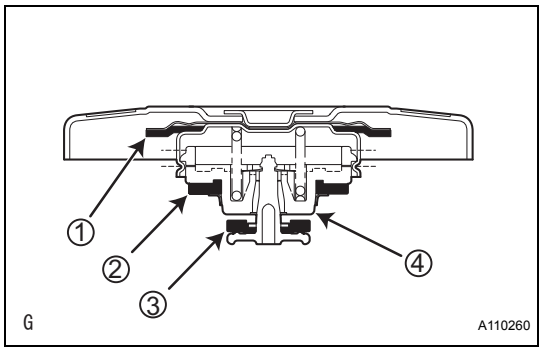


4. **INSTALL COOLING FAN RESISTOR**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

RADIATOR

COMPONENTS





ON-VEHICLE INSPECTION

1. CHECK RADIATOR CAP SUB-ASSEMBLY

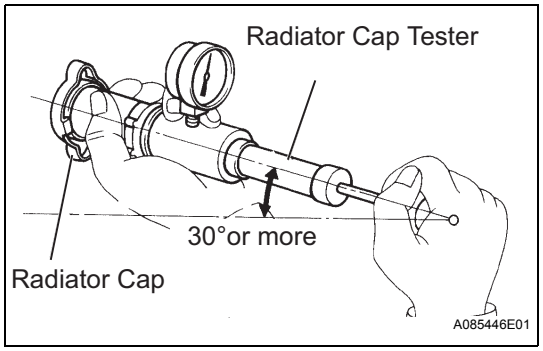
(a) Measure the valve opening pressure.

(1) If there are water stains or foreign matter on rubber packing 1, 2 or 3, clean the part(s) with water and finger scouring.

(2) Check that 1, 2 or 3 is not deformed, cracked or swollen.

(3) Check that 3 and 4 are not stuck together.

(4) Apply engine coolant to 2 and 3 before using the radiator cap tester.



(5) Pump the cap tester several times, and check the maximum pressure*.

NOTICE:

When using the cap tester, keep the tester at an angle of 30° or more above horizontal.

Pumping speed:

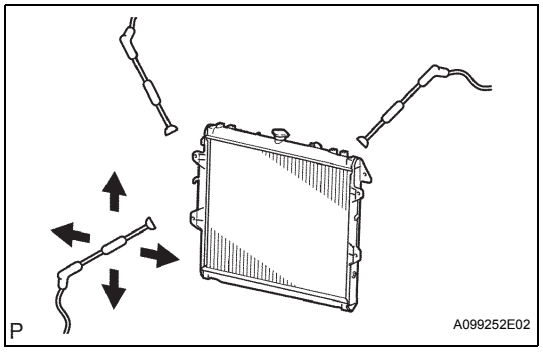
1 pump per second

*: Even if the cap cannot maintain the maximum pressure, it is not a defect.

Judgment criterion

Item	Specified Condition
Standard value (for brand-new cap)	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
Minimum standard value (after using cap)	78.5 kPa (0.8 kgf/cm^2, 11.4 psi)

If the maximum pressure is less than the minimum standard value, replace the radiator cap sub-assembly.



ON-VEHICLE CLEANING

1. CHECK FINS FOR BLOCKAGE

(a) Check that the radiator and condenser are not blocked with leaves, dirt, or insects. Clean the hose connections.

If the fins are blocked, wash them with water or a steam cleaner.

NOTICE:

- **If the distance between the steam cleaner and core is too close, the fins may be damaged.**
- **Keep the following injection distance.**

Standard injection distance

Injection Pressure	Specified Condition
2,942 to 4,903 kPa (30 to 50 kgf/cm^2, 427 to 711 psi)	300 mm (11.81 in.)
4,903 to 7,845 kPa (50 to 80 kgf/cm^2, 711 to 1,138 psi)	500 mm (19.69 in.)

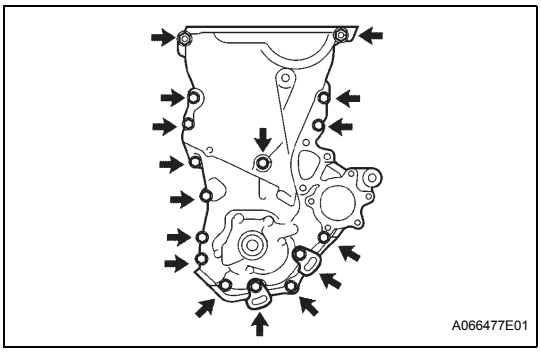
- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Never apply water directly onto the electronic components.**

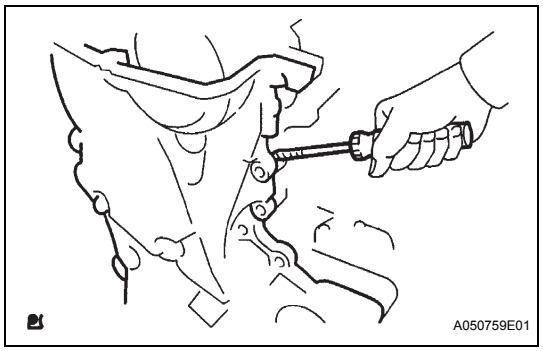
(b) Dry the fins with compressed air.

CO

REMOVAL

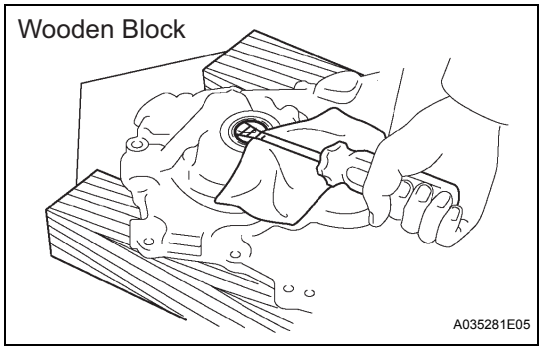
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE NO. 2 CYLINDER HEAD COVER (See page EM-25)**
4. **REMOVE IGNITION COIL (See page EM-25)**
5. **DISCONNECT VENTILATION HOSE**
6. **DISCONNECT NO. 2 VENTILATION HOSE**
7. **REMOVE CYLINDER HEAD COVER (See page EM-26)**
8. **REMOVE GENERATOR V BELT (See page EM-7)**
9. **REMOVE GENERATOR (See page CH-9)**
10. **REMOVE ENGINE UNDER COVER RH**
11. **DRAIN ENGINE OIL (See page LU-3)**
12. **DRAIN ENGINE COOLANT (See page CO-5)**
13. **REMOVE VANE PUMP V BELT (See page EM-7)**
14. **REMOVE WATER PUMP PULLEY (See page EM-91)**
15. **REMOVE WATER PUMP (See page EM-92)**
16. **REMOVE CRANKSHAFT PULLEY (See page EM-26)**
17. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page EM-27)**
18. **REMOVE CRANKSHAFT POSITION SENSOR (See page ES-338)**
19. **REMOVE ENGINE MOUNTING BRACKET INSULATOR RH (See page EM-27)**
20. **REMOVE ENGINE MOUNTING BRACKET RH (See page EM-27)**
21. **REMOVE TIMING CHAIN COVER (OIL PUMP)**
    (a) Remove the 15 bolts and nut.





(b) Using a screwdriver with its tip wrapped in tape, remove the oil pump by prying between the cylinder head and cylinder block.
NOTICE:
Be careful not to damage the contact surface of the oil pump, cylinder head and cylinder block.

(c) Remove the 2 O-rings from the cylinder block and No. 1 oil pan.



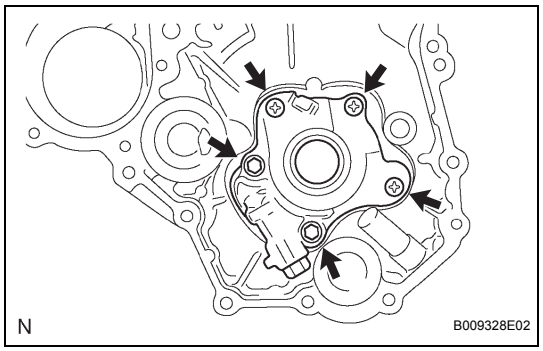
DISASSEMBLY

1. REMOVE OIL PUMP SEAL

(a) Using a screwdriver, remove the oil seal.
HINT:
Tape the screwdriver tip before use.

2. REMOVE OIL PUMP RELIEF VALVE

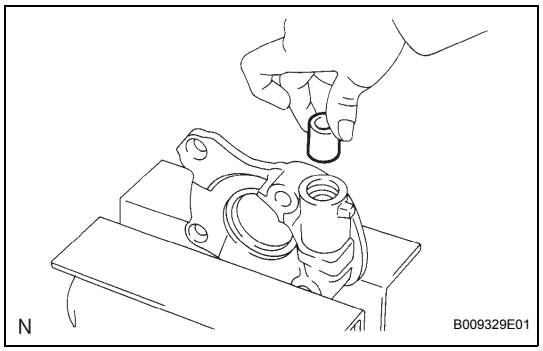
(a) Remove the plug, spring and relief valve.



3. REMOVE OIL PUMP

(a) Remove the 2 bolts, 3 screws and oil pump cover.

(b) Remove the oil pump rotor set.
NOTICE:
Do not change the arrangement or turn over the 2 removed rotors.



INSPECTION

1. INSPECT OIL PUMP RELIEF VALVE

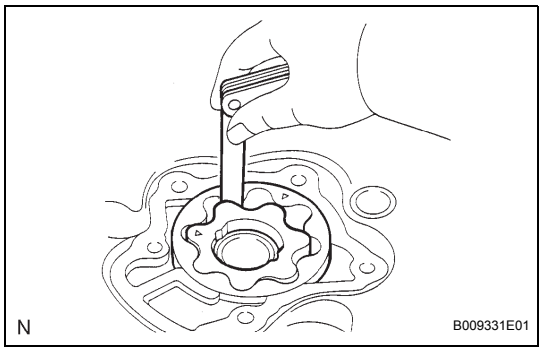
(a) Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

2. INSPECT OIL PUMP

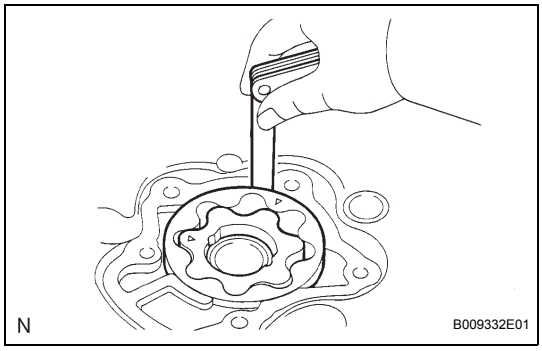
(a) Inspect the oil pump rotor set.

(1) Coat the oil pump rotor set with engine oil and place it into the oil pump body. Check that the rotors revolve smoothly.
If the condition is not as specified, replace the timing chain cover (oil pump).

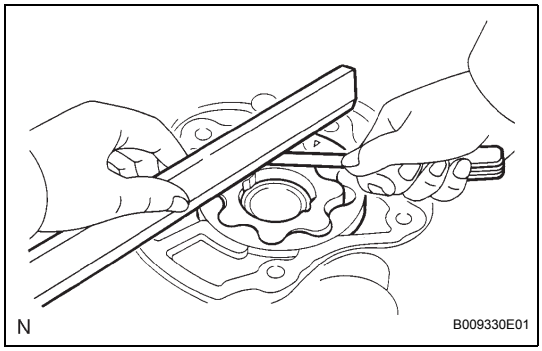
LU



(b) Inspect the rotor tip clearance.
(1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.
Standard tip clearance:
0.060 to 0.180 mm (0.0024 to 0.0071 in.)
Maximum tip clearance:
0.28 mm (0.0110 in.)
If the tip clearance is greater than the maximum, replace the timing chain cover (oil pump).



(c) Inspect the rotor body clearance.
(1) Using a feeler gauge, measure the clearance between the driven rotor and the oil pump body.
Standard body clearance:
0.250 to 0.325 mm (0.0098 to 0.0128 in.)
Maximum body clearance:
0.425 mm (0.0167 in.)
If the body clearance is greater than the maximum, replace the timing chain cover (oil pump).

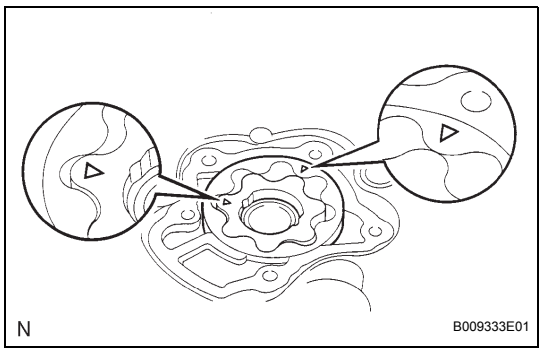


(d) Inspect the rotor side clearance.
(1) Using a feeler gauge and precision straightedge, measure the clearance between the rotors and precision straightedge.
Standard side clearance:
0.03 to 0.09 mm (0.0012 to 0.0035 in.)
Maximum side clearance:
0.15 mm (0.0059 in.)
If the side clearance is greater than the maximum, replace the timing chain cover (oil pump).

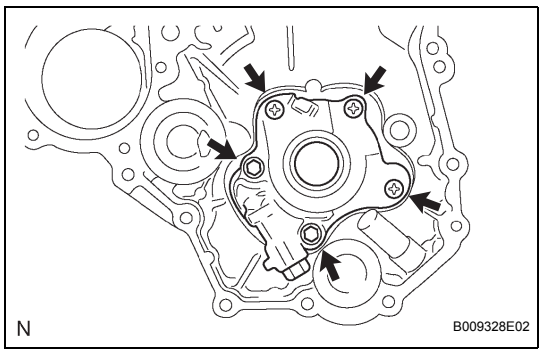
REASSEMBLY

1. INSTALL OIL PUMP

(a) Install the oil pump rotor set.
(1) Coat the oil pump rotor set with engine oil and place it into the pump body with the marks facing the pump body cover side.

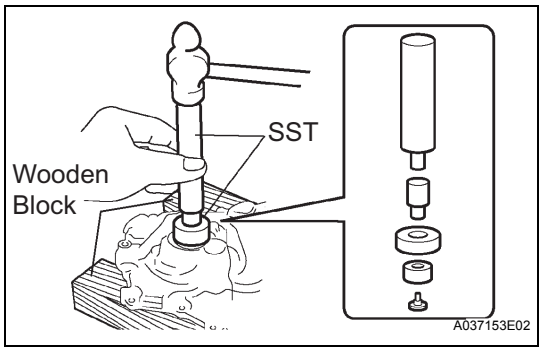


(b) Install the oil pump cover with the 2 bolts and 3 screws.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf) for bolt
10 N*m (102 kgf*cm, 7.6 ft.*lbf) for screw



2. INSTALL OIL PUMP RELIEF VALVE

(a) Coat the relief valve with engine oil and insert the relief valve and spring into the pump body hole.
(b) Install the relief valve plug.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)



3. INSTALL OIL PUMP SEAL

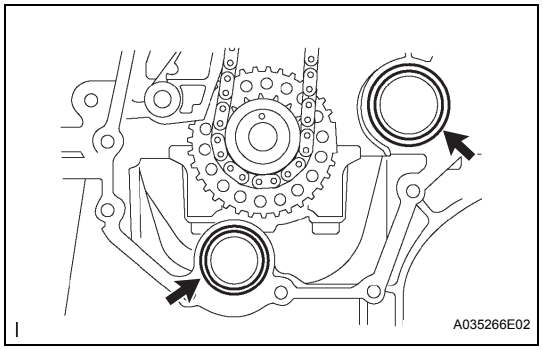
(a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.

SST 09950-60010 (09951-00250, 09951-00380, 09952-06010), 09950-70010 (09951-07100)

NOTICE:

- **Be careful not to tap the oil seal at an angle.**
- **Keep the lip free of foreign objects.**

(b) Apply multi-purpose grease to the lip of the oil seal.



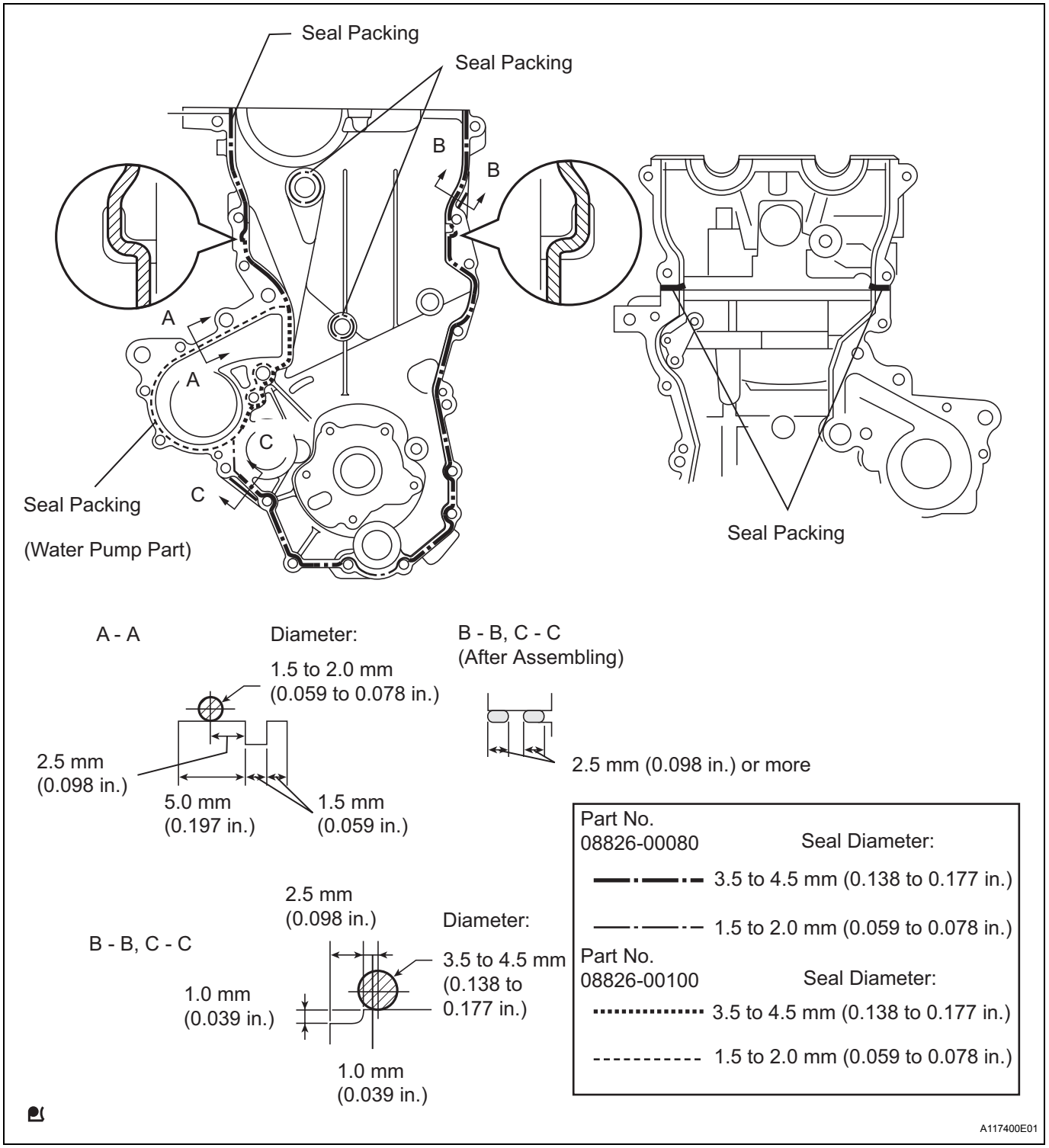
INSTALLATION

1. INSTALL TIMING CHAIN COVER (OIL PUMP)

(a) Install 2 new O-rings onto the 2 locations as shown in the illustration.

(b) Remove any old packing material from the contact surface.

(c) Apply seal packing to the timing chain cover, cylinder head and cylinder block as shown in the illustration.

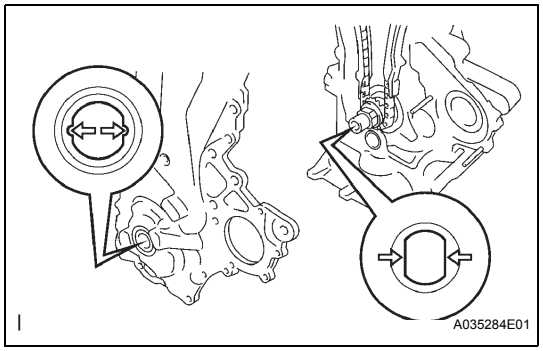


Seal packing:
Water pump part: Part No. 08826-00100 or equivalent
Other part: Part No. 08826-00080 or equivalent

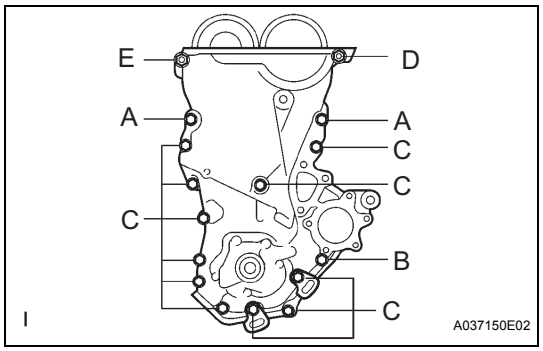
NOTICE:

- **Remove any oil from the contact surface.**

- **Install the oil pump within 3 minutes of applying seal packing.**
- **Do not expose the seal to engine oil for at least 2 hours after the installation.**



(d) Align the keyway of the oil pump drive rotor with the rectangular portion of the crankshaft, and slide the oil pump into place.



(e) Install the timing chain cover with the 15 bolts and nut. Tighten the bolts and nut uniformly in several steps.

Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf) for bolt A
11 N*m (112 kgf*cm, 8.1 ft.*lbf) for bolt B
11 N*m (112 kgf*cm, 8.1 ft.*lbf) for bolt C
24 N*m (245 kgf*cm, 18 ft.*lbf) for bolt D
24 N*m (245 kgf*cm, 18 ft.*lbf) for nut E

NOTICE:
After installing the oil pump assembly, the mounting bracket and water pump must be installed within 15 minutes.

HINT:
Each bolt length is as follows.
30 mm (1.18 in.) for bolt A
35 mm (1.38 in.) for bolt B
20 mm (0.79 in.) for bolt C
20 to 14 mm (0.79 to 0.55 in.) for bolt D

2. **INSTALL WATER PUMP (See page EM-120)**
3. **INSTALL ENGINE MOUNTING BRACKET RH (See page EM-29)**
4. **INSTALL ENGINE MOUNTING BRACKET INSULATOR RH (See page EM-30)**
5. **INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page EM-30)**
6. **INSTALL CRANKSHAFT POSITION SENSOR (See page ES-339)**
7. **INSTALL WATER PUMP PULLEY (See page EM-121)**
8. **INSTALL CRANKSHAFT PULLEY (See page EM-30)**
9. **INSTALL CYLINDER HEAD COVER (See page EM-30)**
10. **CONNECT NO. 2 VENTILATION HOSE**
11. **CONNECT VENTILATION HOSE**

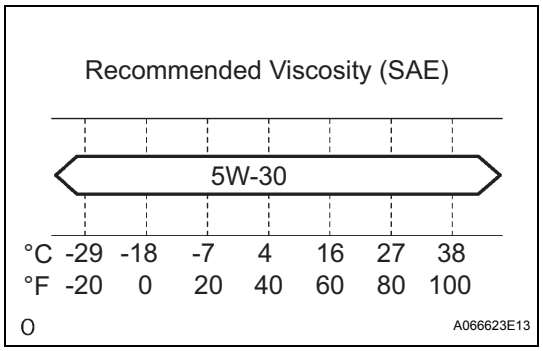
12. **INSTALL IGNITION COIL (See page EM-31)**
13. **INSTALL NO. 2 CYLINDER HEAD COVER (See page EM-31)**
14. **INSTALL GENERATOR (See page CH-15)**
15. **INSTALL VANE PUMP V BELT (See page EM-7)**
16. **INSTALL GENERATOR V BELT (See page EM-7)**
17. **ADJUST GENERATOR V BELT (See page EM-7)**
18. **ADJUST VANE PUMP V BELT (See page EM-7)**
19. **INSPECT DRIVE BELT TENSION (See page EM-6)**
20. **INSTALL FRONT WHEEL RH**
21. **INSTALL OIL PAN DRAIN PLUG**
    (a) Clean and install the drain plug with a new gasket.
    Torque: 37.5 N*m (382 kgf*cm, 28 ft.*lbf)
22. **ADD ENGINE OIL (See page LU-3)**
23. **CHECK FOR ENGINE OIL LEAKS**
24. **ADD ENGINE COOLANT (See page CO-5)**
25. **CHECK FOR COOLANT LEAKS (See page CO-7)**
26. **INSTALL ENGINE UNDER COVER RH**
27. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
28. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

LUBRICATION SYSTEM

ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

(a) Warm up the engine, stop the engine and wait for 5 minutes. The oil level should be between the dipstick's low and full level marks.
If the oil level is low, check for leakage and add oil up to the full level mark.
NOTICE:
Do not add engine oil above the full level mark.



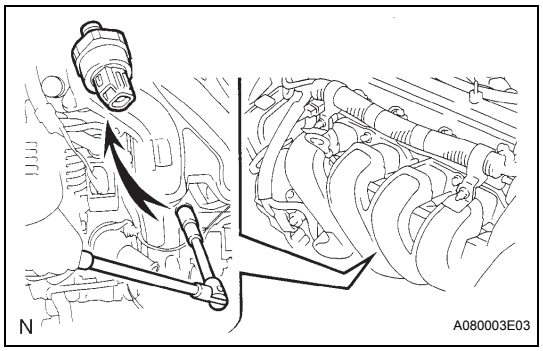
2. CHECK ENGINE OIL QUALITY

(a) Check the oil for deterioration, water contamination, discoloring or thinning.
If the quality is visibly poor, replace the oil.
Oil grade:
ILSAC multigrade engine oil is recommended. SAE 5W-30 is the best choice for this vehicle for good fuel economy and good starting in cold weather.
If SAE 5W-30 is not available, SAE 10W-30 may be used. However, it should be replaced with SAE 5W-30 at the next oil change.

LU

3. CHECK OIL PRESSURE

(a) Disconnect the oil pressure switch connector.

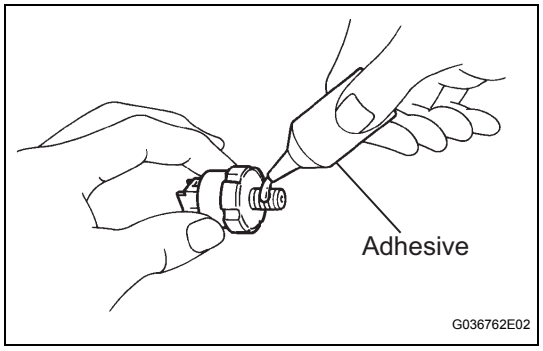


(b) Using a 24 mm deep socket wrench, remove the oil pressure switch.
(c) Install an oil pressure gauge.
(d) Warm up the engine.
(e) Check the oil pressure under the following conditions.
Standard oil pressure

Condition	Specified Condition
Idle	29 kPa (0.3 kgf/cm^2, 4.2 psi) or more
3,000 rpm	150 to 550 kPa (1.5 to 5.6 kgf/cm^2, 22 to 80 psi) or more

(f) Remove the oil pressure gauge.

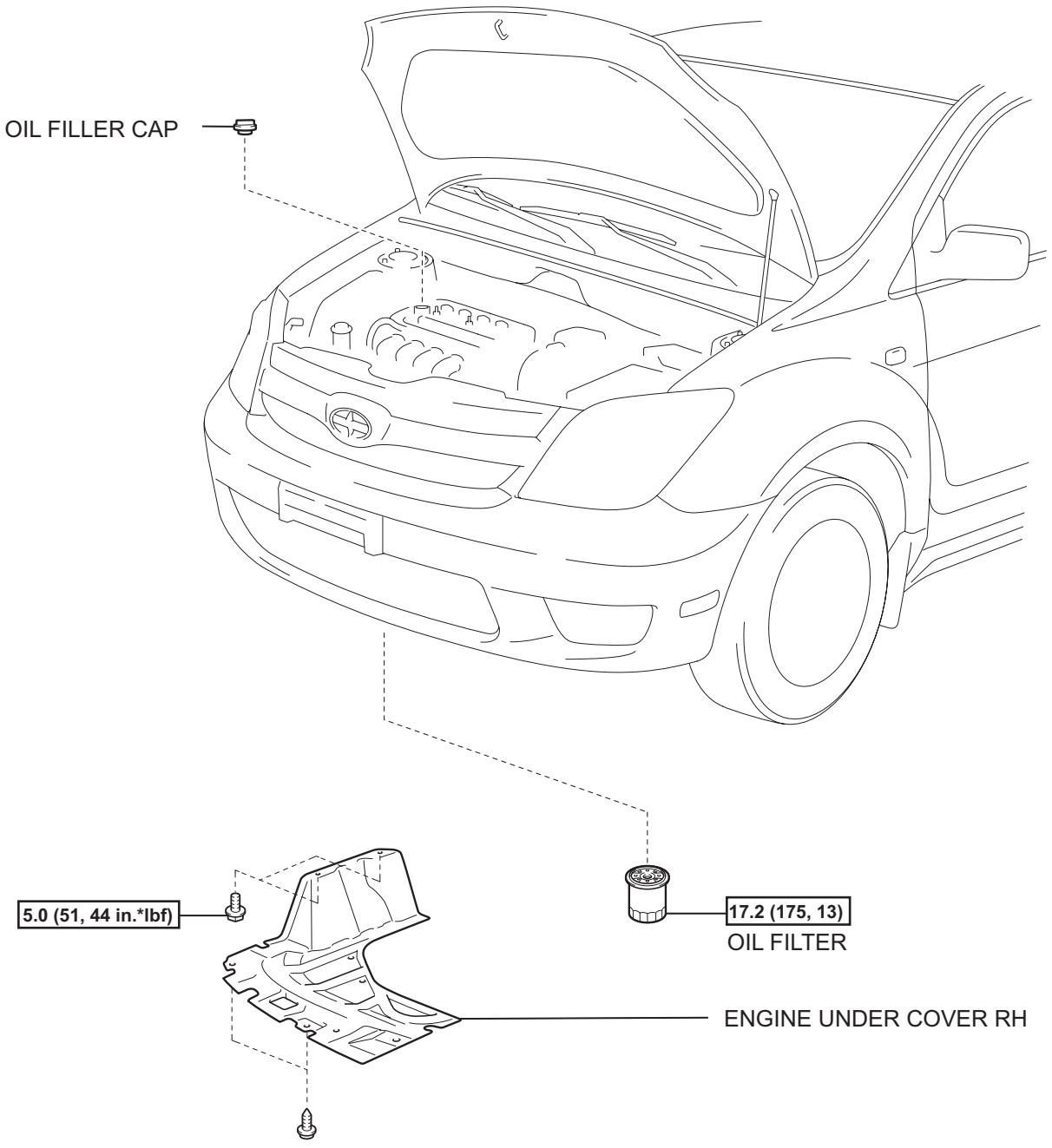
4. INSTALL OIL PRESSURE SWITCH



(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
(b) Using a 24 mm deep socket wrench, install the oil pressure switch.
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)
NOTICE:
Do not start the engine for at least 1 hour after installation of the switch.
(c) Connect the oil pressure switch connector.
(d) Start the engine and check for engine oil leaks.

OIL FILTER

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

T

A116737E01

REPLACEMENT

CAUTION:

- **Prolonged and repeated contact with mineral oil will result in the loss of natural oil from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Wear protective clothing and gloves. Avoid contact with used oil. If contact occurs, wash the area thoroughly with soap and waterless hand cleaner. Never use gasoline, thinners, or solvents to wash the skin.**
- **In order to protect the environment, dispose of used oil and used oil filters at designated disposal sites only.**

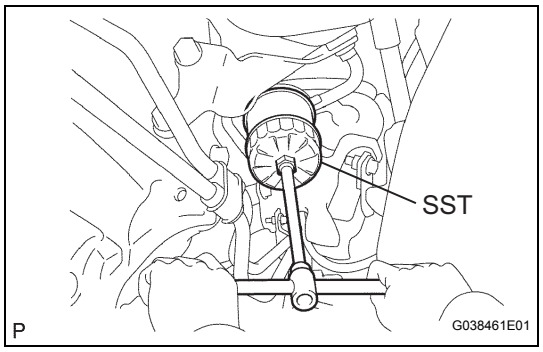
1. DRAIN ENGINE OIL

(a) Remove the oil filler cap.

(b) Remove the oil drain plug and drain the oil into a container.

2. REMOVE OIL FILTER

(a) Using SST, remove the oil filter.
SST 09228-06501



3. INSTALL OIL FILTER

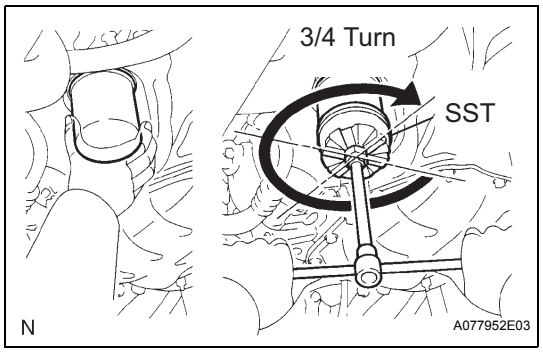
(a) Check and clean the oil filter installation surface.

(b) Apply clean engine oil to the gasket of a new oil filter.

(c) Lightly screw the oil filter into place by hand. Tighten it until the gasket contacts the seat.

(d) Using SST, tighten the oil filter.
SST 09228-06501

(1) Depending on the work space available, choose from the following.
If enough space is available, use a torque wrench to tighten the oil filter.
Torque: 17.2 N*m (175 kgf*cm, 13 ft.*lbf)
If enough space is not available to use a torque wrench, tighten the oil filter a 3/4 turn by hand or use a common wrench.



4. ADD ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 37.5 N*m (382 kgf*cm, 28 ft.*lbf)

(b) Add fresh engine oil.
Standard capacity

Item	Specified Condition
Drain and refill with oil filter change	3.7 liters (3.9 US qts, 3.3 Imp. qts)
Drain and refill without oil filter change	3.4 liters (3.6 US qts, 3.0 Imp. qts)

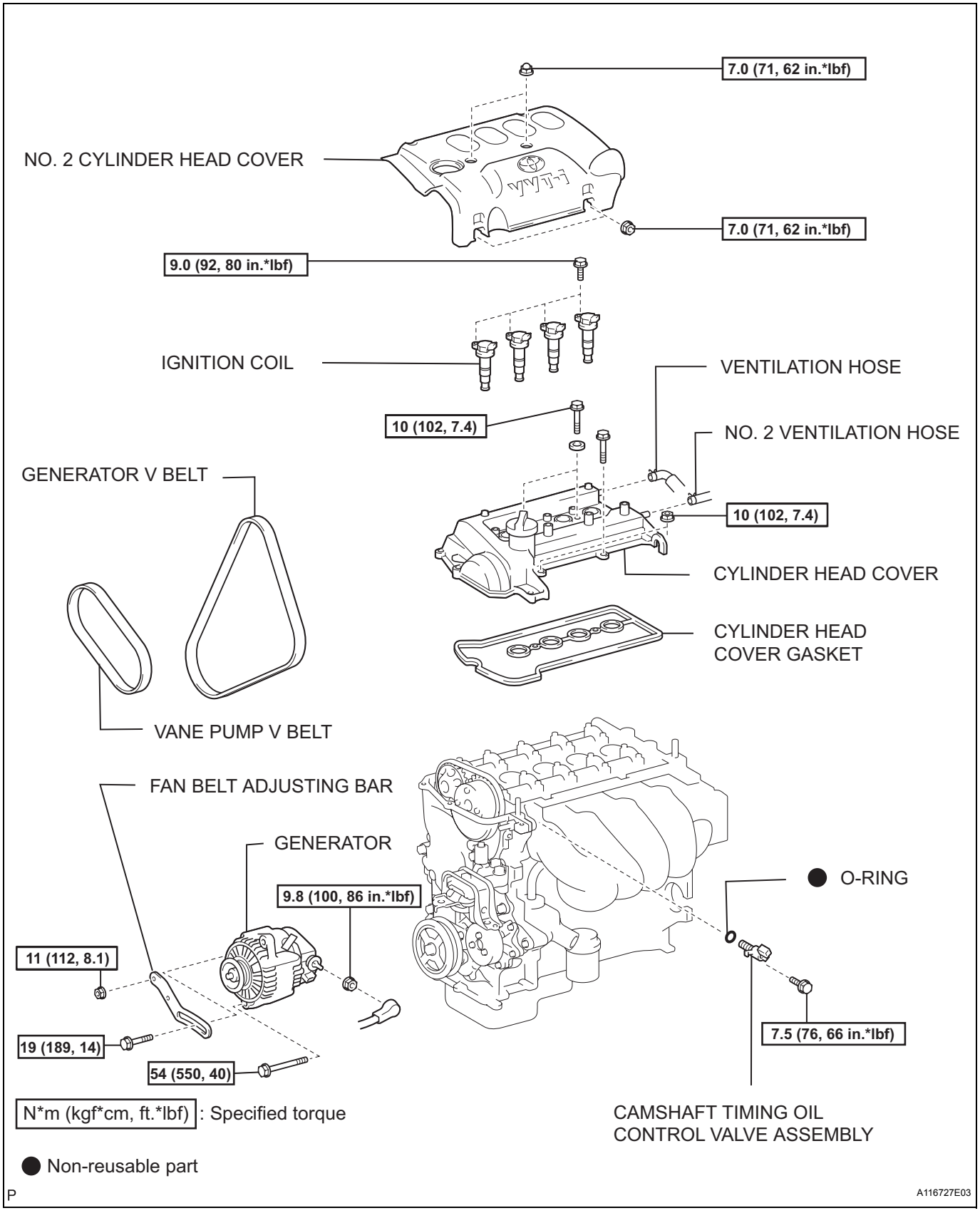
Item	Specified Condition
Dry fill	4.1 liters (4.3 US qts, 3.6 Imp. qts)

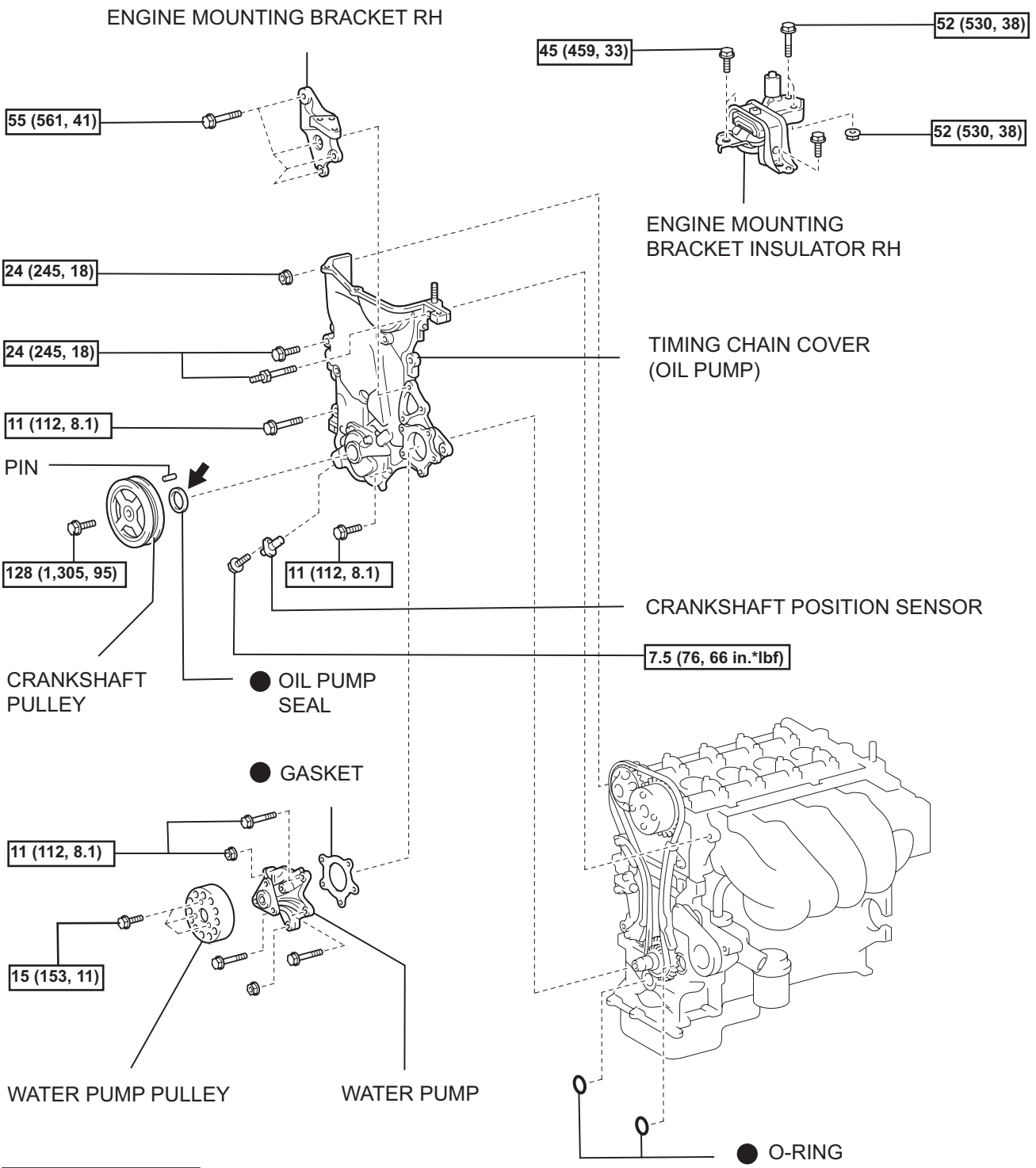
(c) Install the oil filler cap.

5. CHECK FOR ENGINE OIL LEAKS

OIL PUMP

COMPONENTS





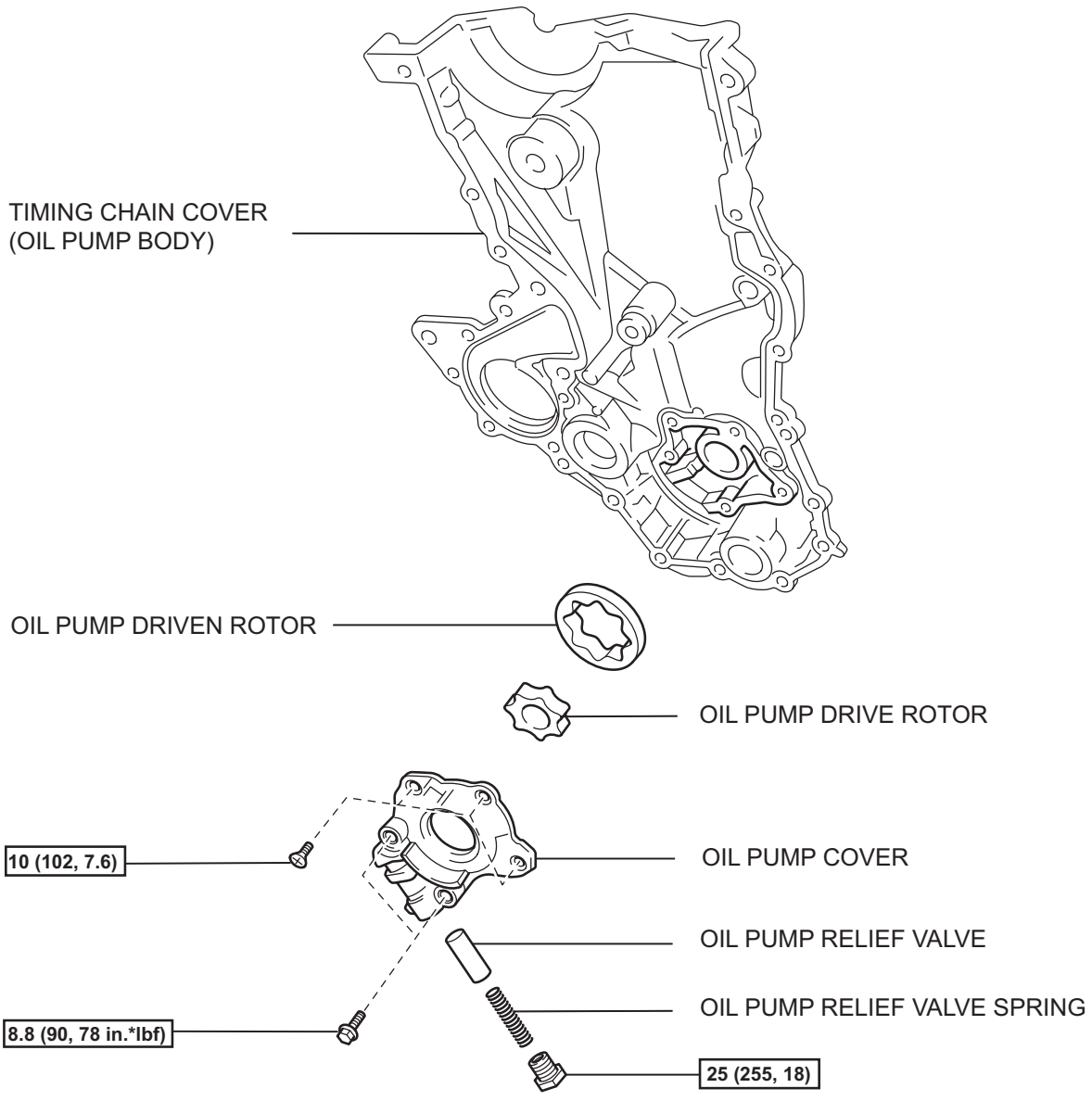
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

← Apply multi-purpose grease

P

A116732E01



N*m (kgf*cm, ft.*lbf) : Specified torque

Y

A116724E01

LU

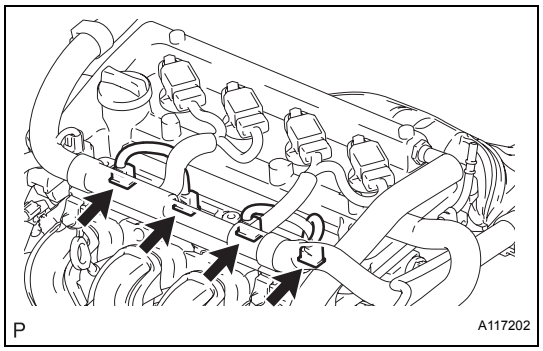
ON-VEHICLE INSPECTION

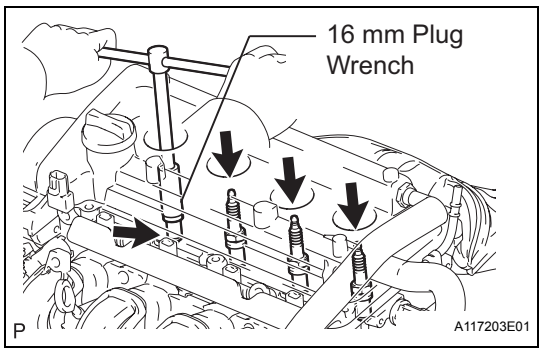
NOTICE:
In this section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

1. INSPECT IGNITION COIL ASSEMBLY AND SPARK TEST

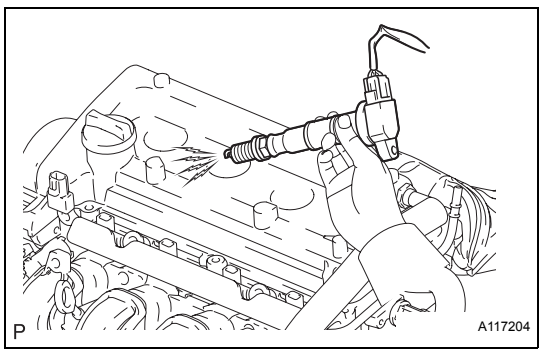
(a) Check for DTCs.
NOTICE:
If a DTC is present, perform troubleshooting in accordance with the procedure for that DTC.

(b) Check that sparks occur.
(1) Remove the No. 1 engine cover.
(2) Remove the ignition coil.
(3) Disconnect the 4 fuel injector connectors.





(4) Using a 16 mm plug wrench, remove the 4 spark plugs.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



(5) Install each spark plug into an ignition coil, then connect the ignition coil connectors.
(6) Ground the spark plugs.
(7) Check that a spark occurs at each spark plug while the engine is being cranked.
NOTICE:
- **Be sure to ground the spark plugs when checking.**
- **If the ignition coil has been struck or dropped, replace it.**
- **Do not crank the engine for more than 2 seconds.**

If spark do not occur, perform the following procedure.

(c) Spark test flow chart.

(1) Check that the wire harness side connector of the ignition coil is securely connected.

Result

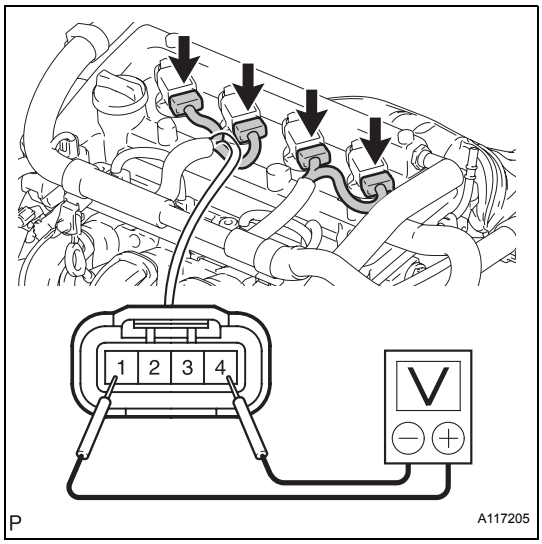
Result	Proceed to
NG	Connect securely
OK	Go to next step

(2) Perform spark test on each ignition coil.

1. Replace ignition coil with a normal one.
2. Perform spark test again.

Result

Result	Proceed to
OK	Replace ignition coil
NG	Go to next step



(3) Check power supply to ignition coil.

1. Disconnect the ignition coil connector.
2. Turn the ignition switch to ON.
3. Using a voltmeter, measure the voltage between the terminals.

Standard voltage

Tester Connection	Specified Condition
1 (+B) - 4 (GND)	9.0 to 14 V

Result

Result	Proceed to
NG	Check wire harness and connector (Between power switch and ignition coil assembly)
OK	Go to next step

(4) Check resistance of camshaft position sensor.

Standard resistance

Temperature	Specified Condition
Cold	1,630 to 2,740 Ω
Hot	1,060 to 1,645 Ω

Result

Result	Proceed to
NG	Replace camshaft position sensor
OK	Go to next step

(5) Check resistance of crankshaft position sensor.

Standard resistance

Temperature	Specified Condition
Cold	985 to 1,600 Ω
Hot	1,265 to 1,890 Ω

Result

Result	Proceed to
NG	Replace crankshaft position sensor
OK	Go to next step

IG

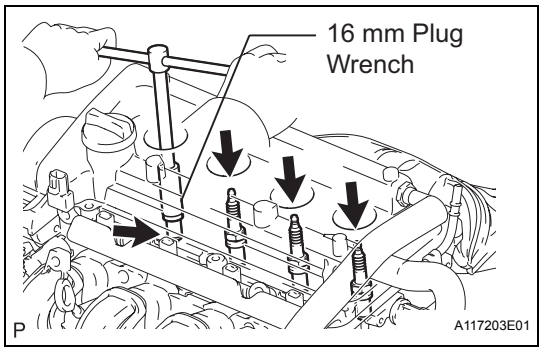
(6) Check IGT signal from ECM.
Result

Result	Proceed to
NG	Replace ECM
OK	Repair wire harness or connector (Between ignition coil assembly and ignition switch)

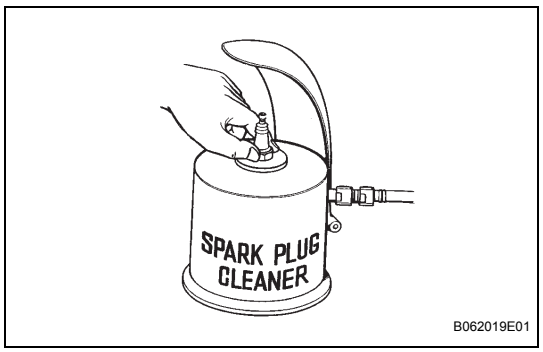
2. INSPECT SPARK PLUG

(a) Remove the ignition coils (see page IG-7).

(b) Using a 16 mm plug wrench, remove the 4 spark plugs.

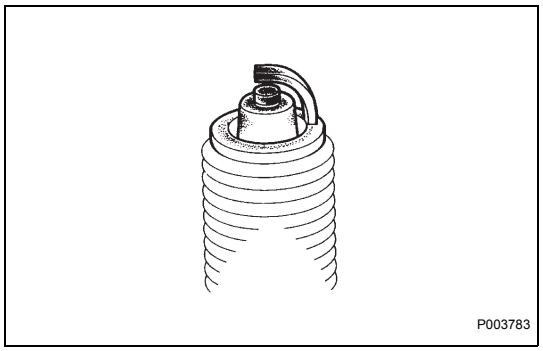


(c) Clean the spark plugs.
If the electrode has traces of wet carbon, clean the electrode with a spark plug cleaner and then dry it.
Standard air pressure:
588 kPa (6 kgf/cm^2, 85 psi)
Standard duration:
20 seconds or less



(d) Check the spark plug for any damage on its threads and insulator.
If there is damage, replace the spark plug. If not, reinstall the spark plug.
Recommended spark plug

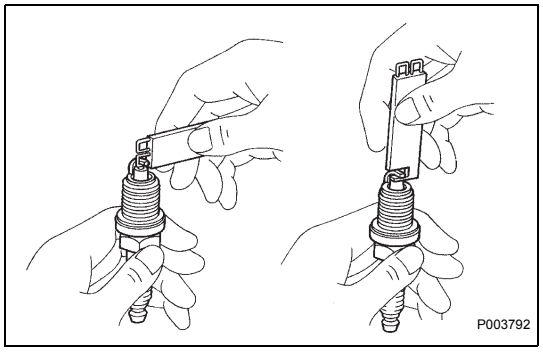
Manufacturer	Product
DENSO	K16R-U
NGK	BKR5EYA



(e) Inspect and adjust the electrode gap.
Standard electrode gap:
0.7 to 0.8 mm (0.028 to 0.031 in.)

(f) Using a 16 mm plug wrench, intall the 4 spark plugs.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

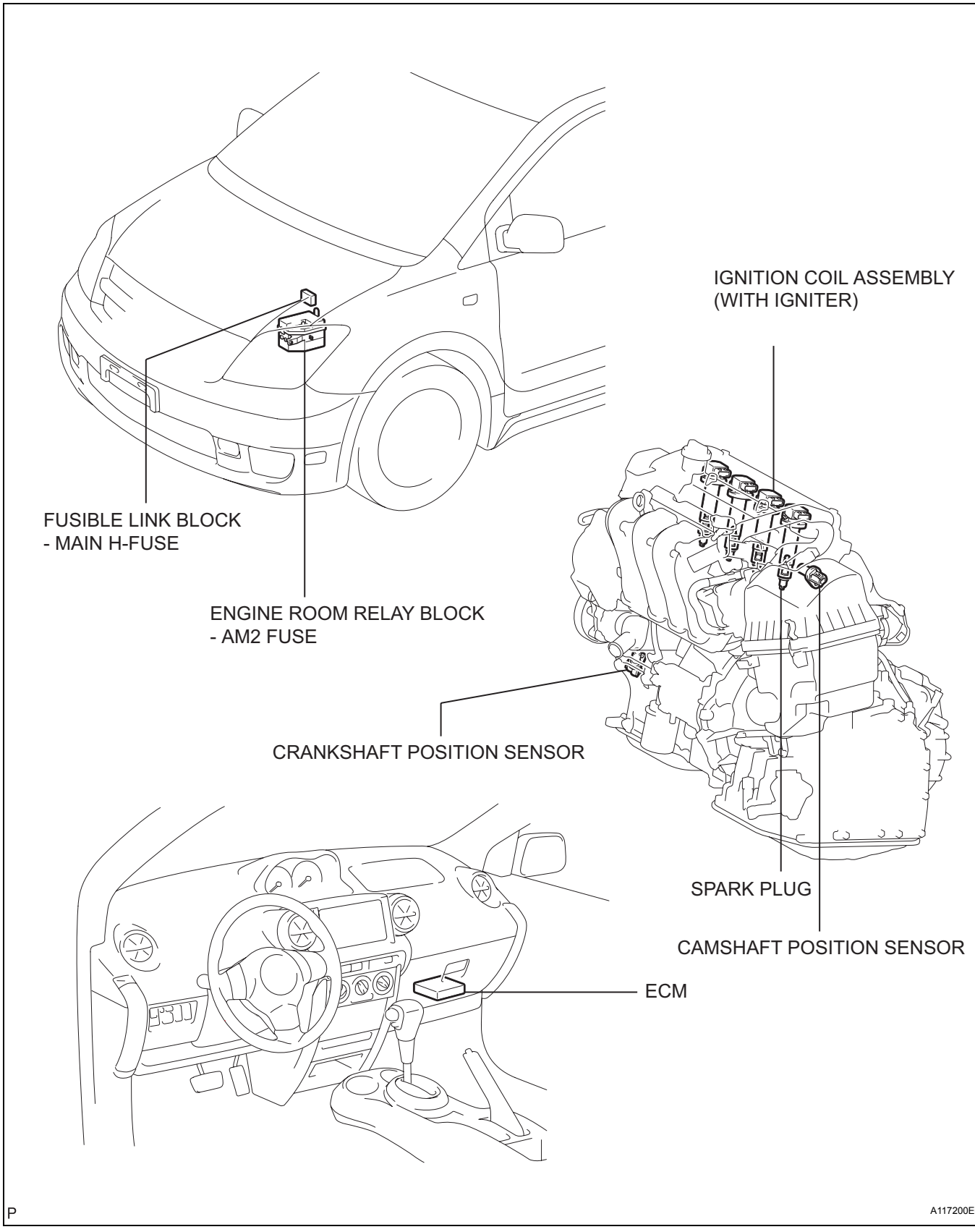
(g) Install the ignition coils (see page IG-7).



IG

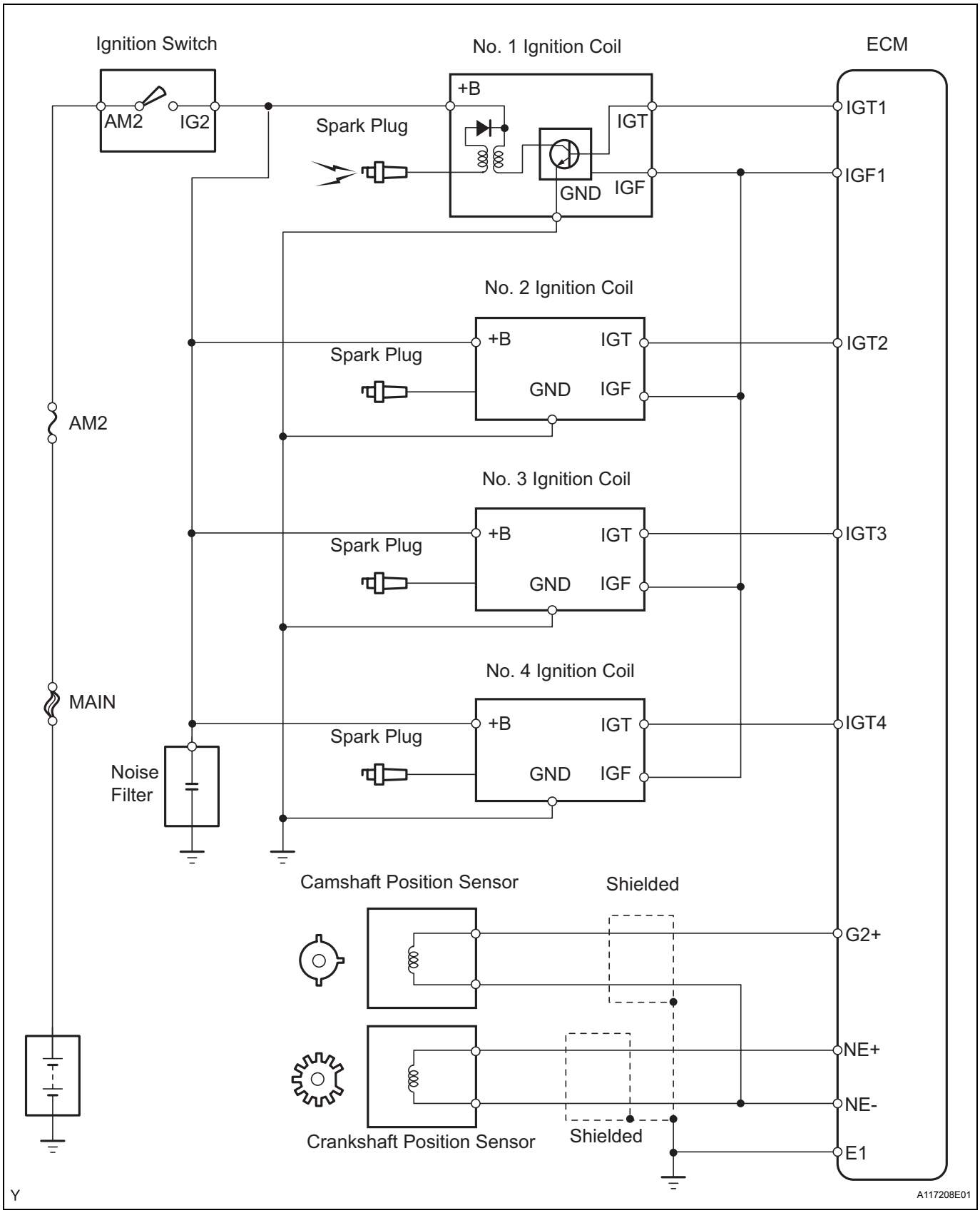
IGNITION SYSTEM

PARTS LOCATION



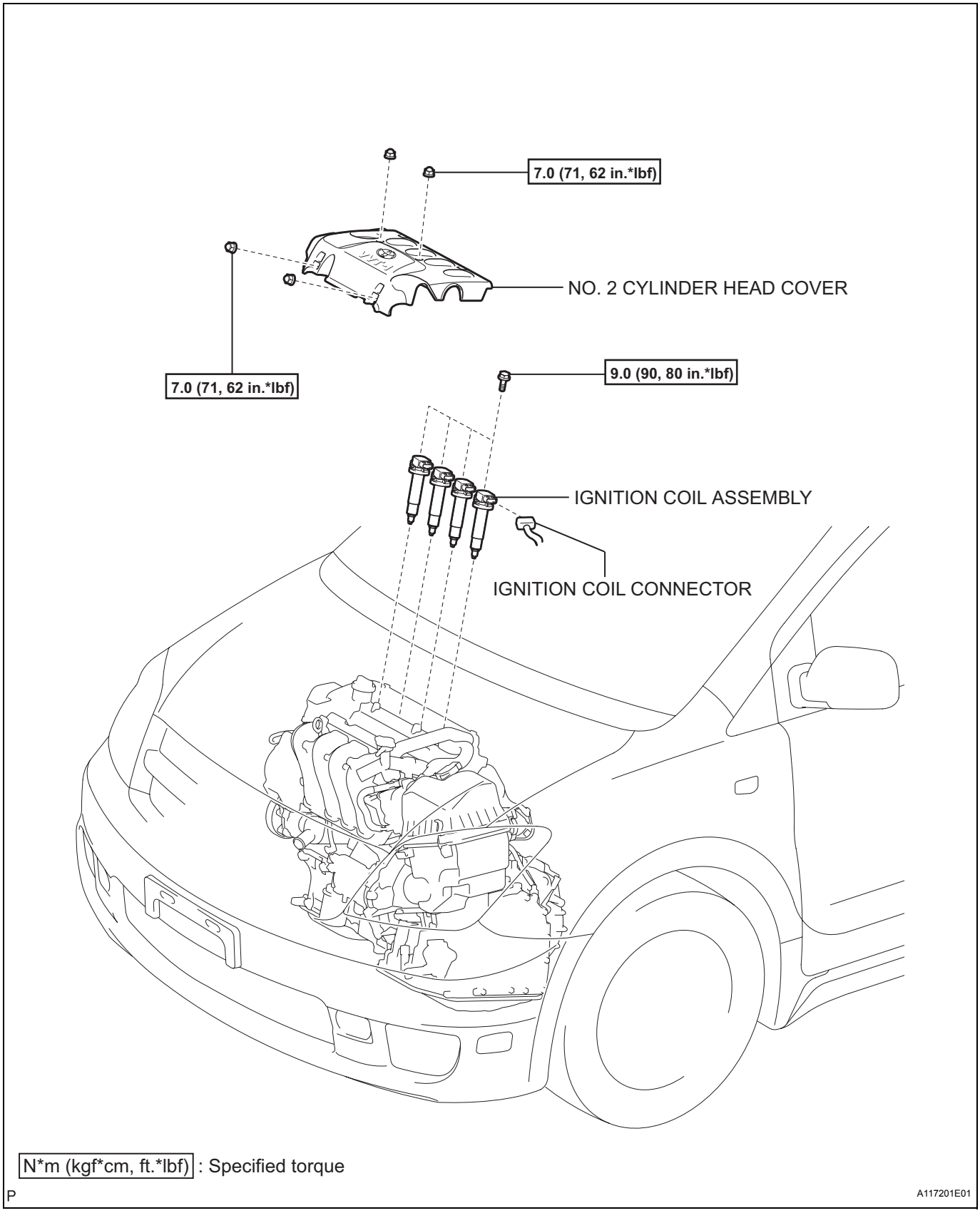
IG

SYSTEM DIAGRAM



IGNITION COIL

COMPONENTS



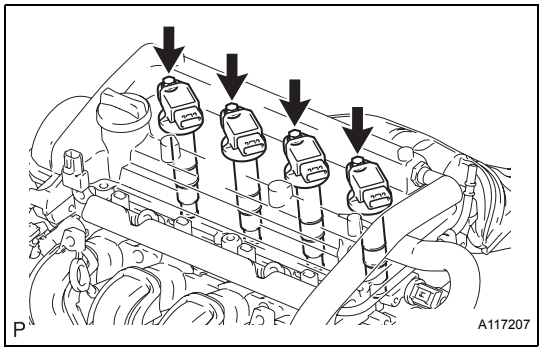
N*m (kgf*cm, ft.*lbf) : Specified torque

P

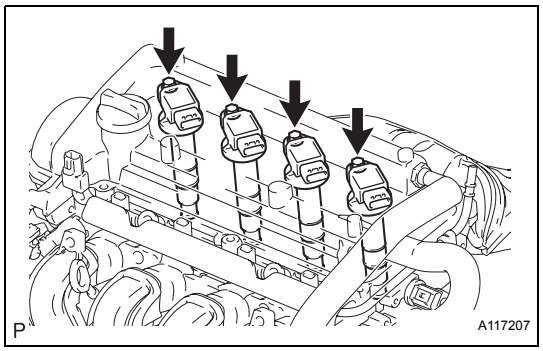
A117201E01

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 2 CYLINDER HEAD COVER**
   (a) Remove the 4 cap nuts and head cover.
3. **REMOVE IGNITION COIL ASSEMBLY**
   (a) Disconnect the 4 ignition coil connectors.
   (b) Remove the 4 bolts and pull out the 4 ignition coils.



INSTALLATION

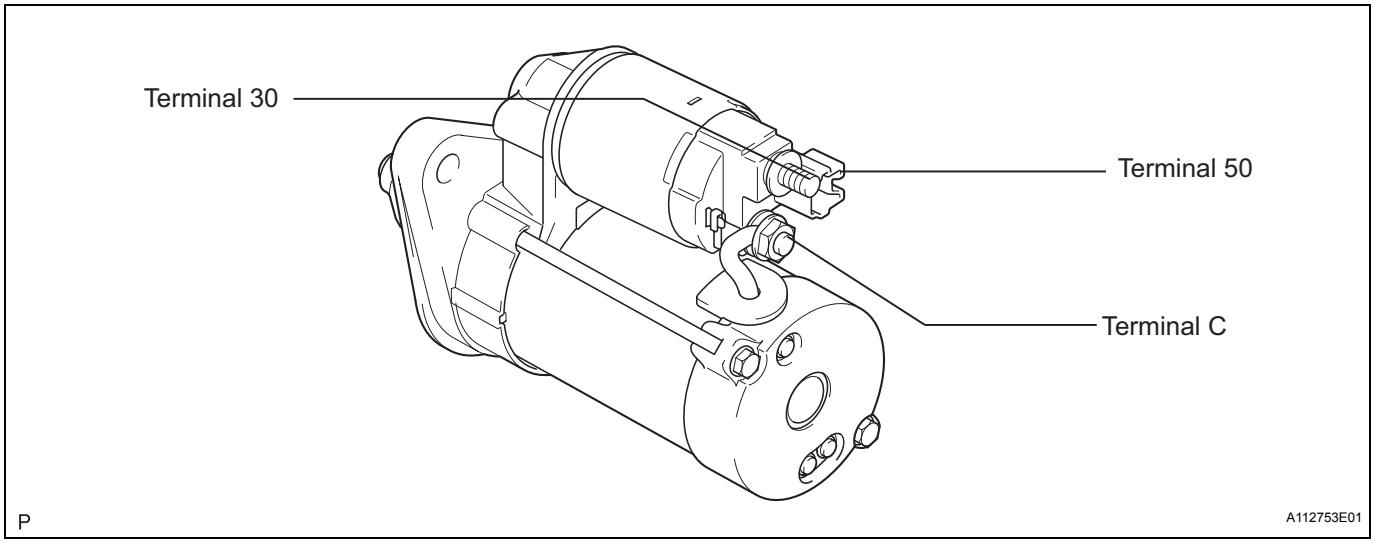


1. **INSTALL IGNITION COIL ASSEMBLY**
   (a) Install the 4 ignition coils with the 4 bolts.
   Torque: 9.0 N*m (90 kgf*cm, 80 in.*lbf)
   (b) Connect the 4 ignition coil connectors.
2. **INSTALL NO. 2 CYLINDER HEAD COVER**
   (a) Install the head cover with the 4 cap nuts.
   Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

INSPECTION

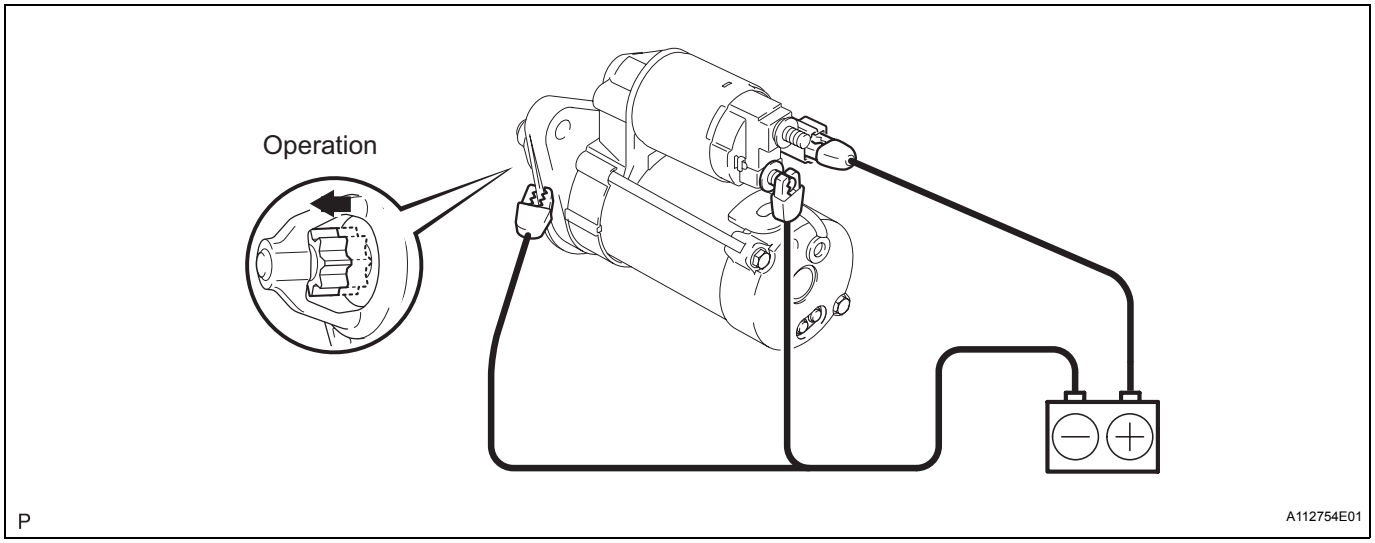
1. INSPECT STARTER ASSEMBLY

CAUTION:
These tests must be performed within 3 to 5 seconds to prevent the coil from burning out.

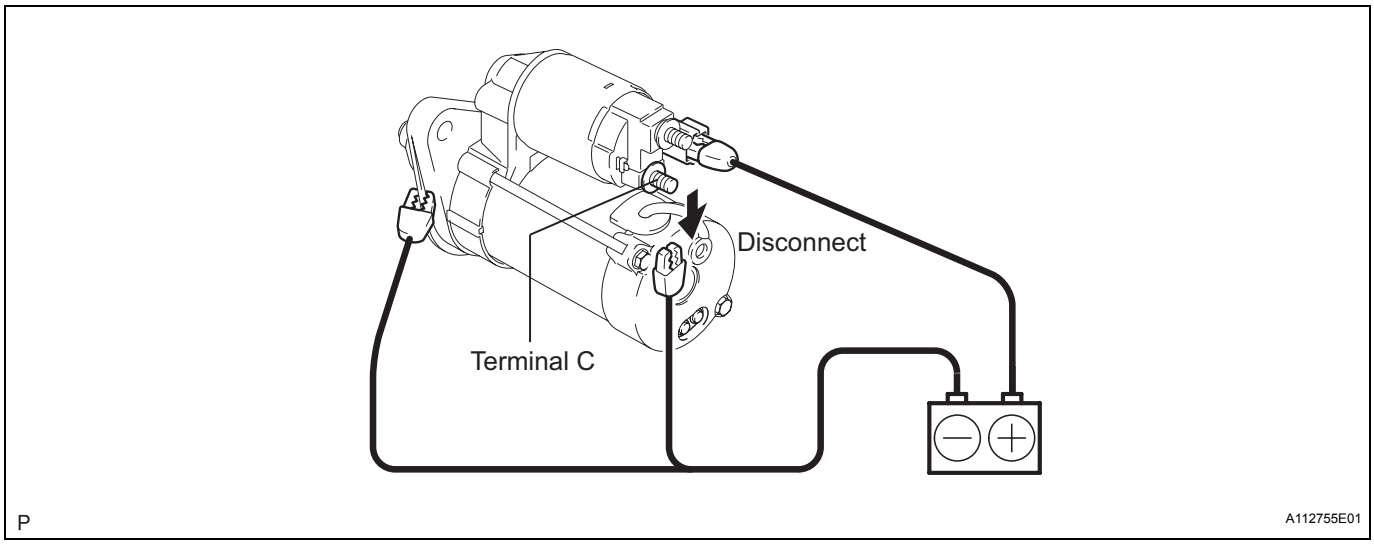


(a) Perform pull-in/holding test.
  (1) Disconnect the field coil lead wire from terminal C.
  (2) Connect the battery to the magnet switch as shown in the illustration. Then check that the clutch pinion gear moves outward.

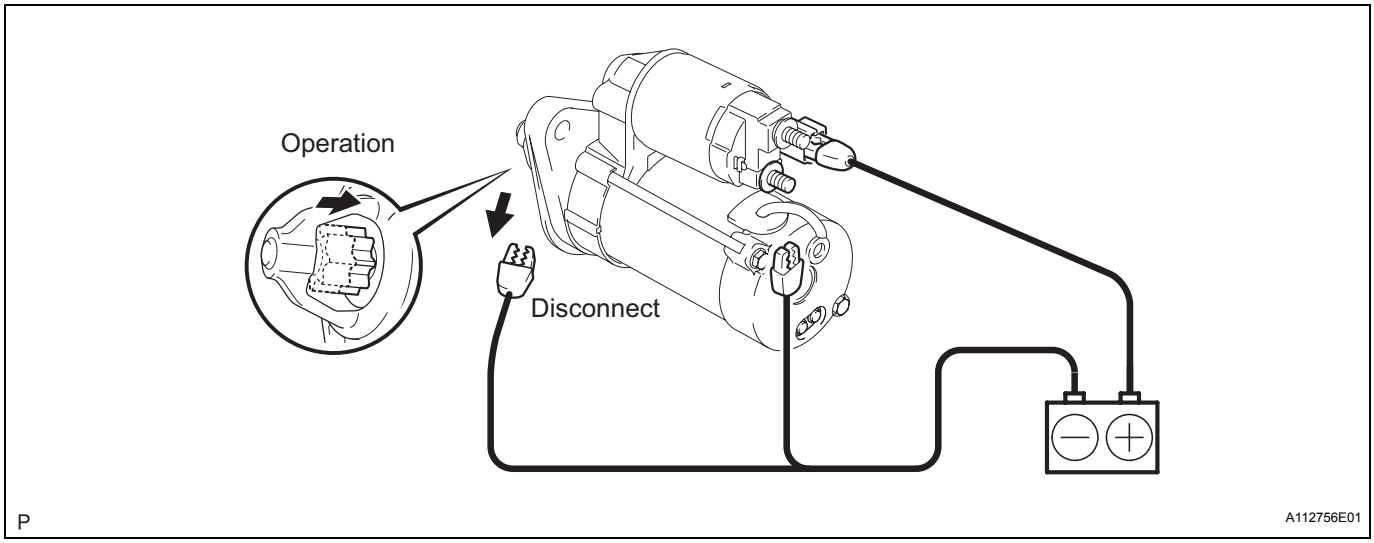
ST



(3) Disconnect the negative (-) lead from terminal C. Check that the pinion gear remains out.



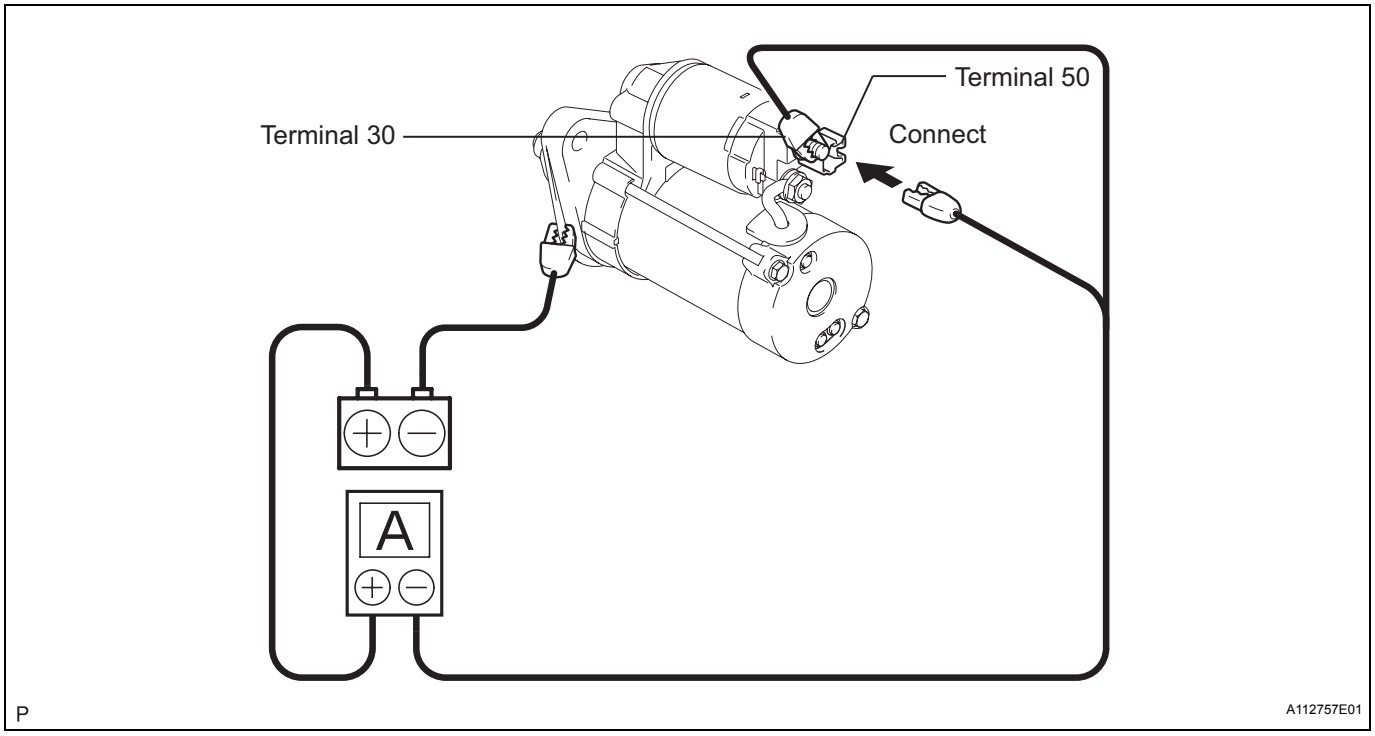
(4) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear returns inward.



ST

If the result is not as specified, replace the magnet switch body.

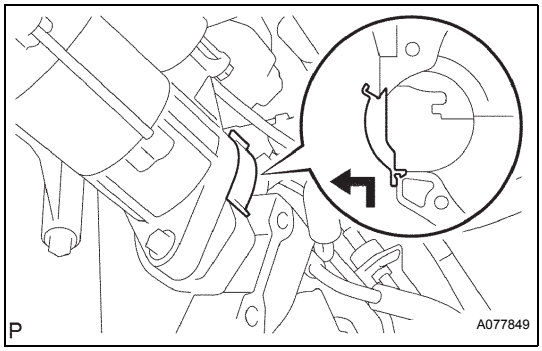
(b) Perform operation test without load.
(1) Connect the field coil lead wire to terminal C.
Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)
(2) Grip the starter with a vise.
(3) Connect the battery and ammeter to the starter as shown in the illustration.
(4) Check that the starter rotates smoothly and steadily while the pinion gear is moving outward. Then measure the current.
Standard current:
90 A or less at 11.5 V

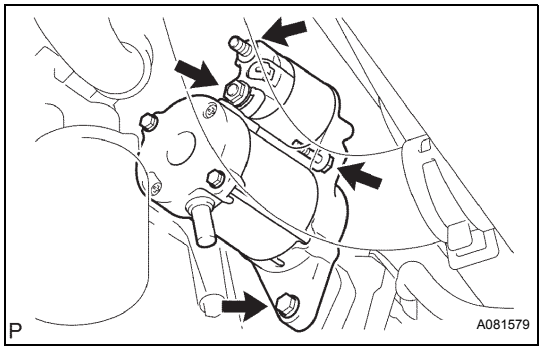


If the result is not as specified, replace the magnet switch body.

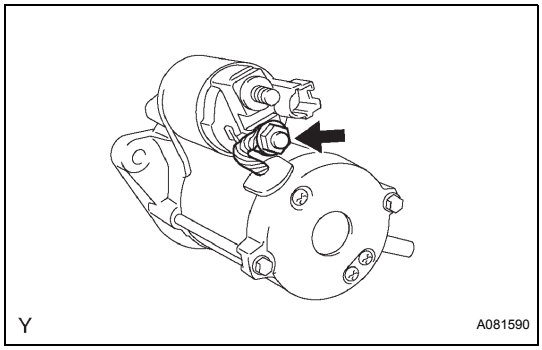
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE ENGINE UNDER COVER LH**
   (a) Remove the 4 bolts, nut and cover.
3. **REMOVE ENGINE UNDER COVER RH**
   (a) Remove the 4 bolts and cover.
4. **REMOVE FLYWHEEL HOUSING SIDE COVER**
   (a) Remove the flywheel housing side cover by pulling it out as shown in the illustration.





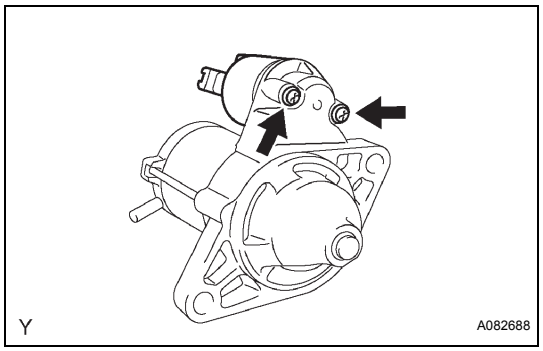
5. **REMOVE STARTER ASSEMBLY**
   (a) Remove the nut and starter wire.
   (b) Disconnect the starter connector.
   (c) Remove the 2 bolts and starter.



DISASSEMBLY

1. **REMOVE MAGNET STARTER SWITCH BODY**
   (a) Remove the nut, and disconnect the lead wire from the magnet starter switch body.

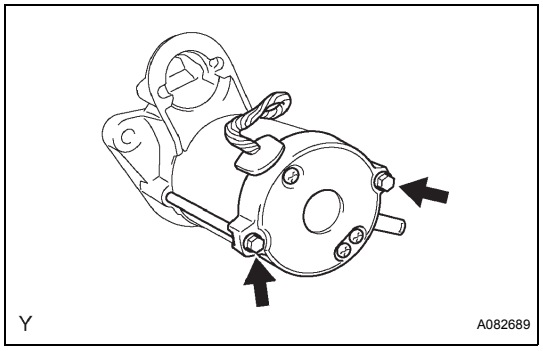
ST



(b) Remove the 2 screws holding the magnet starter switch body.
(c) Remove the magnet starter switch body.
(d) Remove the return spring and plunger.

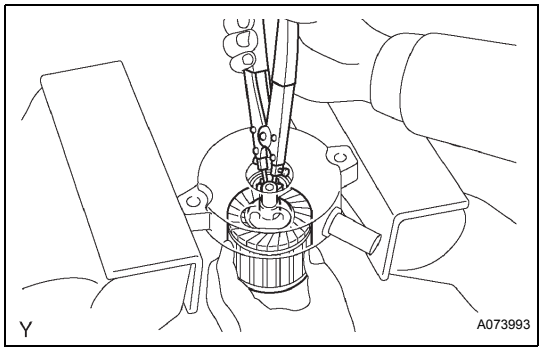
2. REMOVE STARTER COMMUTATOR END FRAME COVER

(a) Using a screwdriver, remove the cover.



3. REMOVE STARTER ARMATURE ASSEMBLY

(a) Remove the 2 through bolts, and pull out the starter yoke and commutator end frame together.
(b) Remove the starter yoke from the commutator end frame.

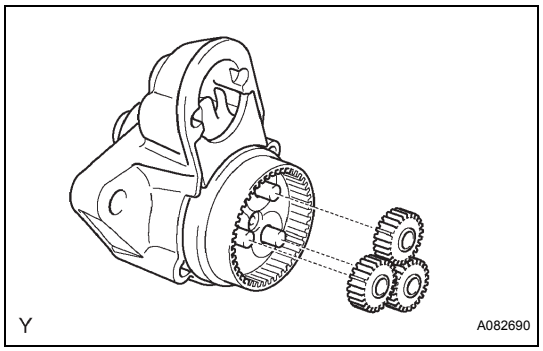


(c) Using snap ring pliers, remove the snap ring and plate washer.
(d) Remove the starter armature from the commutator end frame.

4. REMOVE STARTER ARMATURE PLATE

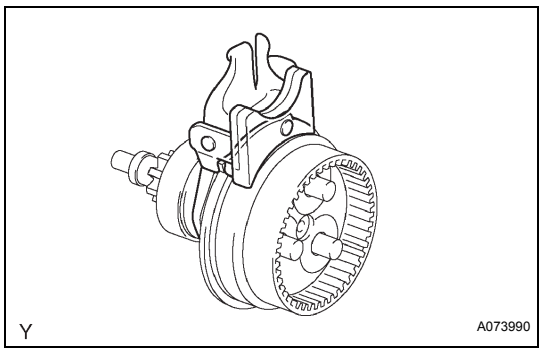
(a) Remove the plate from the starter yoke.

ST



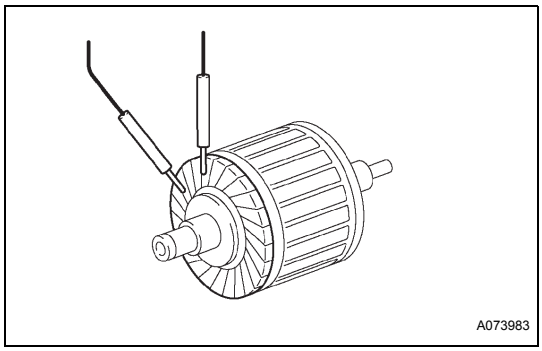
5. REMOVE PLANET GEAR

(a) Remove the 3 planet gears.



6. REMOVE STARTER CENTER BEARING CLUTCH SUB-ASSEMBLY

(a) Remove the starter center bearing clutch with drive lever set pin from the starter drive housing.
(b) Remove the drive lever set pin from the starter center bearing clutch.



INSPECTION

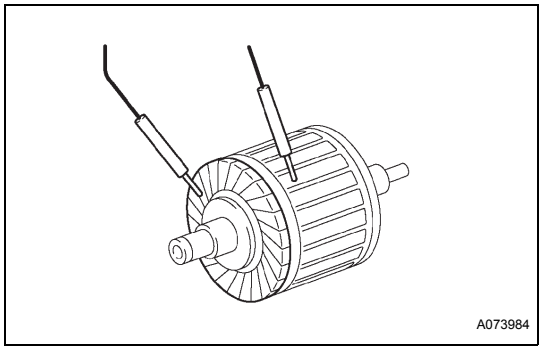
1. INSPECT STARTER ARMATURE ASSEMBLY

(a) Measure the resistance between any 2 segments of the commutator.

Standard resistance:

Below 1 Ω

If the result is not as specified, replace the starter armature assembly.

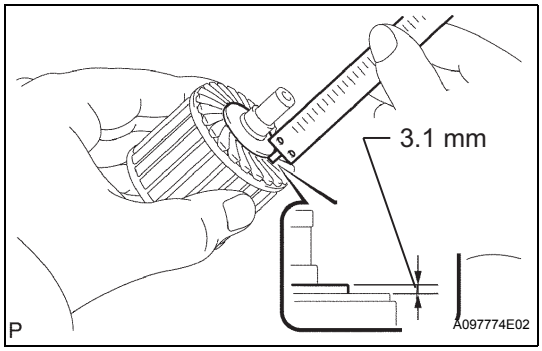


(b) Measure the resistance between each segment of the commutator and armature coil core.

Standard resistance:

10 kΩ or higher

If the result is not as specified, replace the starter armature assembly.



(c) Using a vernier caliper, measure the depth indicated in the illustration.

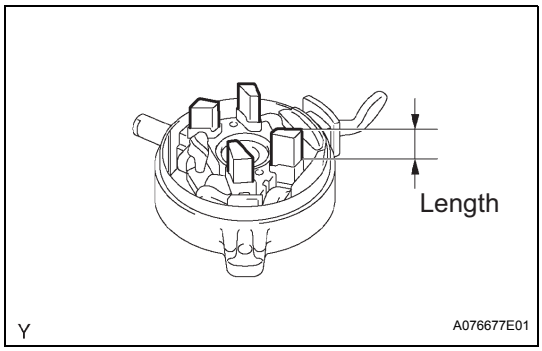
Standard depth:

3.1 mm (0.122 in.)

Maximum depth:

3.8 mm (0.150 in.)

If the depth is greater than the maximum, replace the armature assembly.



2. INSPECT STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Using a vernier caliper, measure the brush length.

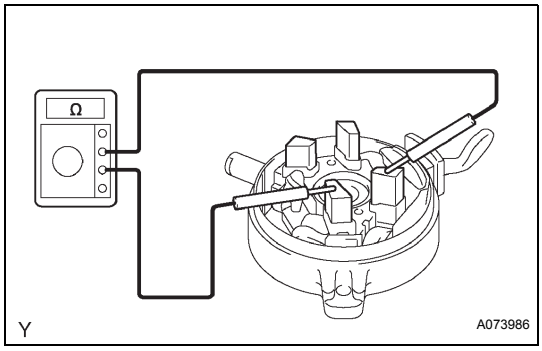
Standard length:

9.0 mm (0.354 in.)

Minimum length:

4.0 mm (0.158 in.)

If the length is less than the minimum, replace the starter commutator end frame assembly.



(b) Measure the resistance between the positive (+) and negative (-) brush holders.

Standard resistance:

10 kΩ or higher

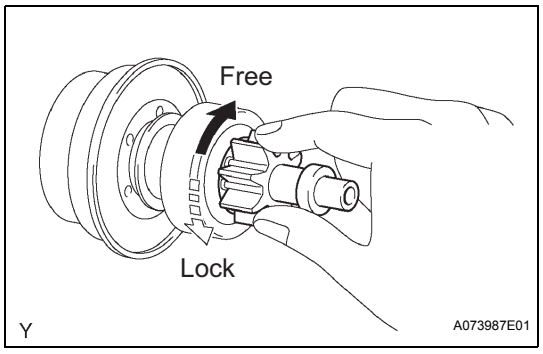
If the result is not as specified, replace the starter commutator end frame assembly.

ST

3. INSPECT STARTER CENTER BEARING CLUTCH SUB-ASSEMBLY

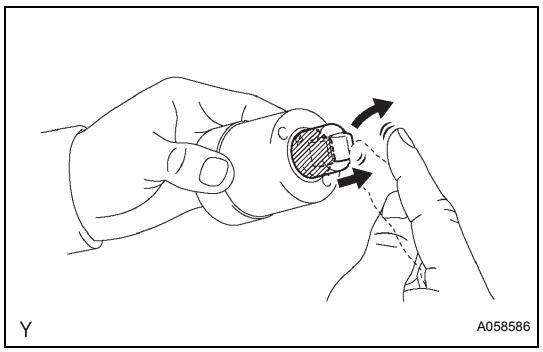
(a) Check the gear teeth on the planetary gear, internal gear and starter clutch for wear or damage.
If damaged, replace the gear or clutch assembly.
Also check the drive plate ring gear for wear or damage.

(b) Rotate the pinion gear clockwise, and check that it turns freely. Try to rotate the pinion gear counterclockwise and check that it locks.
If necessary, replace the center bearing clutch sub-assembly.

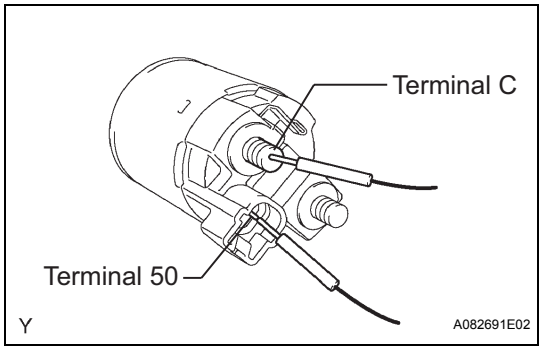


4. INSPECT MAGNET SWITCH BODY

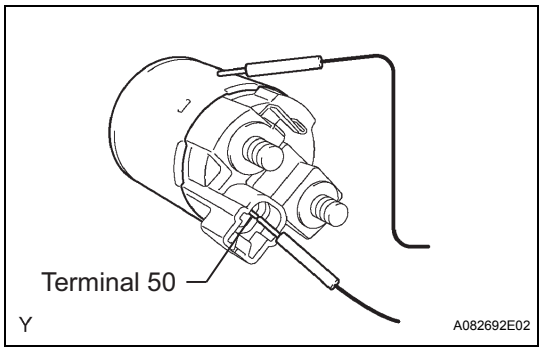
(a) Check the operation.
(1) Push in the plunger, and then check that it returns quickly to its original position.
If necessary, replace the magnet switch body.



(b) Check the pull-in coil.
(1) Measure the resistance between terminals 50 and C.
Standard resistance:
Below 2 Ω
If the result is not as specified, replace the magnet switch body.



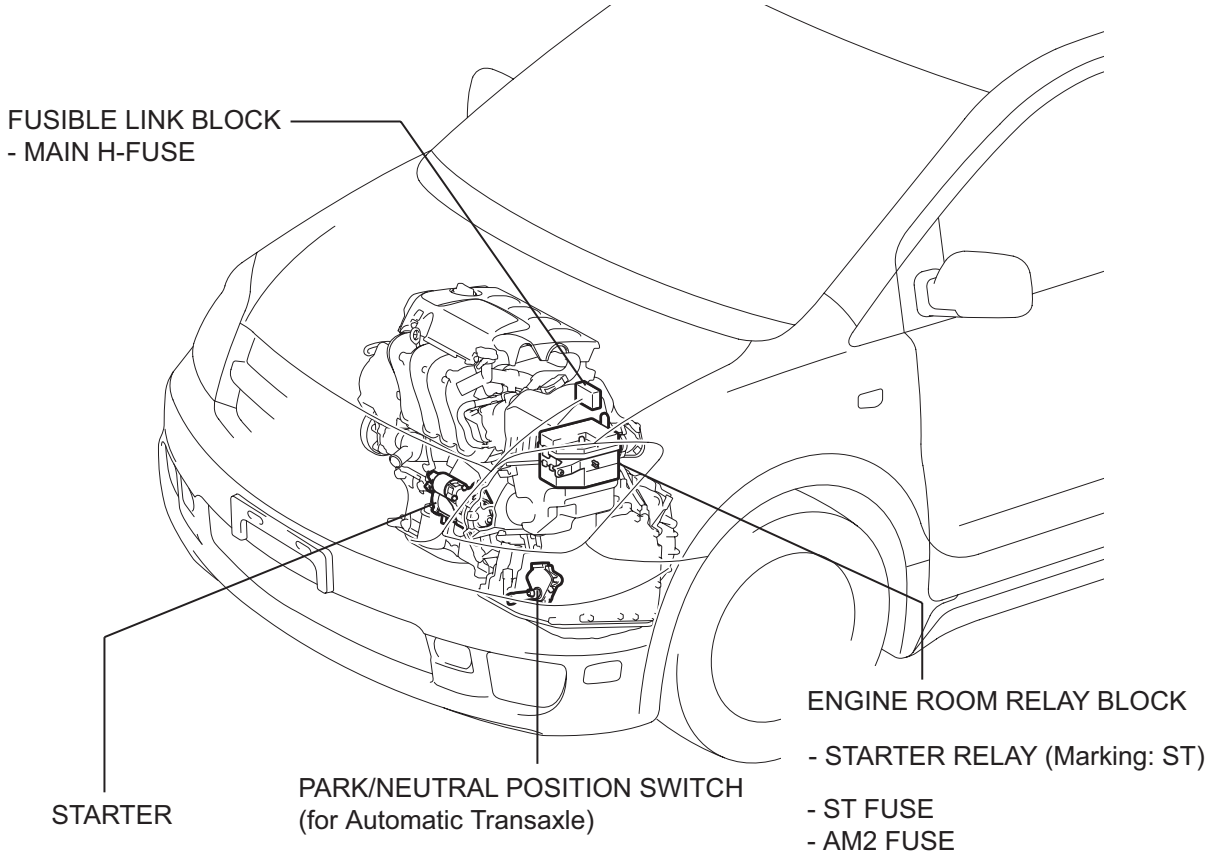
(c) Check the holding coil.
(1) Measure the resistance between terminals 50 and the switch body.
Standard resistance:
Below 1 Ω
If the result is not as specified, replace the magnet switch body.

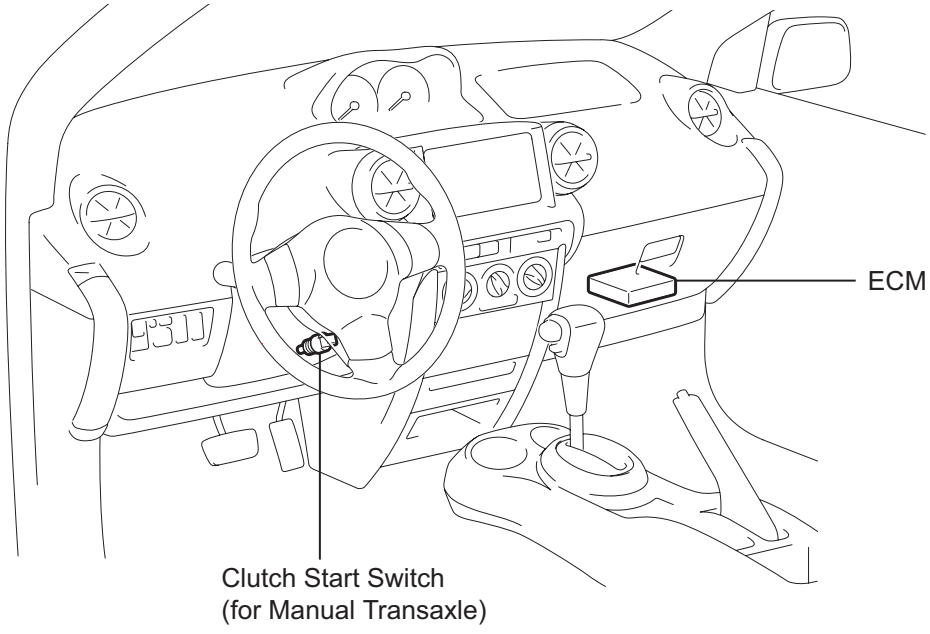


ST

STARTING SYSTEM

PARTS LOCATION



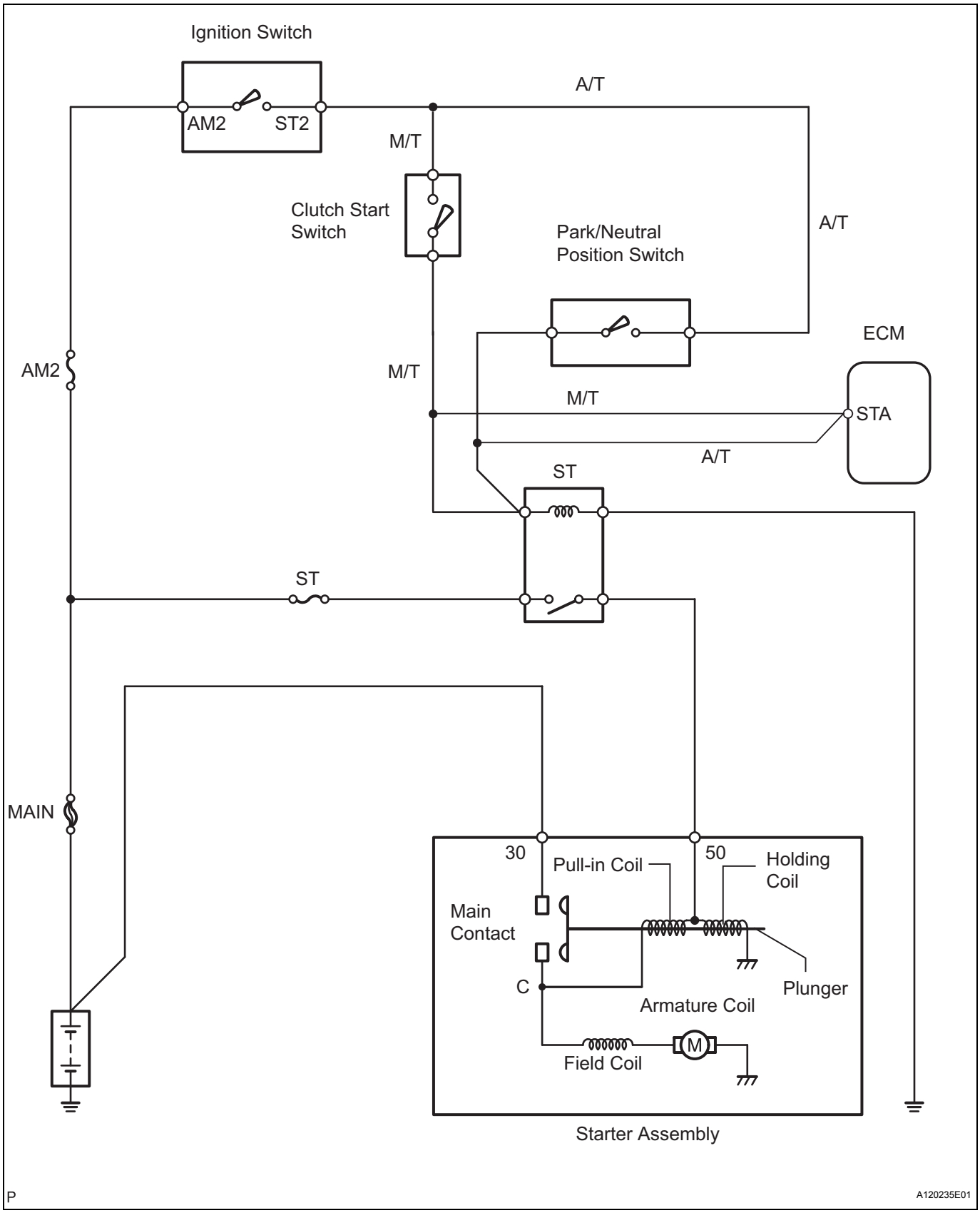


P

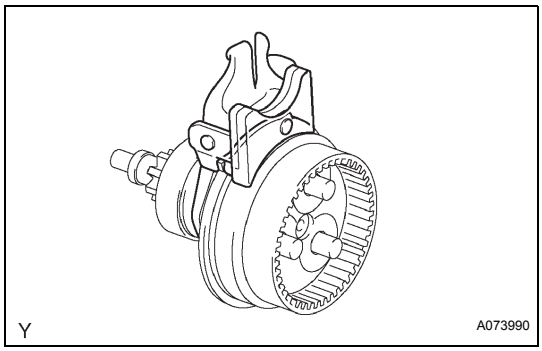
A117216E01

ST

SYSTEM DIAGRAM



ST

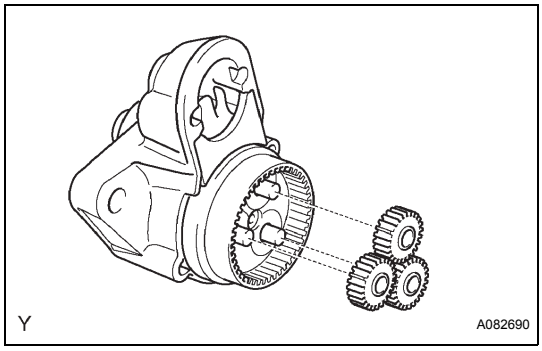


REASSEMBLY

1. INSTALL STARTER CENTER BEARING CLUTCH SUB-ASSEMBLY

(a) Install the drive lever set pin onto the starter center bearing clutch.

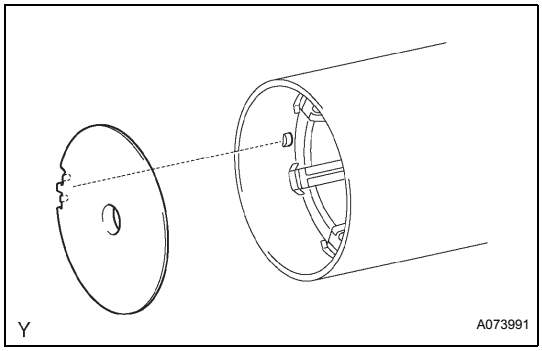
(b) Install the starter center bearing clutch with drive lever set pin to the starter drive housing.



2. INSTALL PLANET GEAR

(a) Apply grease to the planet gears and planet shaft pins.

(b) Install the 3 planet gears.



3. INSTALL STARTER ARMATURE PLATE

(a) Insert the starter armature plate into the starter yoke.

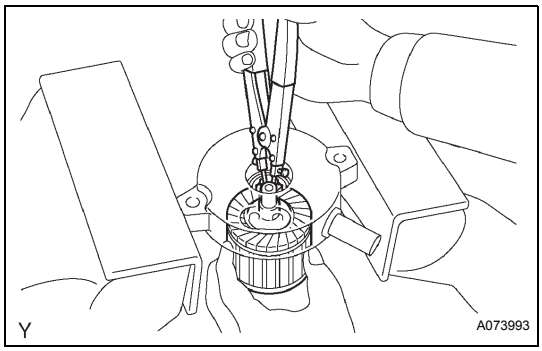
(b) Align the cutout of the plate with the inside protrusion of the starter yoke, and install the plate.

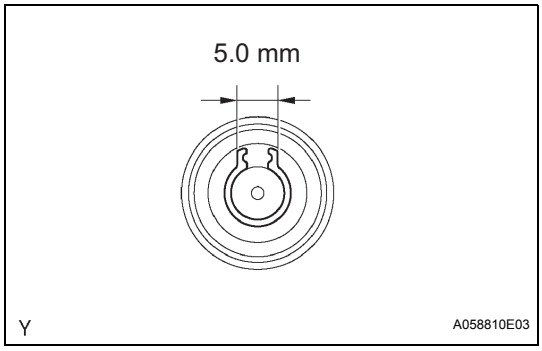
4. INSTALL STARTER ARMATURE ASSEMBLY

(a) Apply grease to the washer plate and armature shaft.

(b) Install the armature shaft onto the starter commutator end frame.

(c) Using snap ring pliers, install the plate washer and snap ring.





(d) Using a vernier caliper, measure the snap ring length.

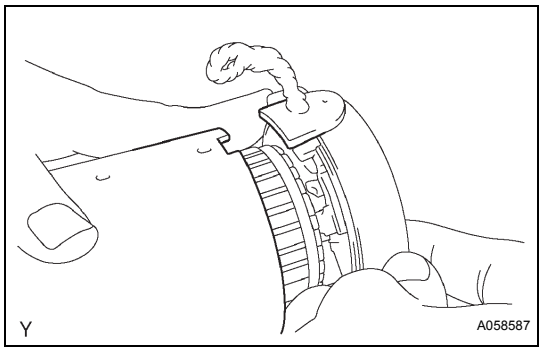
Maximum length:

5.0 mm (0.197 in)

If the length is greater than the maximum, replace the snap ring with a new one.

5. INSTALL STARTER COMMUTATOR END FRAME COVER

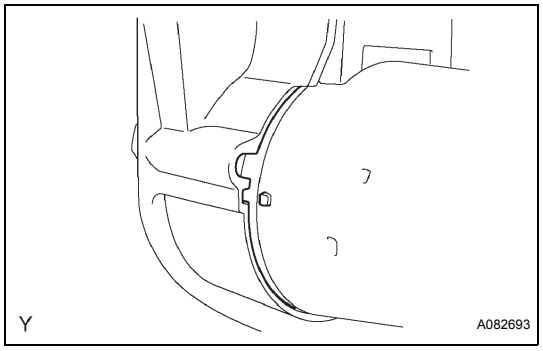
ST



6. INSTALL STARTER YOKE ASSEMBLY

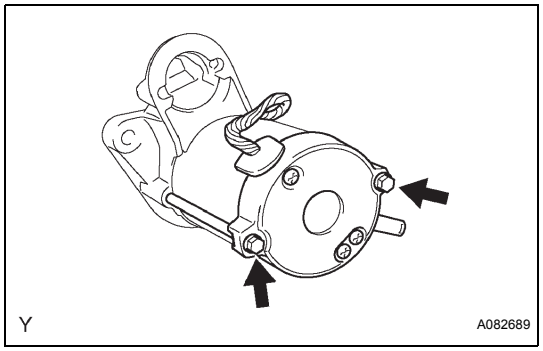
(a) Align the rubber of the starter commutator end frame with the cutout of the starter yoke.

(b) Install the starter yoke onto the starter commutator end frame.



7. INSTALL STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Align the key located on the starter yoke with the keyway of the starter housing.

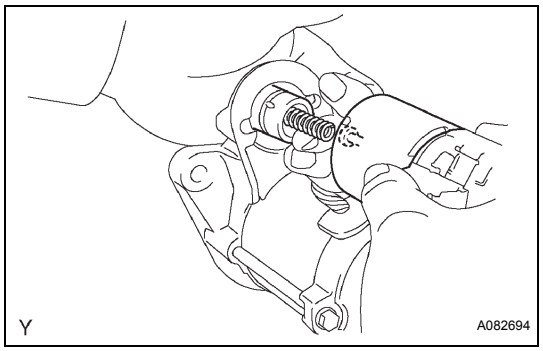


(b) Install the starter yoke with the 2 through bolts.
Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

8. INSTALL MAGNET STARTER SWITCH BODY

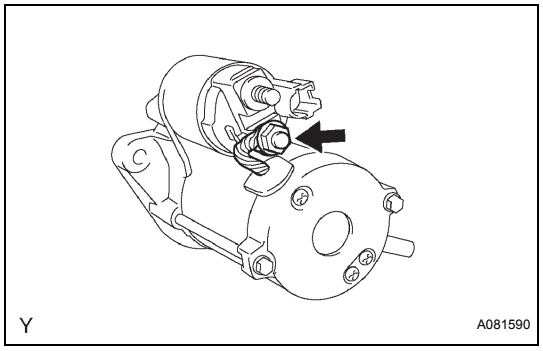
(a) Apply grease to the plunger and hook.

(b) Put the plunger hook of the magnet switch body on the drive lever.



(c) Install the plunger and return spring as shown in the illustration.

(d) Install the magnet switch body with the 2 screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

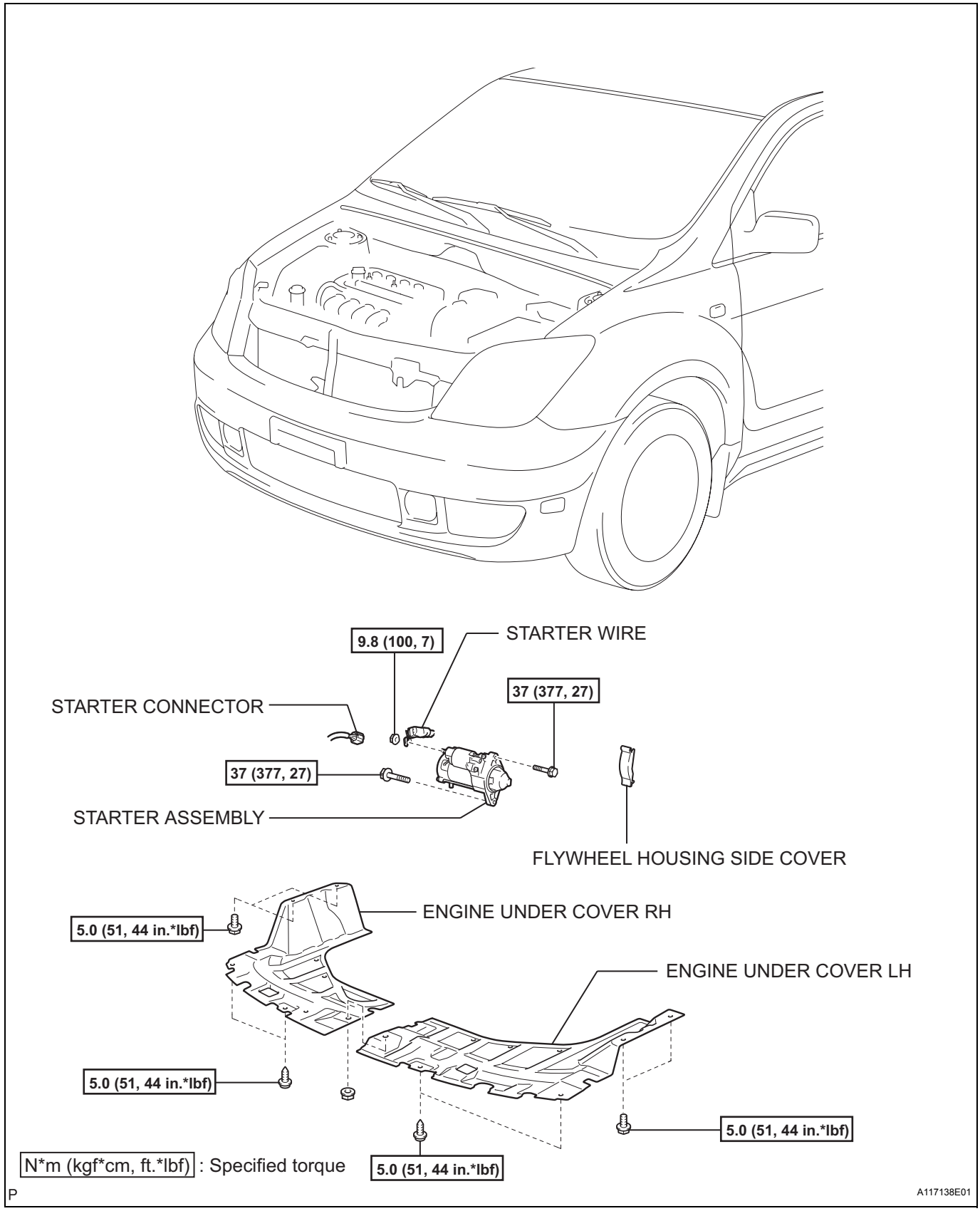


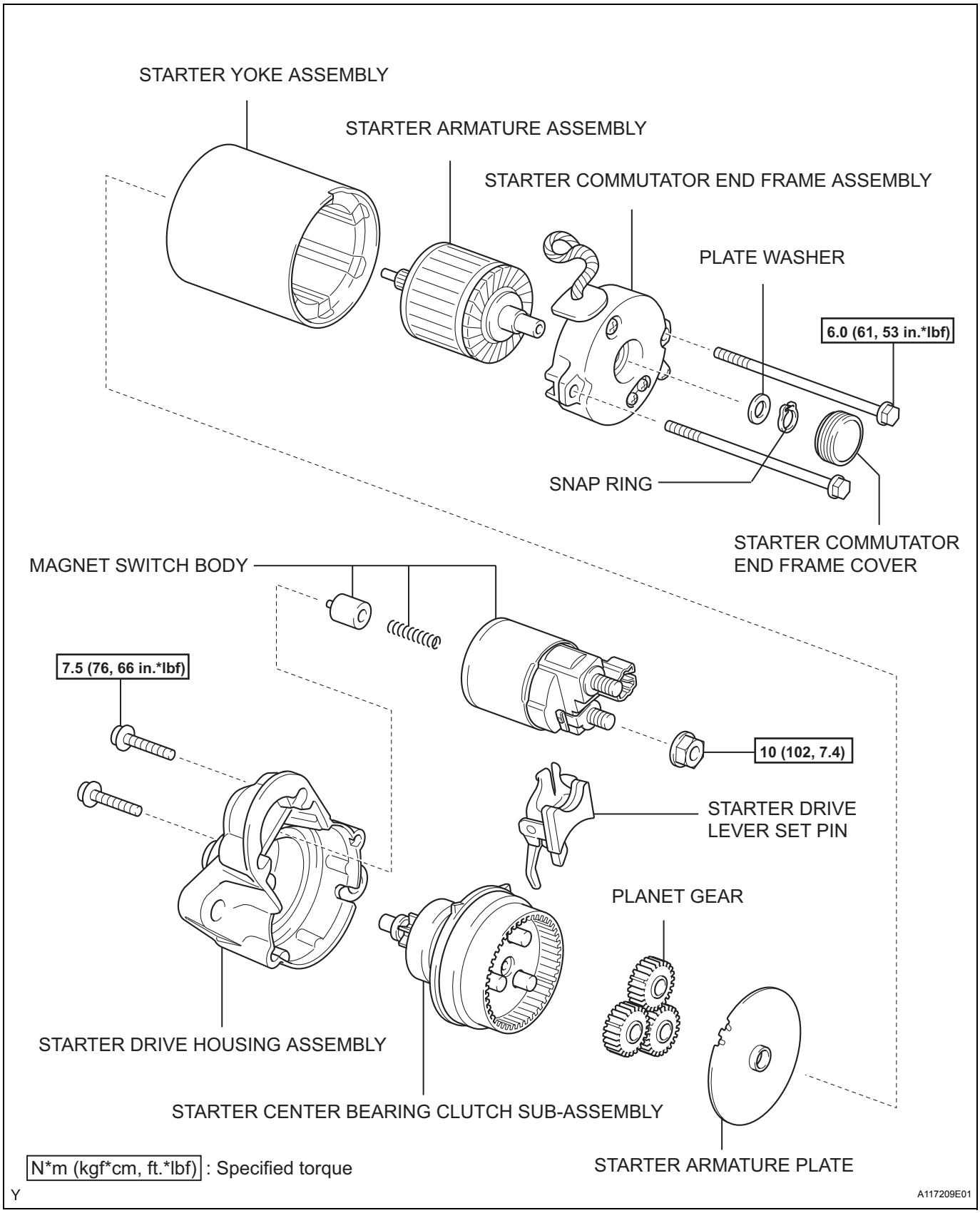
(e) Connect the lead wire to the terminal with the nut.
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf)

ST

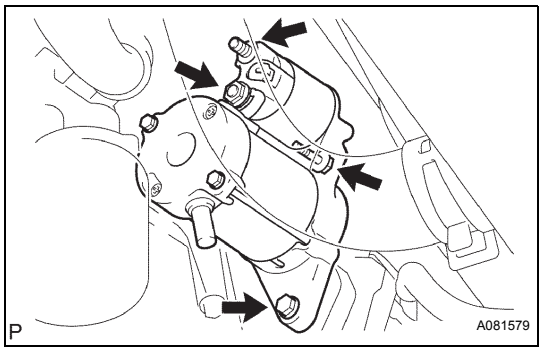
STARTER

COMPONENTS



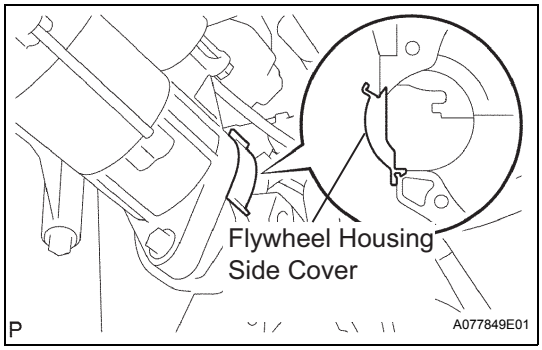

STARTER YOKE ASSEMBLY
STARTER ARMATURE ASSEMBLY
STARTER COMMUTATOR END FRAME ASSEMBLY
PLATE WASHER
6.0 (61, 53 in.*lbf)
SNAP RING
STARTER COMMUTATOR END FRAME COVER
MAGNET SWITCH BODY
7.5 (76, 66 in.*lbf)
10 (102, 7.4)
STARTER DRIVE LEVER SET PIN
PLANET GEAR
STARTER DRIVE HOUSING ASSEMBLY
STARTER CENTER BEARING CLUTCH SUB-ASSEMBLY
STARTER ARMATURE PLATE
N*m (kgf*cm, ft.*lbf) : Specified torque
Y
A117209E01

ST



INSTALLATION

1. **INSTALL STARTER ASSEMBLY**
   (a) Install the starter with the 2 bolts.
   Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)
   (b) Install the starter wire to terminal 30 with the nut.
   Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)
   (c) Connect the starter connector.



2. **INSTALL FLYWHEEL HOUSING SIDE COVER**
   NOTICE:
   - **Insert the claw until it makes a "click" sound when installing the flywheel housing side cover.**
   - **If the claw is deformed, replace the flywheel housing side cover.**
3. **INSTALL ENGINE UNDER COVER RH**
   (a) Install the cover with the 4 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
4. **INSTALL ENGINE UNDER COVER LH**
   (a) Install the cover with the nut and 4 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

ST

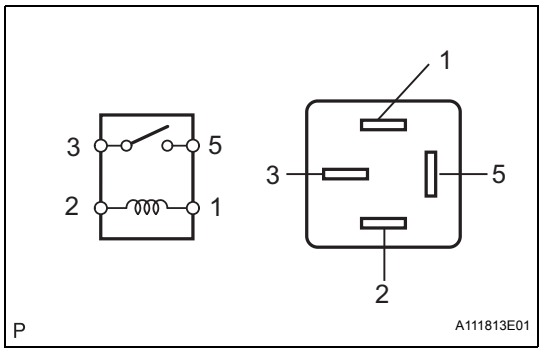
STARTER RELAY

ON-VEHICLE INSPECTION

1. REMOVE STARTER RELAY (Marking: ST)

(a) Remove the engine room relay block cover.

(b) Remove the starter relay from the engine room relay block.



2. INSPECT STARTER RELAY

(a) Measure the resistance of the starter relay.

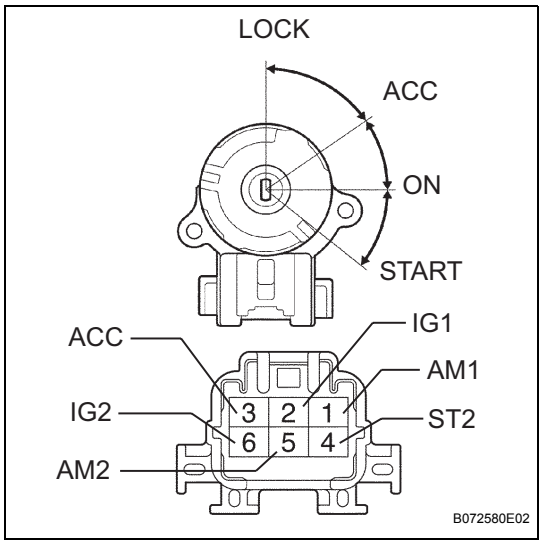
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

3. INSTALL STARTER RELAY

ST



INSPECTION

1. INSPECT IGNITION SWITCH ASSEMBLY

(a) Measure the resistance of the switch.

Standard resistance

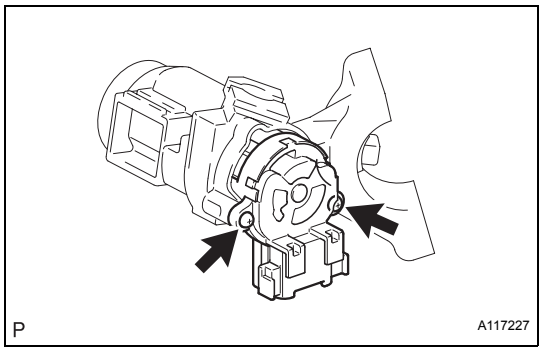
Tester Connection	Switch Condition	Specified Condition
Between all terminals	LOCK	10 kΩ or higher
1 (AM1) - 3 (ACC)	ACC	Below 1 Ω
1 (AM1) - 2 (IG1) 1 (AM1) - 3 (ACC) 5 (AM2) - 6 (IG2)	ON	Below 1 Ω
1 (AM1) - 2 (IG1) 4 (ST2) - 5 (AM2) 5 (AM2) - 6 (IG2)	START	Below 1 Ω

If the result is not as specified, replace the ignition switch assembly.

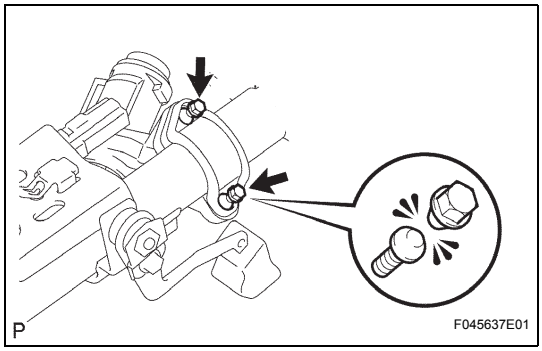
INSTALLATION

1. INSTALL IGNITION SWITCH ASSEMBLY

(a) Install the switch to the steering column bracket with the 2 screws.



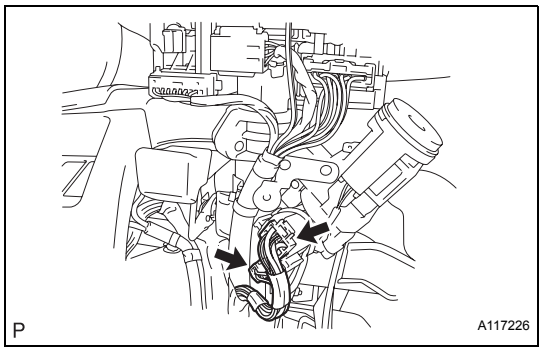
ST



2. REMOVE STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY

(a) Temporarily install the steering column upper with switch bracket and steering column clamp upper with 2 new steering lock set bolts.

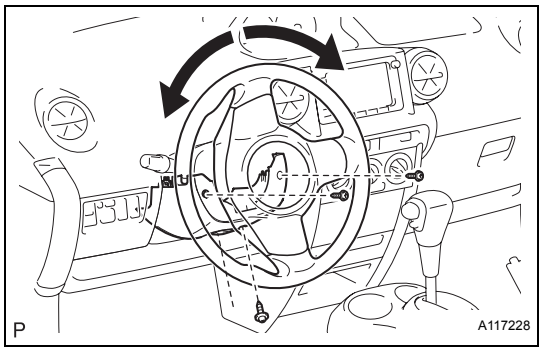
(b) Tighten the 2 steering lock set bolts until the bolt heads break off.



3. CONNECT CONNECTOR

(a) Connect the 2 connectors as shown in the illustration.

(b) Secure the wire harness with the clamps.



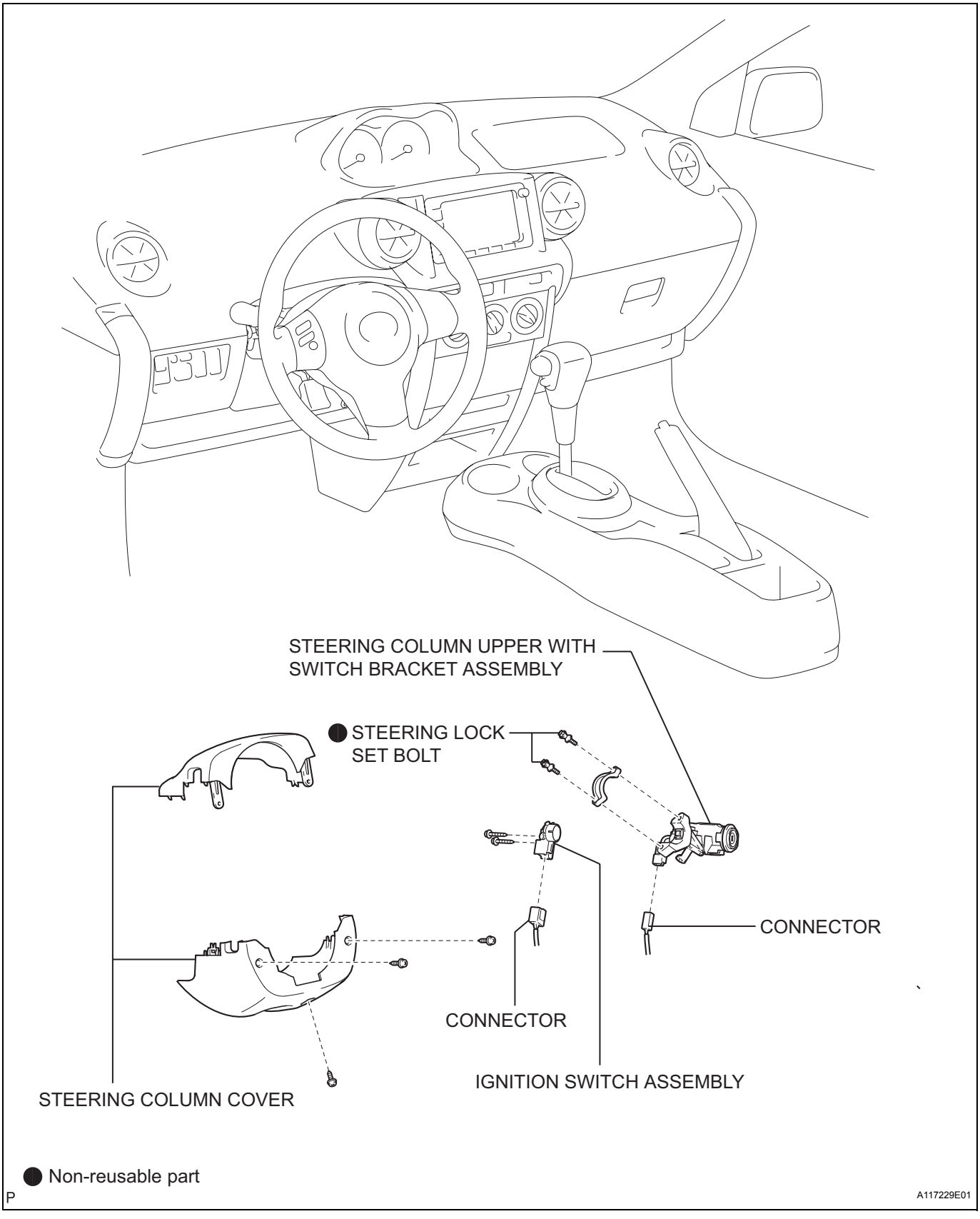
4. **INSTALL STEERING COLUMN COVER**
   (a) Install the cover lower and upper with the 3 screws.
   HINT:
   Turn the steering wheel to the right and left as necessary to install the 3 screws and cover lower.

5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

6. **PERFORM INITIALIZATION**
   Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

IGNITION SWITCH

COMPONENTS



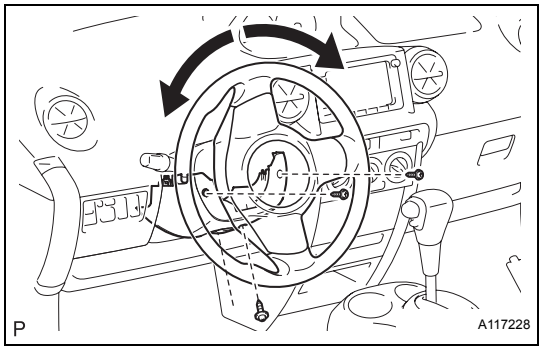
ST

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

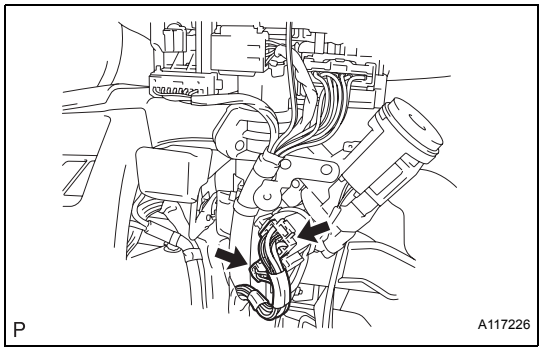


2. REMOVE STEERING COLUMN COVER

(a) Remove the 3 screws, cover lower and upper.

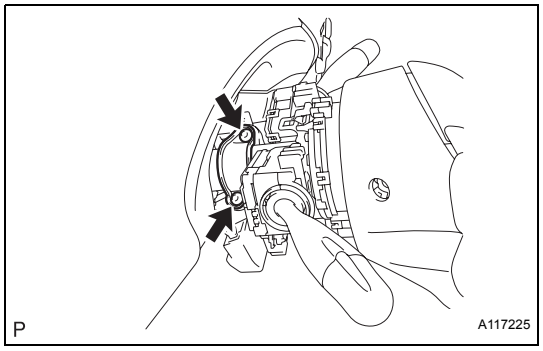
HINT:

Turn the steering wheel to the right and left as necessary to remove the 3 screws and cover lower.



3. DISCONNECT CONNECTOR

(a) Disconnect the 2 connectors and wire harness clamps from the steering column.

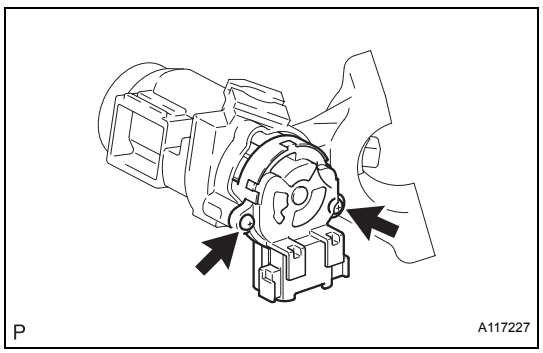


4. REMOVE STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY

(a) Using a centering punch, mark the center of the 2 tapered-head bolts.

(b) Using a 3 to 4 mm (0.12 to 0.16 in.) drill, drill a hole in the 2 bolt heads.

(c) Using a screw extractor, remove the 2 bolts, clamp and steering column upper with switch bracket.

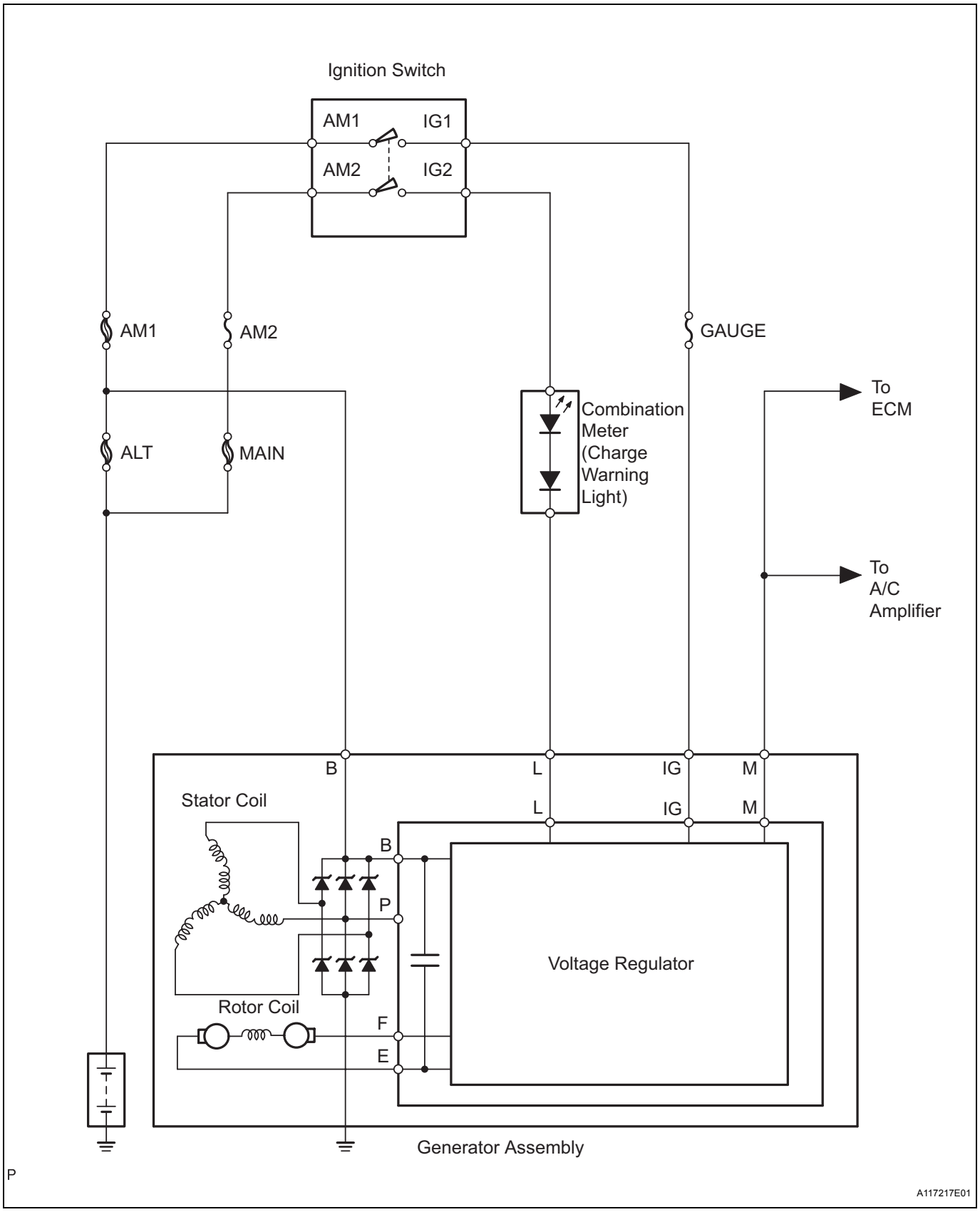


5. REMOVE IGNITION SWITCH ASSEMBLY

(a) Remove the 2 screws and switch from the steering column bracket.

ST

SYSTEM DIAGRAM



CH

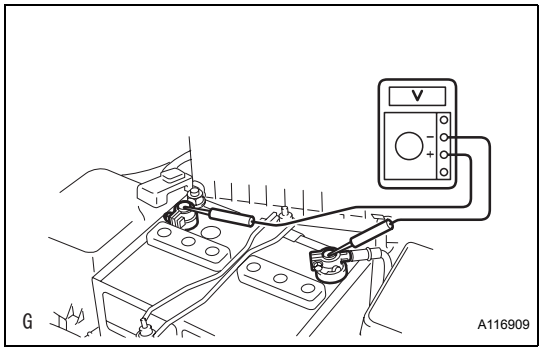
ON-VEHICLE INSPECTION

1. CHECK BATTERY CONDITION

NOTICE:

If the battery is weak or if the engine is difficult to start, perform the following procedures.

(a) Check the battery for damage and deformation. If severe damage, deformation or leakage is found, replace the battery.



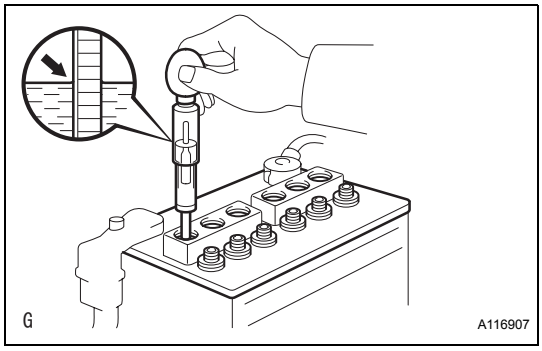
(b) Check the electrolyte quantity of each cell.

(1) For maintenance-free batteries:

- If the electrolyte quantity is below the lower line, replace the battery.
- If the electrolyte quantity is above the lower line, check the battery voltage when cranking the engine. If the voltage is less than 9.6 V, recharge or replace the battery.

HINT:

Before checking the battery voltage, turn off all the electrical systems (headlights, blower motor, rear defogger, etc.).



(2) For non-maintenance-free batteries:

- If the electrolyte quantity is below the lower line, add distilled water to each cell. Then, recharge the battery and check the electrolyte's specific gravity.

Standard specific gravity:

1.25 to 1.29 at 20°C (68°F)

- If the electrolyte quantity is above the lower line, check the battery voltage when cranking the engine. If the voltage is less than 9.6 V, recharge or replace the battery.

HINT:

Before checking the battery voltage, turn off all the electrical systems (headlights, blower motor, rear defogger, etc.).

2. CHECK BATTERY TERMINALS AND FUSES

(a) Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean the terminals.

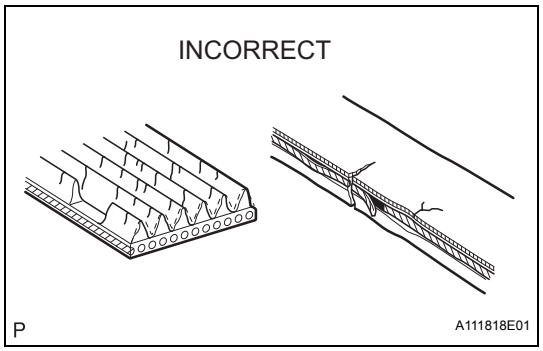
(b) Measure the resistance of the fusible links, H-fuse and fuses.

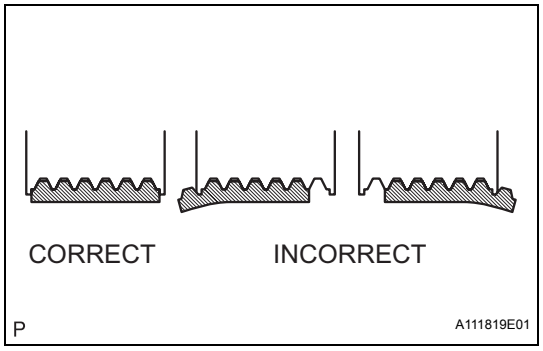
Standard resistance:

Below 1 Ω

If the results are not as specified, replace the fuses as necessary.

CH





3. CHECK V-RIBBED BELT

(a) Check the belt for wear, cracks and other signs of damage.
If any defect is found, replace the drive belt.
HINT:
Replace the drive belt, if the following defects are found:
- The belt is worn out and wire is exposed.
- The cracks reach the wire in more than one place.
- The belt has chunks missing from the ribs.

(b) Check that the belt fits properly in the ribbed grooves.
HINT:
With your hand, confirm that the belt has not slipped out of the grooves on the bottom of the pulley.

4. VISUALLY CHECK GENERATOR WIRING

(a) Check that the wiring is in good condition.

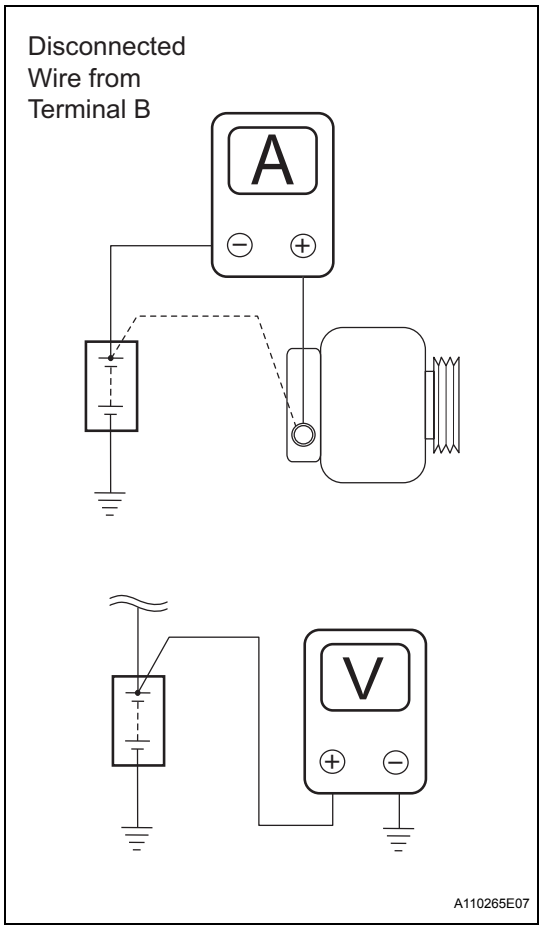
5. LISTEN FOR ABNORMAL NOISE FROM GENERATOR

(a) Check that the generator does not emit any abnormal noise while the engine is running.

6. CHECK CHARGE WARNING LIGHT CIRCUIT

(a) Turn the ignition switch ON. Check that the charge warning light turns on.

(b) Start the engine and check that the light turns off.
If the light does not operate as specified, troubleshoot the charge warning light circuit.



7. CHECK CHARGING CIRCUIT WITHOUT LOAD

(a) Connect a voltmeter and ammeter to the charging circuit as follows.

HINT:

If a battery/generator tester is available, connect the tester to the charging circuit according to the manufacturer's instructions.

(1) Disconnect the wire from terminal B of the generator and connect it to the negative (-) lead of the ammeter.

(2) Connect the ammeter's positive (+) lead to terminal B of the generator.

(3) Connect the voltmeter's positive (+) lead to positive (+) terminal B of the battery.

(4) Ground the voltmeter's negative (-) lead.

(b) Check the charging circuit.

(1) Keep the engine speed at 2,000 rpm. Check the reading on the ammeter and voltmeter.

Standard amperage:

10 A or less

Standard voltage:

12.9 to 14.9 V

HINT:

- If the voltmeter reading is more than the standard voltage, replace the voltage regulator.
- If the voltmeter reading is less than the standard voltage, check the voltage regulator and generator.

8. CHECK CHARGING CIRCUIT WITH LOAD

(a) With the engine running at 2,000 rpm, turn on the high beam headlights and turn the heater blower switch to the HI position.

(b) Check the reading on the ammeter.

Standard amperage:

30 A or more

HINT:

- If the ammeter reading is less than the standard amperage, repair the generator.
- If the battery is fully charged, the indication will sometimes be less than the standard amperage.

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

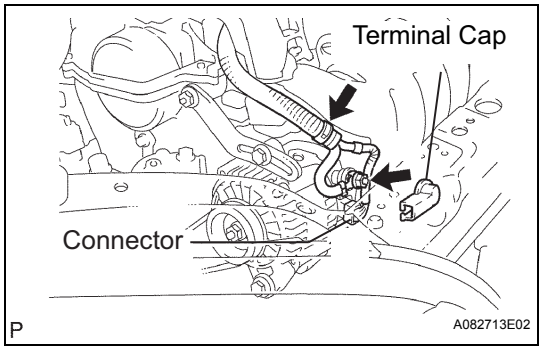
2. REMOVE GENERATOR ASSEMBLY

(a) Remove the terminal cap.

(b) Remove the nut and generator wire.

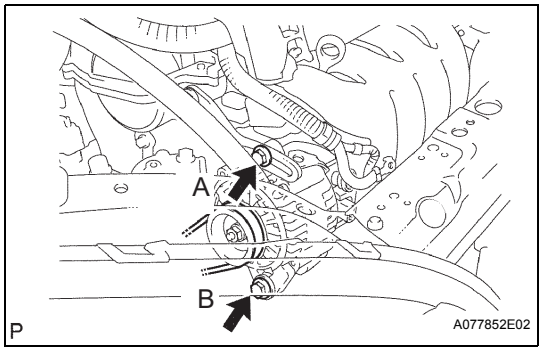
(c) Disconnect the generator connector.

(d) Remove the wire harness clamp.

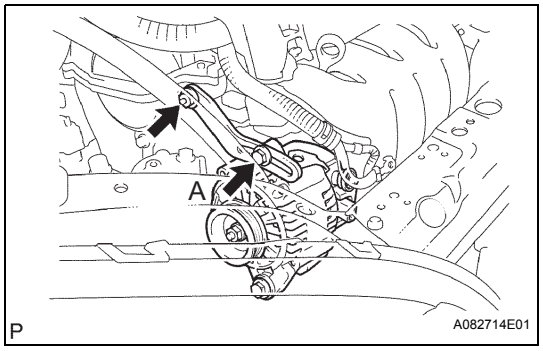


(e) Loosen bolts A and B.

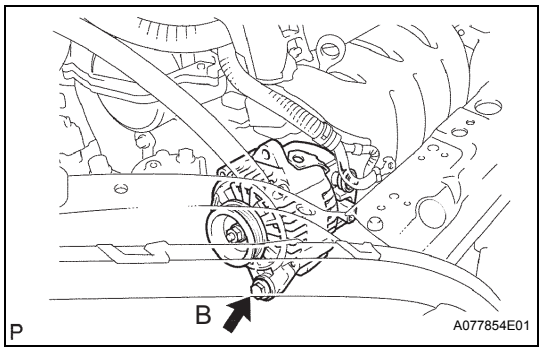
(f) Release the fan and generator V-belt tension, and remove the fan and generator V-belt.



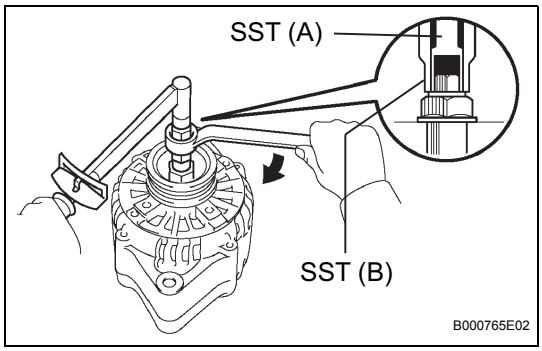
(g) Remove bolt A, the nut and the adjusting bar.



(h) Remove bolt B and the generator.



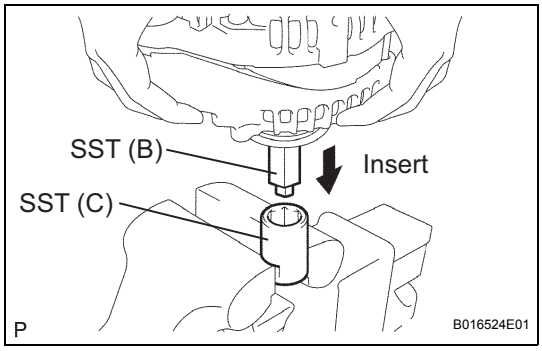
CH



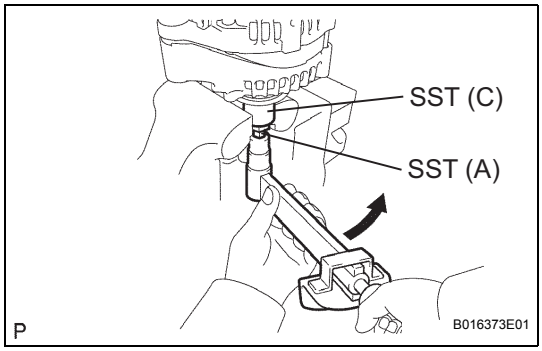
DISASSEMBLY

1. REMOVE GENERATOR PULLEY

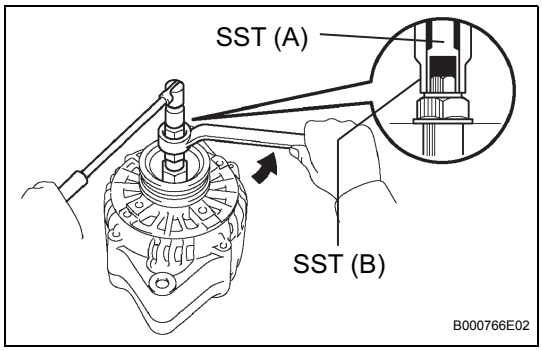
(a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820-63010 (09820-06010, 09820-06020)
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)
NOTICE:
Check that SST is secured to the rotor shaft.



(b) Mount SST (C) in a vise.
(c) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

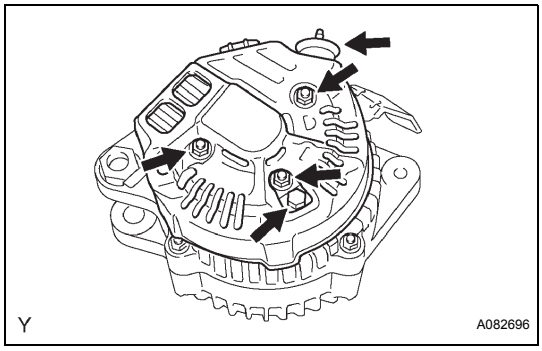


(d) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.
NOTICE:
To prevent damage to the rotor shaft, do not loosen the pulley nut more than one-half of a turn.
(e) Remove the generator from SST (C).

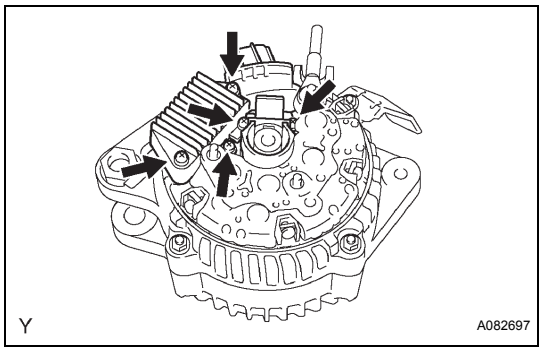


(f) Turn SST (B), and remove SST (A and B).
(g) Remove the pulley nut and pulley.

2. REMOVE REAR END COVER



(a) Remove the nut and terminal insulator.
(b) Remove the bolt, 3 nuts, plate terminal and end cover.



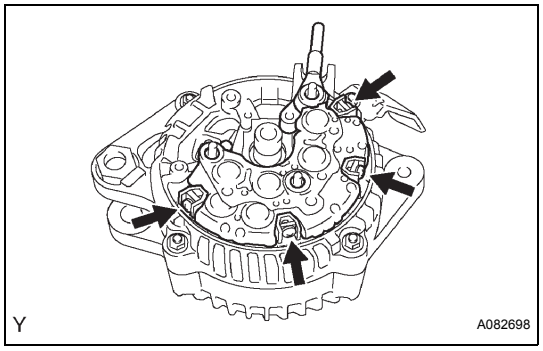
3. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY

(a) Remove the brush holder cover from the brush holder.

(b) Remove the 2 screws and brush holder.

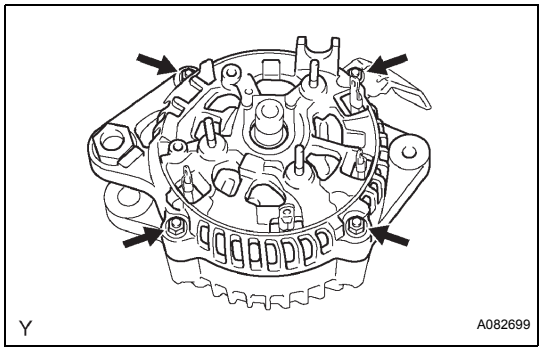
4. REMOVE GENERATOR REGULATOR ASSEMBLY

(a) Remove the 3 screws and generator regulator.



5. REMOVE GENERATOR HOLDER WITH RECTIFIER

(a) Remove the 4 screws and holder with rectifier.

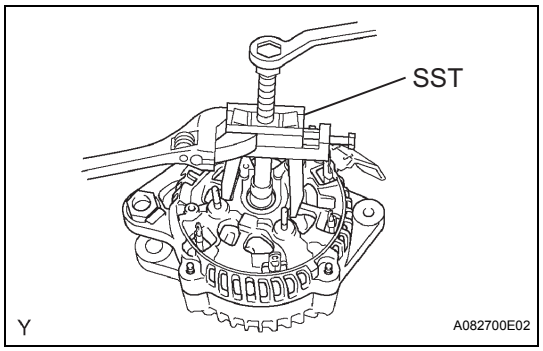


6. REMOVE GENERATOR RECTIFIER END FRAME

(a) Remove the 4 rubber insulators.

(b) Remove the seal plate.

(c) Remove the 4 nuts and cord clip.



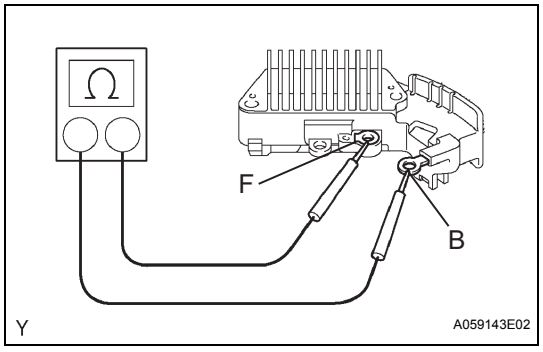
(d) Using SST, remove the rectifier end frame.
SST 09286-46011

7. REMOVE GENERATOR ROTOR ASSEMBLY

(a) Remove the generator washer from the rotor.

(b) Remove the rotor from the drive end frame.
NOTICE:
Do not drop the rotor.

INSPECTION

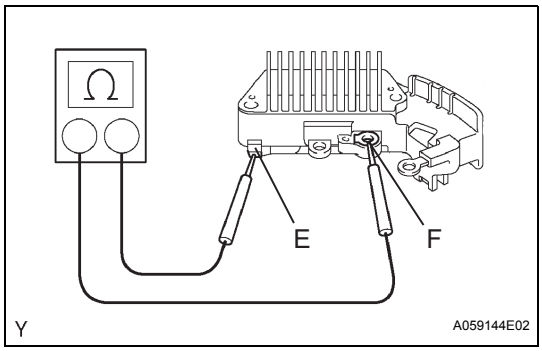


1. INSPECT GENERATOR REGULATOR ASSEMBLY

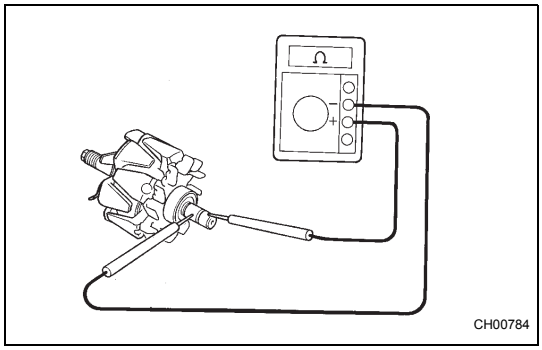
(a) Measure the resistance between the regulator terminals (F) and (B).
Standard resistance:
Below 1 Ω or more than 10 kΩ
HINT:
When the ohmmeter's leads are initially touched to the regulator, one of the above values will be output. When the leads are reversed, the reading will change to the other reading.

CH

If the result is not as specified, replace the generator regulator.

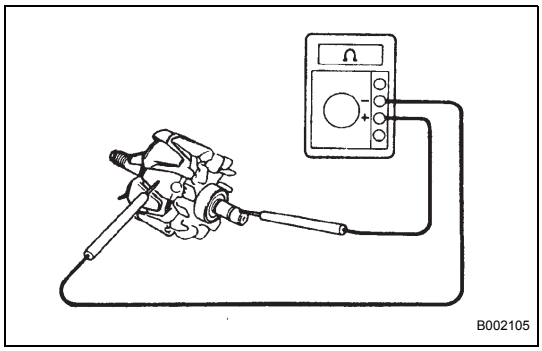


(b) Measure the resistance between the regulator terminals (F) and (E).
Standard resistance:
Below 1 Ω or more than 10 kΩ
HINT:
When the ohmmeter's leads are initially touched to the regulator, one of the above values will be output. When the leads are reversed, the reading will change to the other reading.
If the result is not as specified, replace the generator regulator.



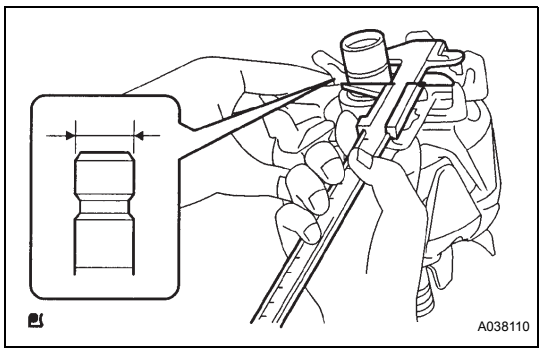
2. INSPECT GENERATOR ROTOR ASSEMBLY

(a) Check the rotor for an open circuit.
(1) Measure the resistance between the slip rings.
Standard resistance:
2.1 to 2.5 Ωat 20°C (68°F)
If the result is not as specified, replace the rotor assembly.



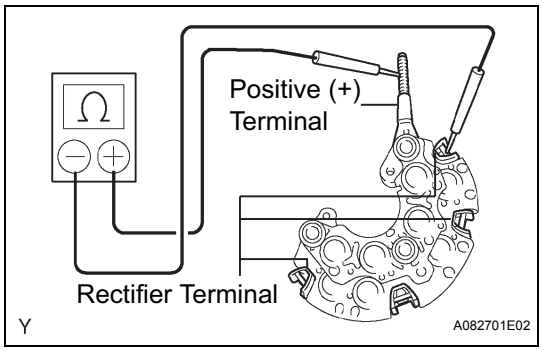
(b) Check if the rotor is grounded.
(1) Measure the resistance between the slip ring and rotor.
Standard resistance:
10 kΩ or higher
If the result is not as specified, replace the rotor assembly.

(c) Check that the slip rings are not rough or scored.
If rough or scored, replace the rotor assembly.



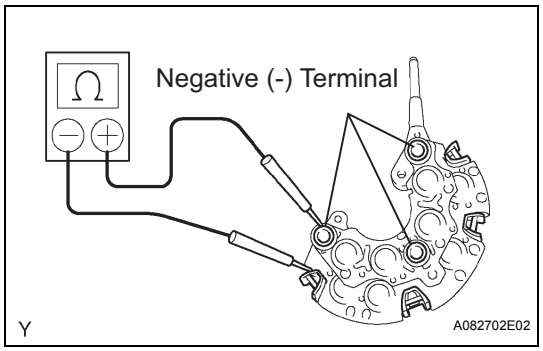
(d) Using a vernier caliper, measure the slip ring diameter.
Standard diameter:
14.2 to 14.4 mm (0.559 to 0.567 in.)
Minimum diameter:
12.8 mm (0.504 in.)
If the diameter is less than the minimum, replace the rotor assembly.

CH

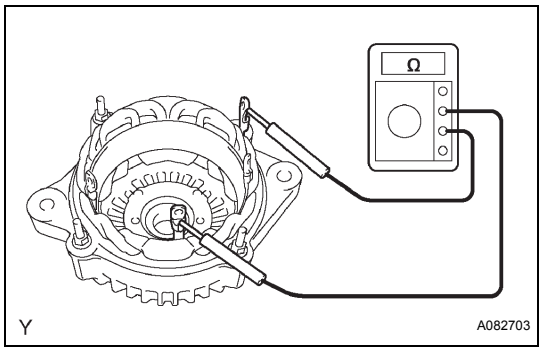


3. INSPECT GENERATOR HOLDER WITH RECTIFIER

(a) Inspect the positive (+) rectifier.
  (1) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.
  (2) Reverse the polarity of the tester probes and repeat the step above.
  (3) Check that one shows a resistance of below 1 Ω and the other shows a resistance of 10 kΩ or higher.
  If the result is not as specified, replace the rectifier holder.

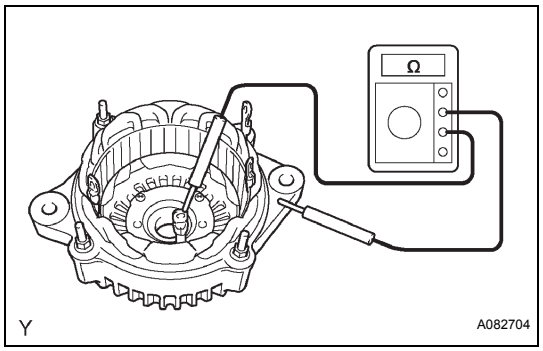


(b) Inspect the negative (-) rectifier.
  (1) Using an ohmmeter, connect one tester probe to each negative (-) terminal and the other to each rectifier terminal.
  (2) Reverse the polarity of the tester probes and repeat the step above.
  (3) Check that one shows a resistance of below 1 Ω and the other shows a resistance of 10 kΩ or higher.
  If the result is not as specified, replace the rectifier holder.



4. INSPECT DRIVE END FRAME

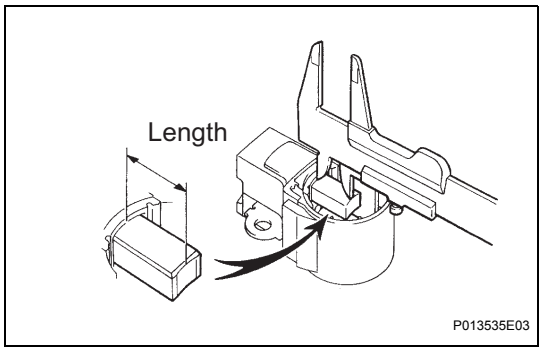
(a) Check the stator coil for an open circuit.
  (1) Measure the resistance between the coil leads.
  Standard resistance:
  Below 1 Ω
  If the result is not as specified, replace the drive end frame.



(b) Check the stator for ground.
  (1) Measure the resistance between the coil lead and drive end frame.
  Standard resistance:
  10 kΩ or higher
  If the result is not as specified, replace the drive end frame.

(c) Check that the bearing is not rough or worn.
  If necessary, replace the generator assembly.

CH



5. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY

(a) Using a vernier caliper, measure the exposed brush length.

Standard exposed length:
9.5 to 11.5 mm (0.374 to 0.453 in.)
Minimum exposed length:
4.5 mm (0.177 in.)

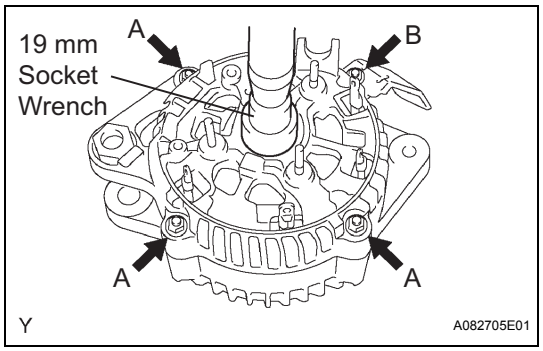
If the exposed length is less than the minimum, replace the brush holder assembly.

REASSEMBLY

1. INSTALL GENERATOR ROTOR ASSEMBLY

(a) Install the generator rotor.

(b) Install the generator washer onto the rotor.



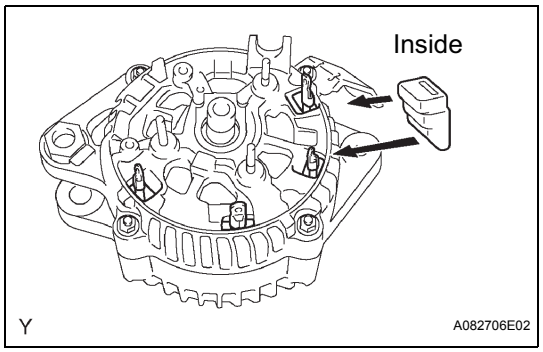
2. INSTALL GENERATOR RECTIFIER END FRAME

(a) Using a 19 mm socket wrench and press, slowly press in the rectifier end frame.

(b) Install the 4 nuts and cord clip.

Torque: 4.5 N*m (46 kgf*cm, 40 in.*lbf) for nut A
5.4 N*m (55 kgf*cm, 48 in.*lbf) for nut B

(c) Install the seal plate onto the rectifier end frame.



(d) Install the 4 rubber insulators onto the lead wires.

NOTICE:
Be careful that the rubber insulators are in the right direction.

3. INSTALL GENERATOR HOLDER WITH RECTIFIER

(a) Install the rectifier holder while pushing it with the 4 screws.

Torque: 2.9 N*m (30 kgf*cm, 26 in.*lbf)

4. INSTALL GENERATOR REGULATOR ASSEMBLY

(a) Install the 3 screws and generator regulator.

Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)

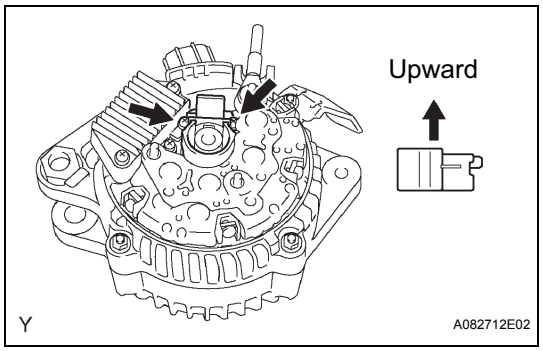
5. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

(a) Install the brush holder with the 2 screws.

Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)

NOTICE:
Be careful that the holder is in the right direction when installing.

(b) Install the brush holder cover.



6. INSTALL REAR END COVER

(a) Install the end cover and plate terminal with the bolt and 3 nuts.

Torque: 3.9 N*m (40 kgf*cm, 34 in.*lbf) for bolt
4.4 N*m (45 kgf*cm, 39 in.*lbf) for nut

(b) Install the terminal insulator with the nut.

Torque: 4.1 N*m (42 kgf*cm, 36 in.*lbf)

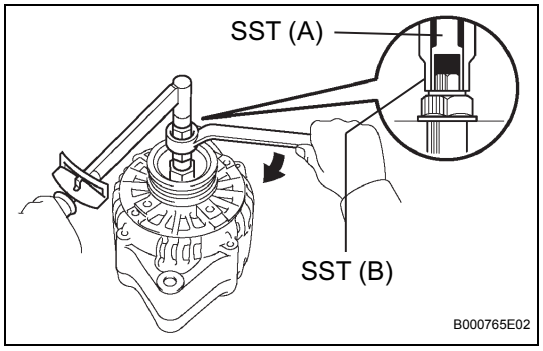
7. INSTALL GENERATOR PULLEY

(a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.

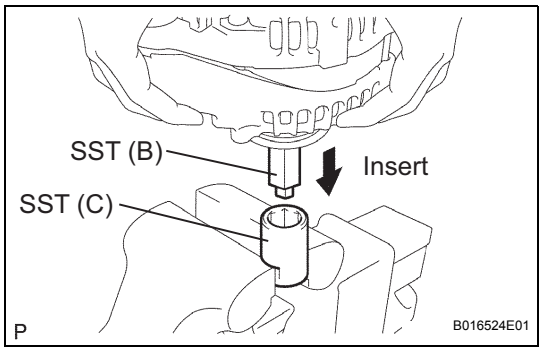
(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

SST 09820-63010 (09820-06010, 09820-06020)
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

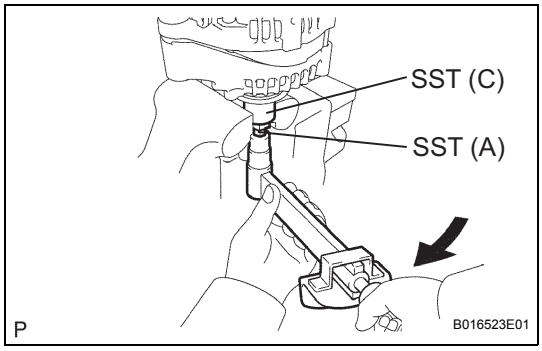
(c) Check that SST (A) is secured to the pulley shaft.



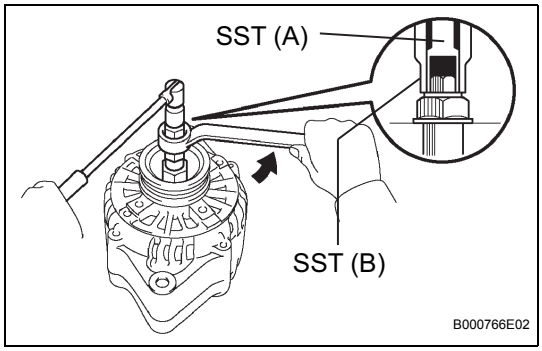
CH



(d) Mount SST (C) in a vise.
(e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).



(f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 133 N*m (1,356 kgf*cm, 98 ft.*lbf)
(g) Remove the generator from SST (C).

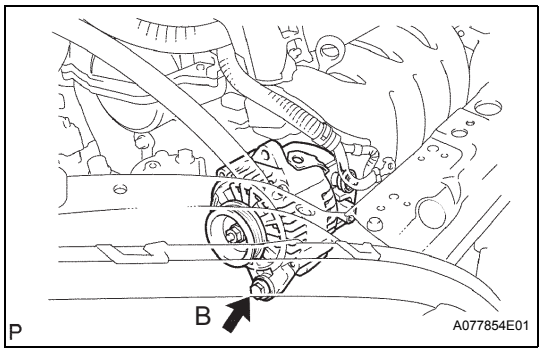


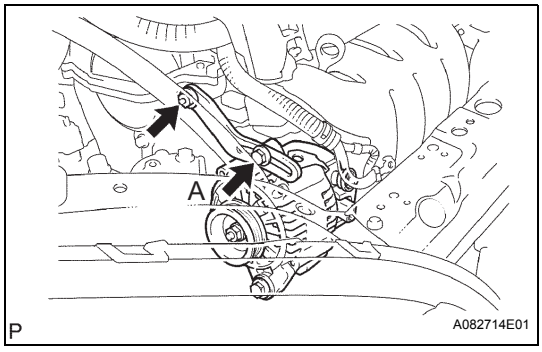
(h) Turn SST (B), and remove SST (A and B).

INSTALLATION

1. INSTALL GENERATOR ASSEMBLY

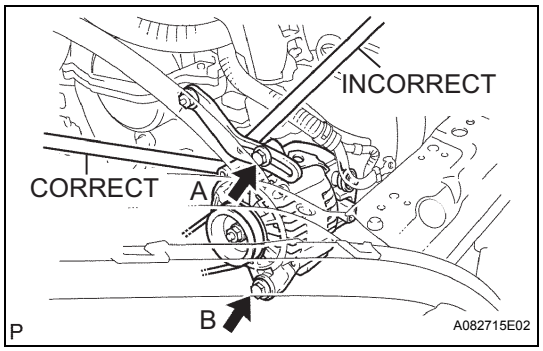
(a) Temporarily install the generator with bolt B.





(b) Temporarily install the adjusting bar with bolt A, and tighten the nut to the specified torque.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

CH



(c) Temporarily install the fan and generator V-belt onto each pulley.

(d) Insert the adjusting bar between the engine mounting bracket and generator. Push the adjusting bar towards the vehicle front to adjust the V-belt tension.

NOTICE:
Do not insert the adjusting bar between the oil control valve and generator because it could damage the oil control valve.

(e) First tighten bolt A, and then tighten bolt B.
Torque: 18.5 N*m (189 kgf*cm, 14 ft.*lbf) for bolt A
54 N*m (551 kgf*cm, 40 ft.*lbf) for bolt B

(f) Install the wire harness clamp.

(g) Connect the generator connector.

(h) Install the generator wire with the nut.
Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)

(i) Install the terminal cap.

2. INSPECT GENERATOR V BELT (See page EM-7)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION

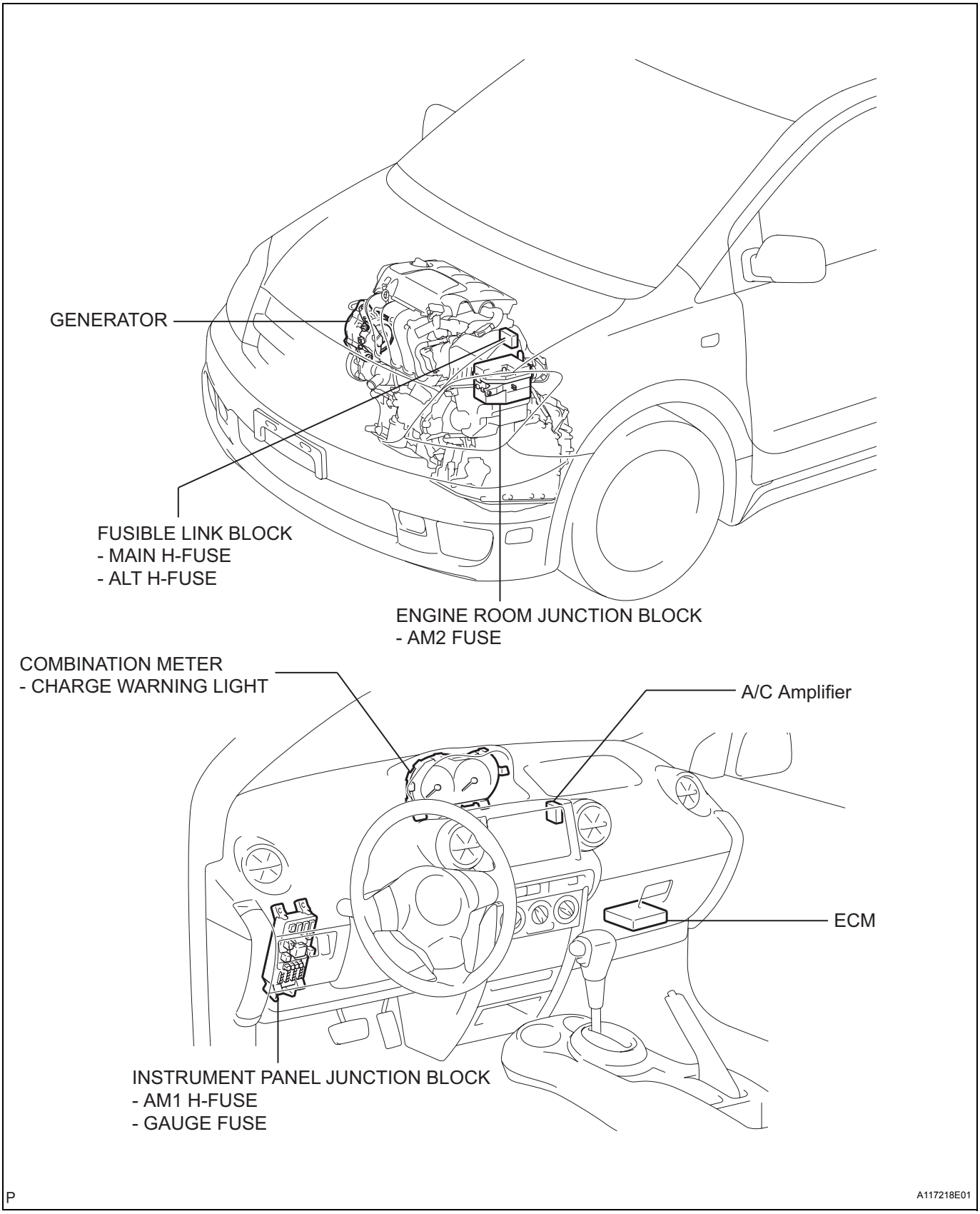
(a) Perform initialization (see page).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

CHARGING SYSTEM

PRECAUTION

1. **Check that the battery cables are connected to the correct terminals.**
2. **Disconnect the battery cables when the battery is quickly charged.**
3. **Do not perform tests with a high voltage insulation resistance tester.**
4. **Never disconnect the battery cable while the engine is running.**
5. **Check that the charging cable nut is tightened on terminal B of the generator and the fuse box.**
6. **If the generator is installed to the vehicle, do not perform checks on terminal F.**

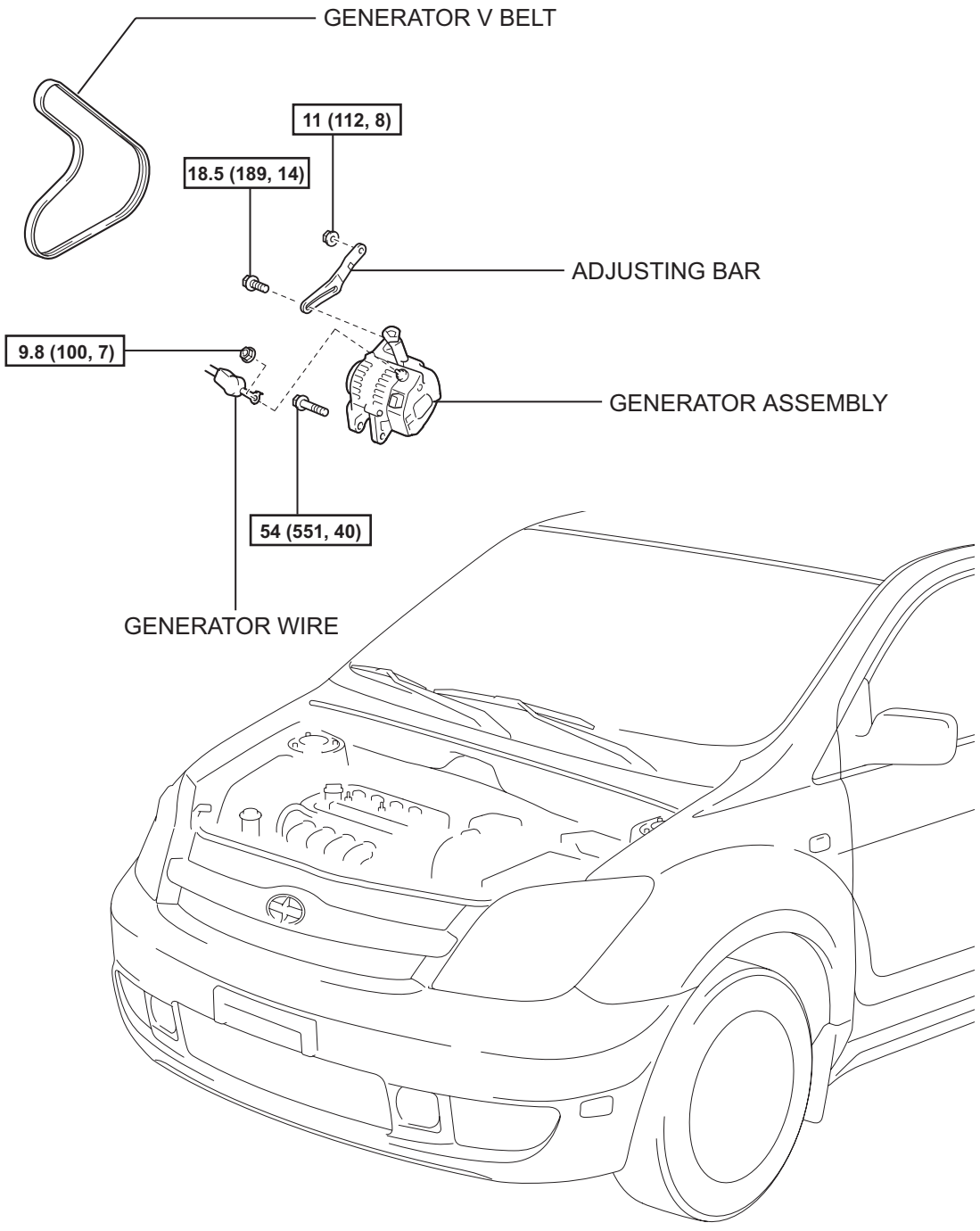
PARTS LOCATION



CH

GENERATOR

COMPONENTS

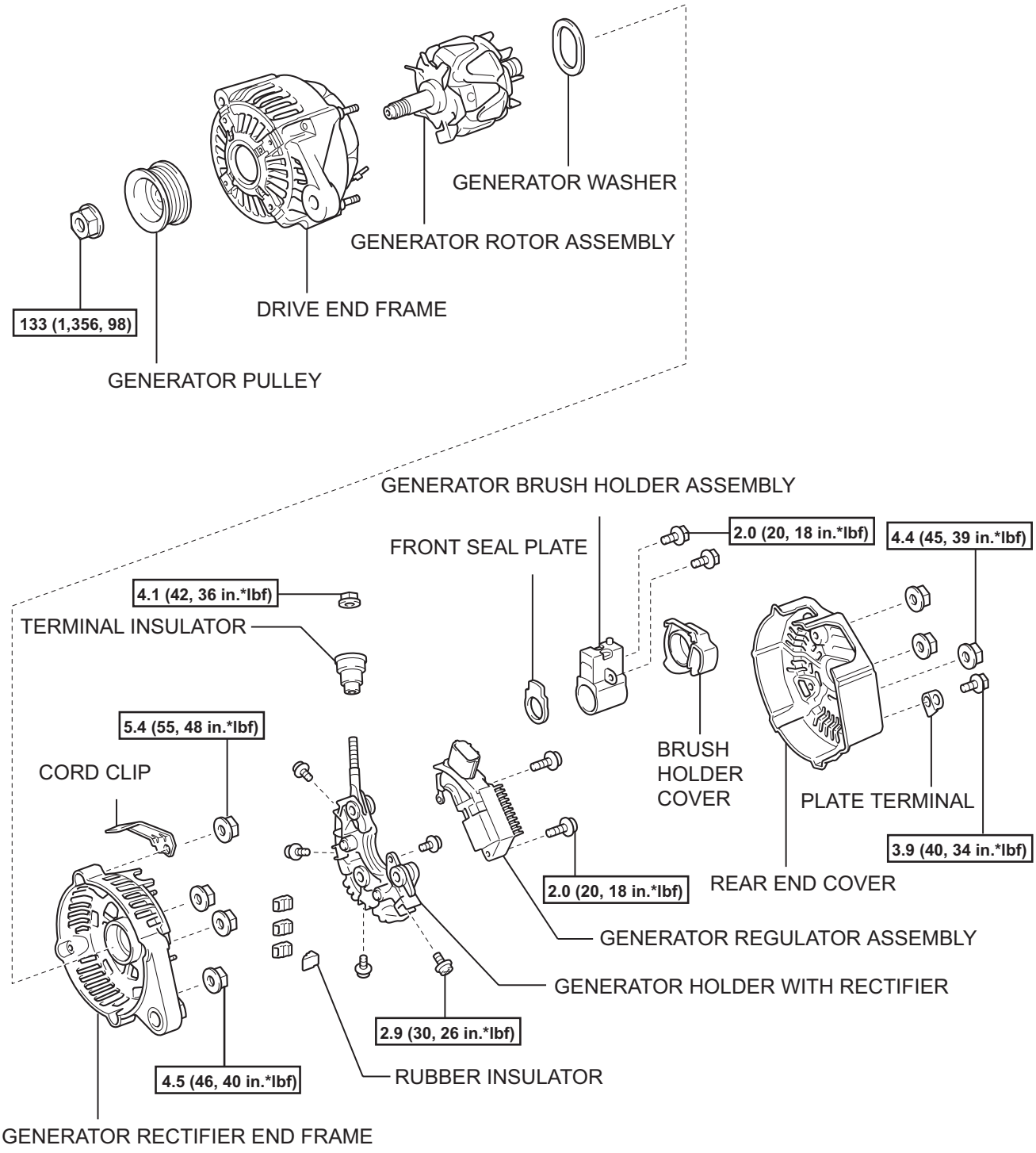


N*m (kgf*cm, ft.*lbf) : Specified torque

P

A117139E01

CH



CH

N*m (kgf*cm, ft.*lbf) : Specified torque

Y

A117210E01

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects malfunction only 1 time during a single driving cycle. "Continuous" means that the ECM detects a malfunction every time the enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediate" means that the ECM illuminates the MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates the MIL if the same malfunction is detected again in the 2nd driving cycle.
Component operating range	Normal operation range of sensors and solenoids under normal driving conditions. Use these ranges as a reference. They cannot be used to judge if a sensor or solenoid is defective or not.

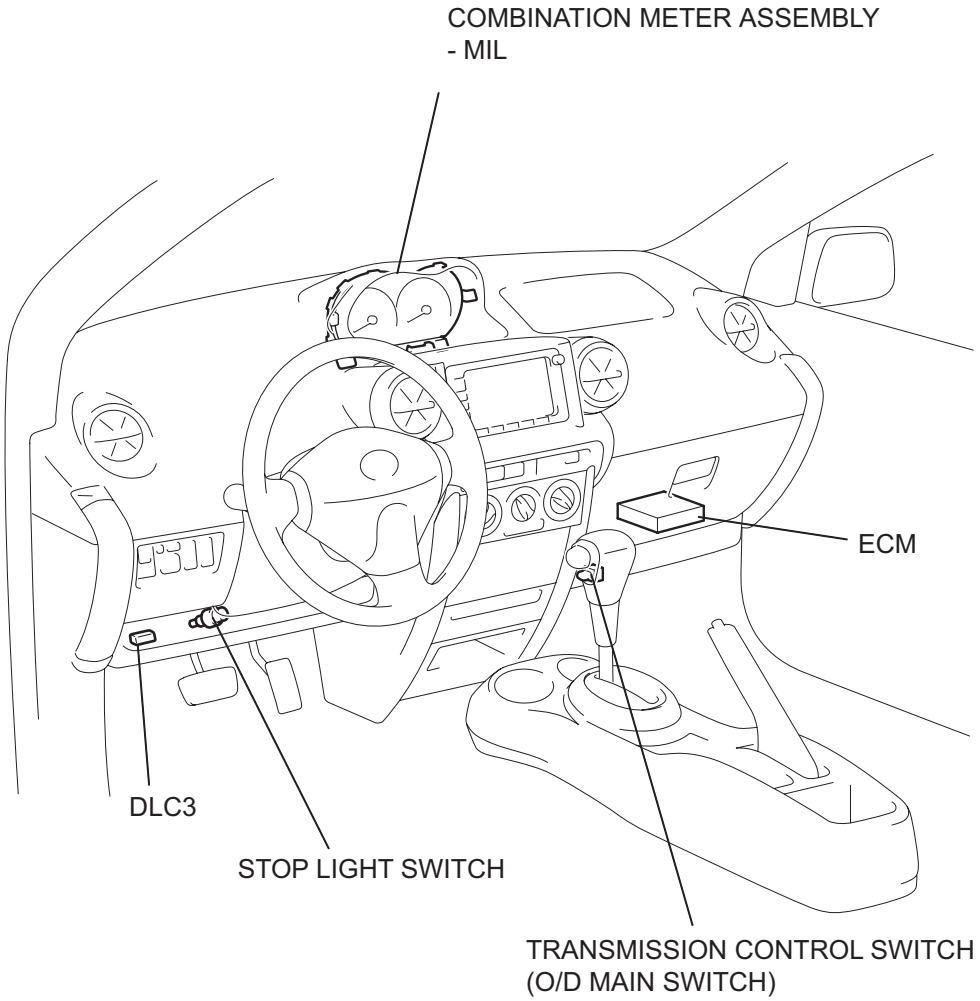
PART AND SYSTEM NAME LIST

This reference list indicates the part and system names used in this manual along with their definitions.

Part and System Name	Definition
Accel position sensor	Accelerator pedal position sensor
AFS	Air fuel ratio sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor "A"	Transmission fluid temperature sensor
Camshaft timing oil control valve, Oil control valve OCV, VVT, VSV	Camshaft timing oil control valve
Charcoal canister	Evaporative emissions canister
Crankshaft position sensor "A"	Crankshaft position sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic transmission
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Engine immobiliser system, Immobiliser system	Vehicle anti-theft system
Engine speed sensor	Crankshaft position sensor
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
Input speed sensor, Input turbine speed sensor "A", Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intermediate shaft speed sensor "A"	Counter gear speed sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
O2 sensor	Heater oxygen sensor
ORVR system	On-board refueling vapor recovery system
Output speed sensor	Output shaft speed sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
PNP switch, NSW	Park/Neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
PS pressure switch	Power steering pressure switch
Shift solenoid	Transmission shift solenoid valve
Speed sensor, Vehicle speed sensor "A", Speed sensor for skid control ECU	Vehicle speed sensor
THA	Intake air temperature
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Toyota HCAC system, Hydrocarbon adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Transmission control switch, Shift lock control unit	Shift lock control module
Turbo pressure sensor	Turbocharger pressure sensor
Vacuum sensor	Manifold air pressure sensor
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Variable timing and lift, VVTL	Camshaft timing and lift control
Variable valve timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system

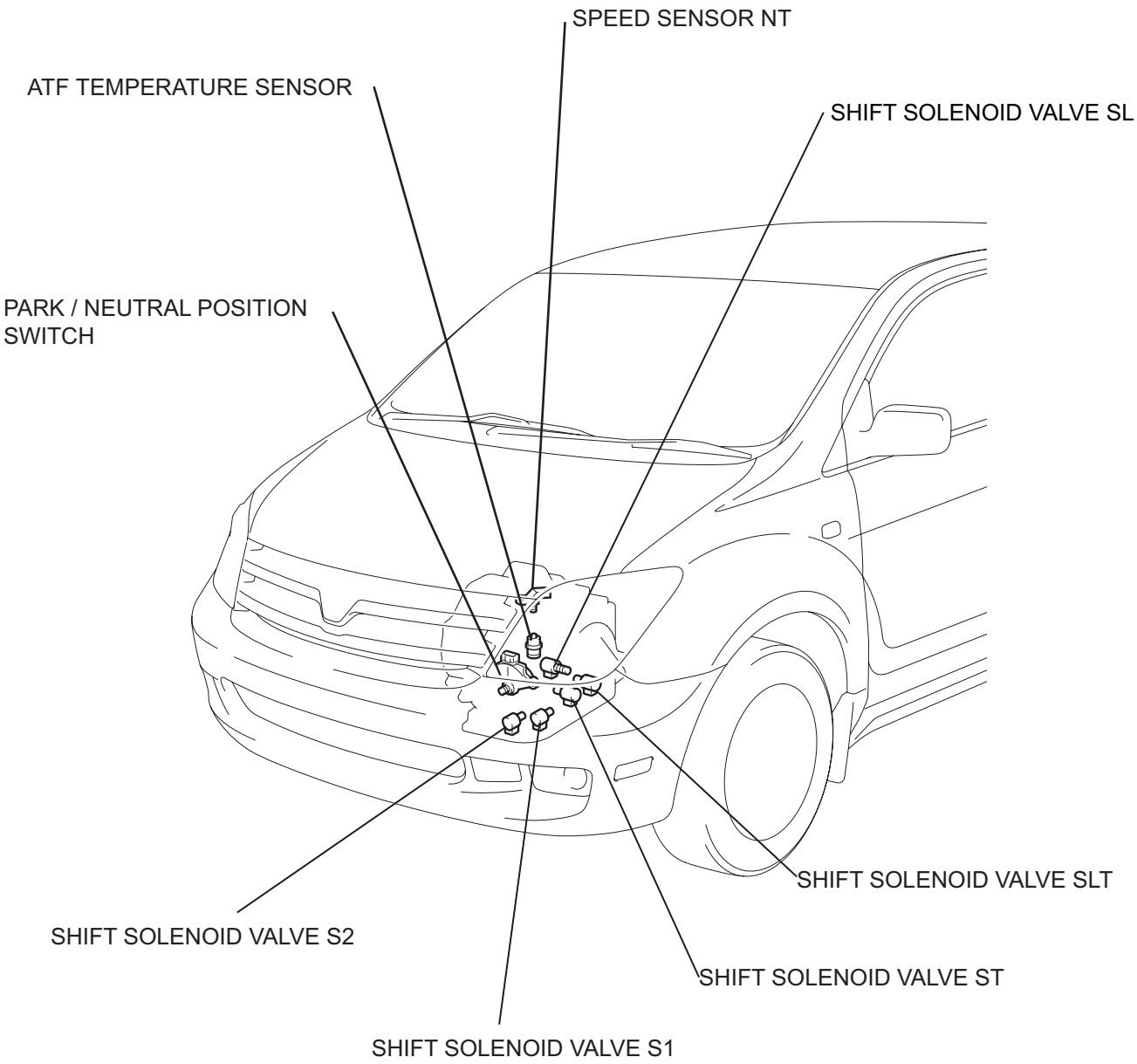
Part and System Name	Definition
VSV for ACM	Active control engine mount
VSV for CCV, VSV for canister close valve	Evaporative emissions canister vent valve
VSV for EVAP, No. 1 vacuum switching valve assembly, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for intake control	Intake manifold tuning solenoid valve
VSV for pressure switching valve, By-pass VSV	Evaporative emission pressure switching valve
VSV for turbo	Turbocharger pressure control solenoid valve

PARTS LOCATION



P

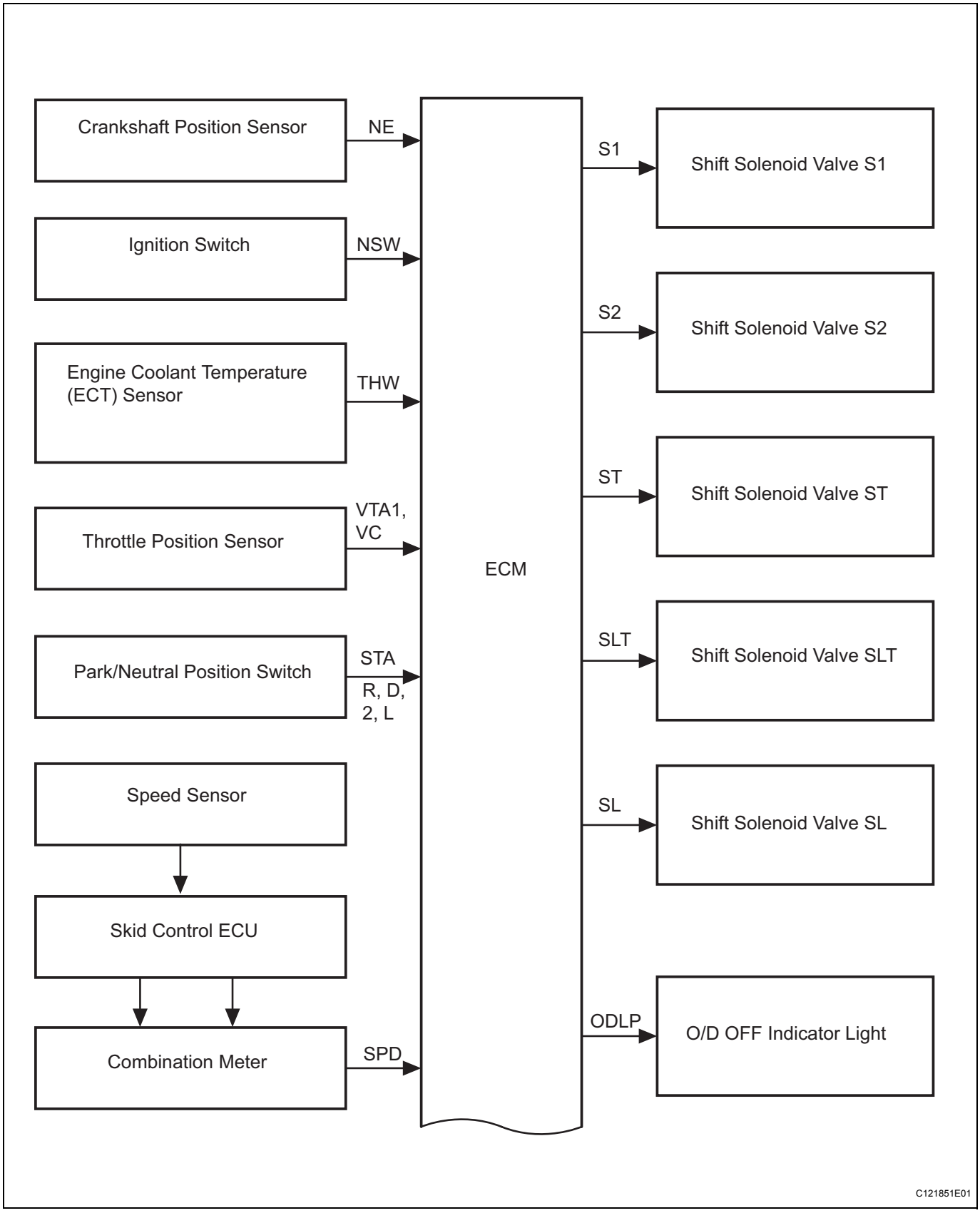
C118359E02


SPEED SENSOR NT
ATF TEMPERATURE SENSOR
SHIFT SOLENOID VALVE SL
PARK / NEUTRAL POSITION SWITCH
SHIFT SOLENOID VALVE SLT
SHIFT SOLENOID VALVE S2
SHIFT SOLENOID VALVE ST
SHIFT SOLENOID VALVE S1
P
C118360E01

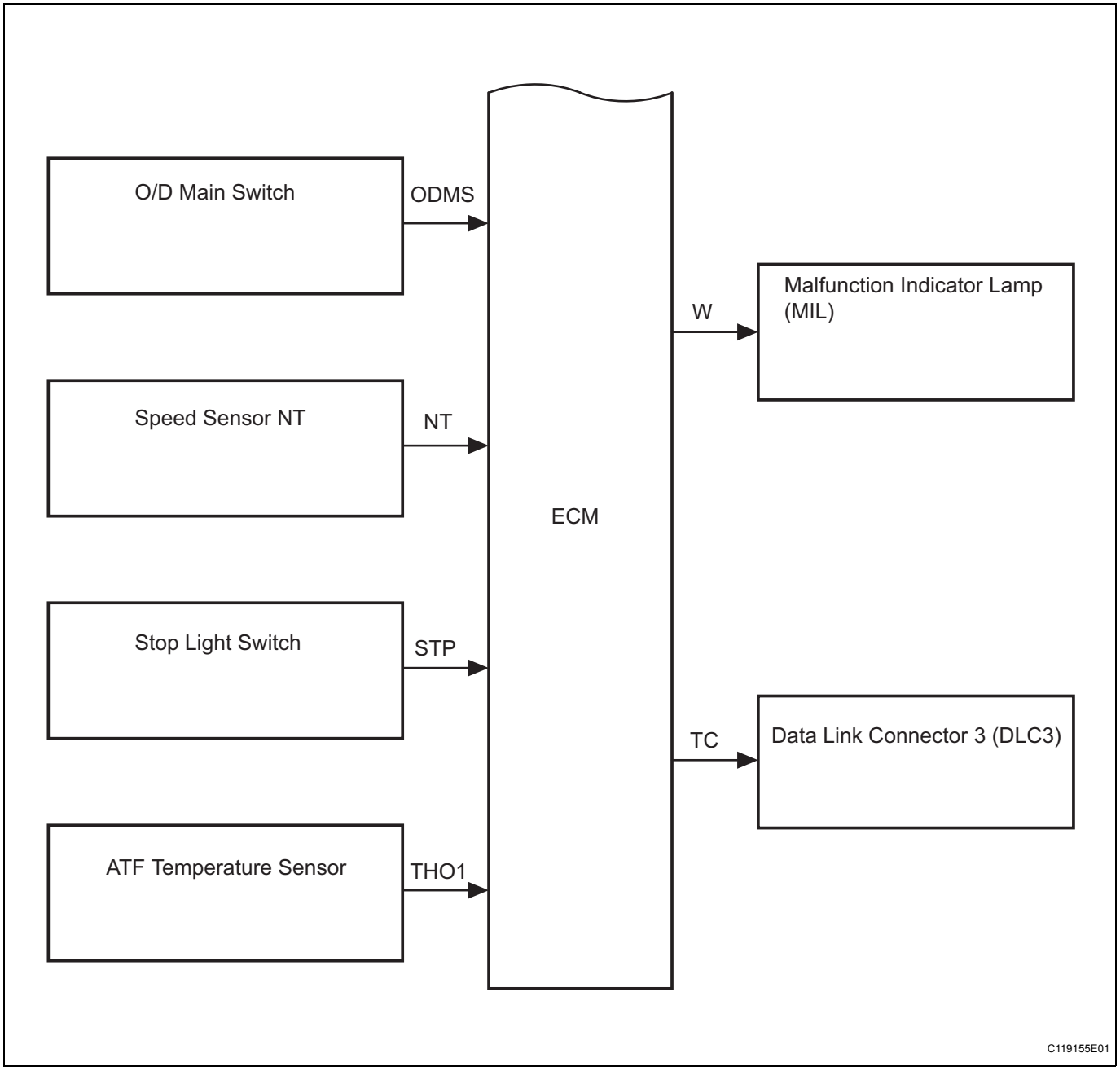
AX

SYSTEM DIAGRAM

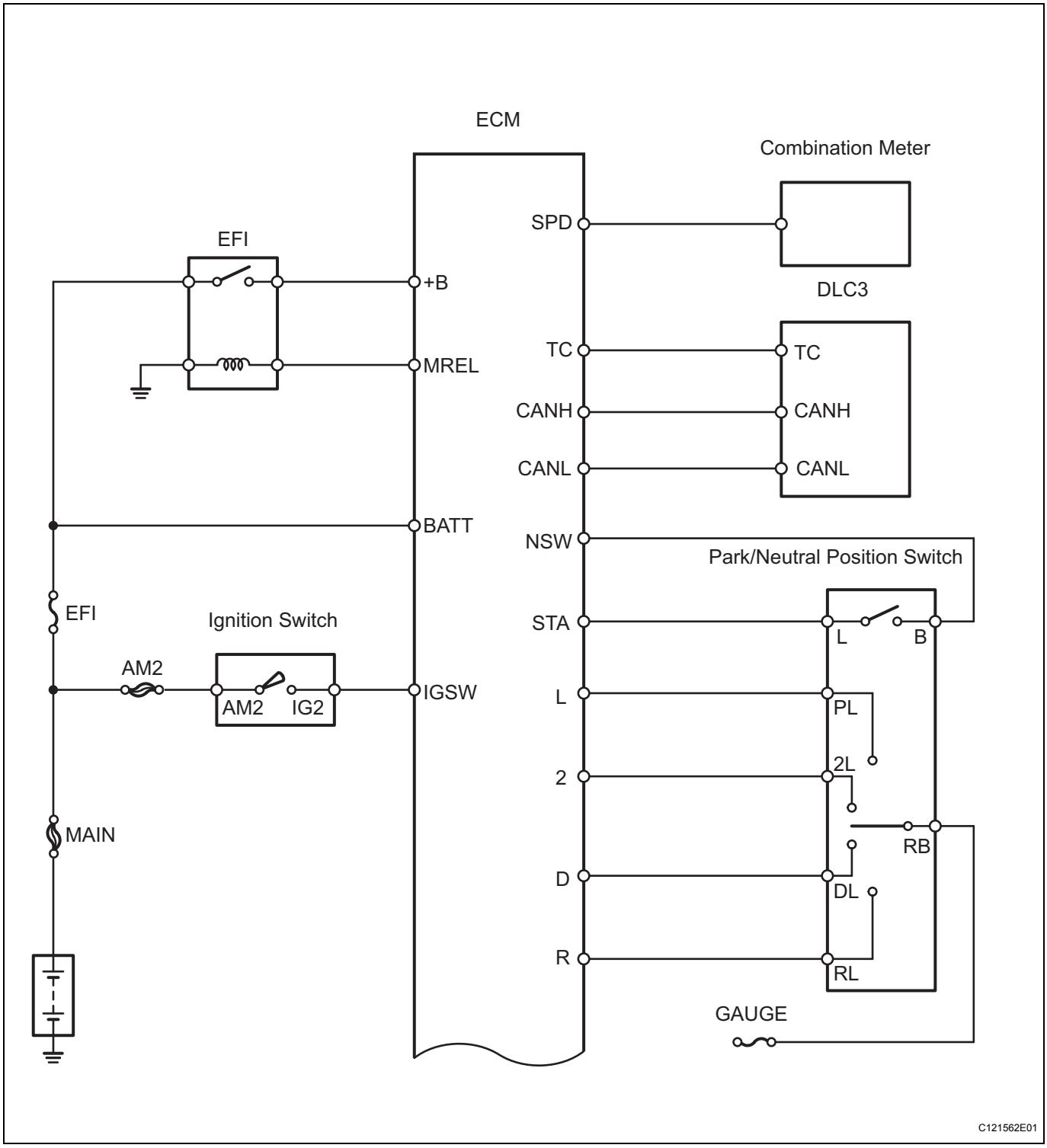
The configuration of the electronic control system in the U340E automatic transaxle is as shown in the following chart.



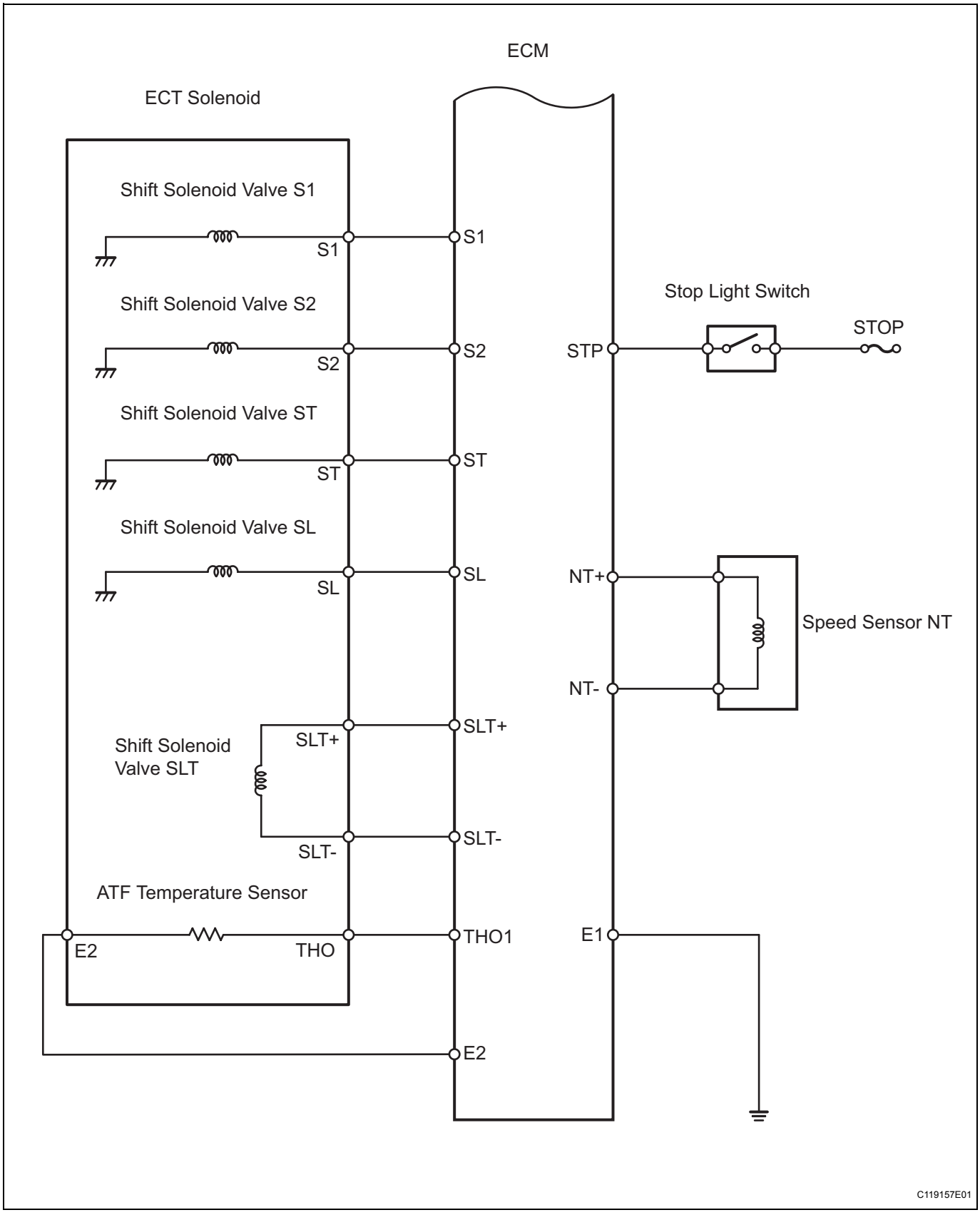
AX


O/D Main Switch
ODMS
Speed Sensor NT
NT
Stop Light Switch
STP
ATF Temperature Sensor
THO1
ECM
W
Malfunction Indicator Lamp (MIL)
TC
Data Link Connector 3 (DLC3)
C119155E01

AX

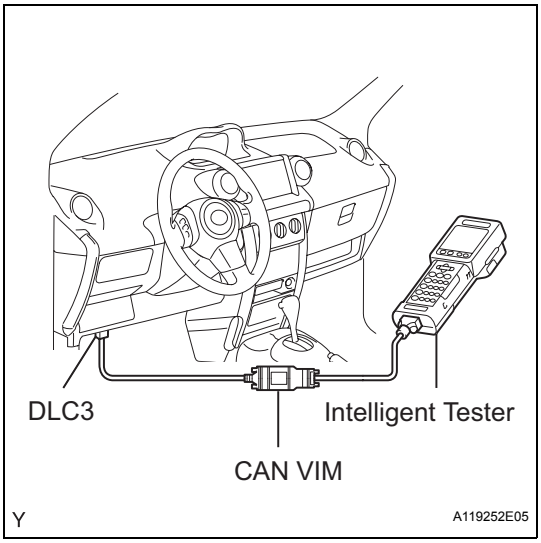

ECM
Combination Meter
SPD
EFI
+B
DLC3
TC
MREL
TC
CANH
CANH
CANL
CANL
BATT
NSW
Park/Neutral Position Switch
EFI
Ignition Switch
STA
L
B
AM2
IGSW
L
PL
AM2
IG2
2
2L
RB
MAIN
D
DL
R
RL
GAUGE
C121562E01

AX


ECM
ECT Solenoid
Shift Solenoid Valve S1
S1
S1
Shift Solenoid Valve S2
S2
S2
Shift Solenoid Valve ST
ST
ST
Shift Solenoid Valve SL
SL
SL
Shift Solenoid
Valve SLT
SLT+
SLT+
SLT-
SLT-
ATF Temperature Sensor
E2
THO
THO1
E2
Stop Light Switch
STP
STOP
NT+
NT-
Speed Sensor NT
E1
C119157E01

6. **CHECK MIL**
   (a) Check that the MIL illuminates when turning the ignition switch ON.
   If the MIL does not illuminate, there is a problem in the MIL circuit (see page ES-321).
   (b) When the engine is started, the MIL should turn off.
7. **ALL READINESS**
   (a) For this vehicle, using the intelligent tester allows readiness codes corresponding to all DTCs to be read. When the diagnosis (normal or malfunctioning) has been completed, readiness codes are set. Enter the following menus: ENHANCED OBD II / MONITOR STATUS on the intelligent tester.

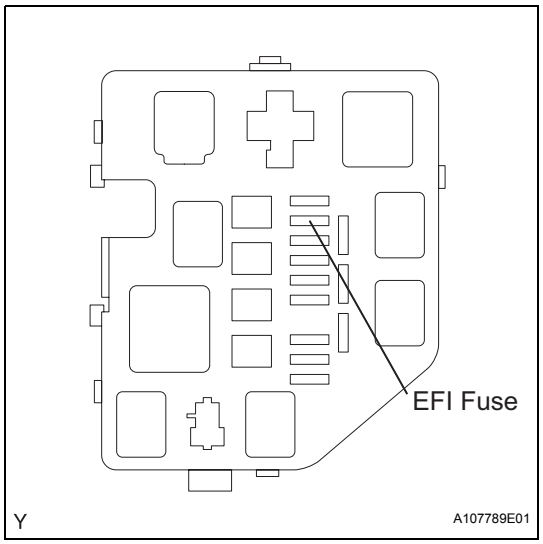
DTC CHECK / CLEAR



1. **CHECK DTC**
   (a) DTCs which are stored in the ECM can be displayed on the intelligent tester.
   The intelligent tester can display pending DTCs and current DTCs. Some DTCs are not stored unless a malfunction is detected in consecutive driving cycles. When a malfunction is detected in only one driving cycle, it is stored as a pending DTC.
   (1) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
   (2) Turn the ignition switch ON.
   (3) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES (or PENDING CODE).
   (4) Confirm the DTCs and freeze frame data and then write them down.
   (5) Confirm the details of the DTCs (see page AX-36).
   NOTICE:
   When simulating a symptom with the scan tool to check for DTCs, use normal mode. For codes on the DIAGNOSTIC TROUBLE CODE CHART subject to "2 trip detection logic", perform the following actions. Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the symptom has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.
2. **CLEAR DTC**
   (a) When using the intelligent tester:
   (1) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
   (2) Turn the ignition switch ON.

(3) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES. Then press YES.
HINT:
When operating the intelligent tester to erase the codes, the DTCs and freeze frame data will be erased.

(b) When not using the intelligent tester:
(1) Disconnect the battery terminal or remove the EFI fuse from the engine room junction block for 60 seconds or more. If you disconnect the battery terminal, perform the "INITIALIZATION" procedure (see page AX-19).

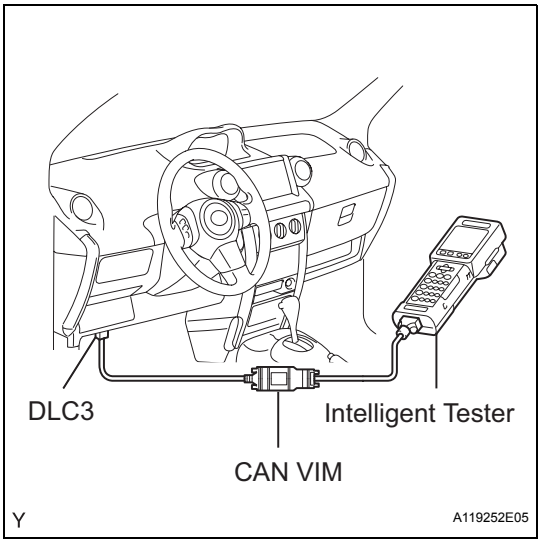


CHECK MODE PROCEDURE

1. DESCRIPTION

(a) Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are detected with 1 trip detection logic.

2. CHECK MODE PROCEDURE



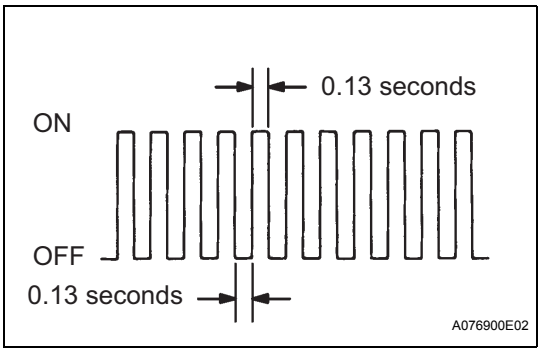
(a) Make sure that the following conditions are met:
(1) Battery positive voltage 11 V or more
(2) Throttle valve fully closed
(3) Transaxle in the P or N position
(4) A/C OFF

(b) Turn the ignition switch OFF.

(c) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(d) Turn the ignition switch ON.

(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.



(f) Change the ECM to check mode. Make sure the MIL flashes as shown in the illustration.
NOTICE:
All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester is used to change the ECM from normal mode to check mode or vice versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.
Before changing to check mode, make notes of the DTCs and freeze frame data.

(g) Start the engine. The MIL should turn off after the engine starts.

(h) Perform "MONITOR DRIVE PATTERN" for the ECT test (see page AX-21).
(Or, simulate the conditions of the malfunction described by the customer.)

(i) After simulating the malfunction conditions, use the intelligent tester to check the DTC and freeze frame data.

AX

FAIL-SAFE CHART

1. FAIL-SAFE CHART

This function minimizes the loss of the ECT functions when any malfunction occurs in a sensor or solenoid.

(a) Vehicle speed signal (SPD):
When there are problems with vehicle speed signals, O/D up-shift is prohibited.

(b) Speed sensor (NT):
When the input turbine speed sensor has a malfunction, O/D up-shift is prohibited.

(c) Automatic Transmission Fluid (ATF) temperature sensor:
When the ATF temperature sensor has a malfunction, O/D up-shift is prohibited.

(d) Shift solenoid valve SL:
If the ECM detects a malfunction in the solenoid valve SL, it turns the valve OFF.

(e) Shift solenoid valve SLT:
When the solenoid valve SLT has a malfunction, O/D up-shift is prohibited.

(f) Engine Coolant Temperature (ECT) sensor:
When the ECT sensor has a malfunction, O/D up-shift is prohibited.

(g) Knock sensor:
When the knock sensor has a malfunction, O/D up-shift is prohibited.

(h) Throttle position sensor:
When the throttle position sensor has a malfunction, O/D up-shift is prohibited.

(i) Shift solenoid valve S1 and S2:
Fail-safe function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid "ON" and "OFF" in order to shift into the gear positions shown in the table below.
The ECM also turns the shift solenoid valve ST OFF at the same time. If both solenoids malfunction, hydraulic control cannot be performed electronically and must be done manually.
Manual shifting as shown in the following table must be done. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid.
Even if starting the engine in the fail-safe mode, the gear position remains in the same position.

AX

Position	Normal			Shift Solenoid Valve S1 Malfunctioning			Shift Solenoid Valve S2 Malfunctioning			Both Solenoid Valves Malfunctioning
	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear	Gear when shift selector is manually operated
	S1	S2		S1	S2		S1	S2		
D	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
	OFF	ON	O/D	X	ON	O/D	OFF	X	3rd	3rd

Position	Normal			Shift Solenoid Valve S1 Malfunctioning			Shift Solenoid Valve S2 Malfunctioning			Both Solenoid Valves Malfunctioning
	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear	Gear when shift selector is manually operated
	S1	S2		S1	S2		S1	S2		
2	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
L	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd

HINT:

- X: OFF (the ECM stops sending current to a malfunctioning solenoid valve)
- ↓: Condition in the electrical operation is shown above the "↓".
- ↓: Condition in the fail-safe mode is shown below the "↓".

AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

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

System Name	See procedure
Sliding Roof System	RF-4

- **Perform the RESET MEMORY procedure (A/T initialization) when replacing the automatic transaxle assembly, engine assembly or ECM (see page AX-19).**

HINT:
RESET MEMORY cannot be completed by only reconnecting the cable to the negative (-) battery terminal.

CAUTION:
When using compressed air, always aim away from yourself to prevent Automatic Transmission Fluid (ATF) or kerosene from spraying on your face.

NOTICE:

- **The automatic transaxle is composed of precision-made parts, necessitating careful inspection before reassembly because even a small nick could cause fluid leakage or affect performance.**
- **The procedures are organized so that you work on only one component group at a time. This will help avoid confusion with similar-looking parts of different sub-assemblies being on your workbench at the same time.**
- **The component groups are inspected and repaired from the converter housing side.**
- **Whenever possible, complete the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups.**
- **Use of Toyota Genuine ATF T-IV is recommended.**
- **All disassembled parts should be washed clean, and compressed air should be blown through any fluid passages and holes.**
- **Dry all parts with compressed air. Never use cloth.**
- **The recommended ATF or kerosene should be used for cleaning.**
- **After cleaning, the parts should be arranged in the order they were removed for efficient inspection, repairs, and reassembly.**

- **When disassembling a valve body, be sue to match each valve with its corresponding spring.**
- **New discs for the brakes and clutches that will be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.**
- **All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.**
- **All old gaskets and rubber O-rings must be replaced.**
- **Do not apply adhesive cement to gaskets and similar parts.**
- **Make sure that the ends of the snap rings are not aligned with any cutouts. Also make sure that snap rings are correctly installed into the grooves.**
- **If a worn bushing is to be replaced, the sub-assembly containing the bushing must also be replaced.**
- **Check the thrust bearings and races for wear or damage. Replace if necessary.**
- **Use petroleum jelly to keep parts in place.**
- **When working with FIPG material, perform the following:**
  Using a razor blade and gasket scraper, remove all old FIPG material from the gasket surface.
  Clean all components thoroughly to remove all foreign matter.
  Clean both sealing surfaces with a non-residue solvent.
  Apply FIPG material in a continuous line approximately 1 mm (0.04 in.) in diameter on the sealing surface.
  Reassemble parts within 10 minutes of applying FIPG material. Failing to do so will require the FIPG material to be removed and reapplied.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.

(b) Turn the ignition switch OFF.

(c) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(d) Turn the ignition switch ON.

(e) Turn the intelligent tester ON.

(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

(g) Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF	-
PNP SW (NSW)	PNP switch status/ ON or OFF	Shift lever is: On P or N: ON Not on P or N: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
REVERSE	PNP switch status/ ON or OFF	Shift lever is: On R: ON Not on R: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
DRIVE	PNP switch status/ ON or OFF	Shift lever is: On D: ON Not on D: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
2ND	PNP switch status/ ON or OFF	Shift lever is: On 2: ON Not on 2: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
LOW	PNP switch status/ ON or OFF	Shift lever is: On L: ON Not on L: OFF	When shift lever position displayed on intelligent tester differs from actual position, adjustment of PNP switch or shift cable may be incorrect HINT: When failure still occurs even after adjusting these parts, see page AX-38
SHIFT	ECM gear shift command/ 1st, 2nd, 3rd or 4th (O/D)	Shift lever position is: • On L: 1st • On 2: 1st or 2nd • On 3 (O/D OFF): 1st, 2nd or 3rd • On D (O/D ON): 1st, 2nd, 3rd or 4th (O/D)	-
LOCK UP SOL	Lock-up solenoid status/ ON or OFF	• Lock-up: ON • Not on lock-up: OFF	-
SOLENOID (SLT)	Shift solenoid SLT status/ ON or OFF	• Accelerator pedal is depressed: OFF • Accelerator pedal is released: ON	-
OVERDRV CUT SW2	O/D switch status/ ON or OFF	• Ignition switch ON: ON ↓ • O/D switch pushed: OFF ↓ • O/D switch pushed: ON	-
AT FLUID TEMP	ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature during cold soak	If value is -40°C (-40°F) or 215°C (419°F), ATF temperature sensor circuit is opened or short circuited

AX

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
(d) Turn the ignition switch ON.
(e) Turn the tester ON.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.

(g) Perform the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate shift solenoid valve and set each shift lever position by yourself [Vehicle Condition] 50 km/h (31 mph) or less [Other information] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check operation of shift solenoid valves
LOCK UP	[Test Details] Control shift solenoid SL to set automatic transaxle to the lock-up condition [Vehicle Condition] Vehicle speed: 58 km/h (36 mph) or more	Possible to check shift solenoid SL operation
TIMING SOL	[Test Details] Operate shift solenoid ST [Vehicle Condition] • Vehicle stopped • IDL: ON	Possible to check shift solenoid ST operation
LINE PRESS UP*	[Test Details] Operate shift solenoid SLT and raise line pressure [Vehicle Condition] • Vehicle stopped • IDL: ON HINT: OFF: Line pressure up ON: No action (normal operation)	-

HINT:
*: LINE PRESS UP in the ACTIVE TEST is performed to check the line pressure changes by connecting SST to the automatic transaxle, which is used in the HYDRAULIC TEST (see page AX-18) as well. Please note that the pressure values in the ACTIVE TEST and HYDRAULIC TEST are different.

DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	- Short in park/neutral position switch circuit - Park/Neutral position switch - ECM	Comes on	DTC stored	AX-38
P0710	Transmission Fluid Temperature Sensor "A" Circuit	- Open or short in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-42
P0711	Transmission Fluid Temperature Sensor "A" Performance	- Transaxle fluid level - ATF temperature sensor - ECM	Comes on	DTC stored	AX-45
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	- Short in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-42
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	- Open in ATF temperature sensor circuit - ATF temperature sensor - ECM	Comes on	DTC stored	AX-42
P0717	Input Speed Sensor Circuit No Signal	- Open or short in speed sensor NT circuit - Speed sensor NT - ECM - Automatic transaxle (clutch, brake, gear, etc.)	Comes on	DTC stored	AX-48
P0724	Brake Switch "B" Circuit High	- Short in stop light switch circuit - Stop light switch - ECM	Comes on	DTC stored	AX-51
P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)	- Shift solenoid valve SL remains open or closed - Valve body is blocked - Shift solenoid valve SL - Torque converter clutch - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-54
P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	- Shift solenoid valve S1 remains open or closed - Valve body is blocked - Shift solenoid valve S1 - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-57

DTC No.	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	- Shift solenoid valve S2 remains open or closed - Valve body is blocked - Shift solenoid valve S2 - Automatic transaxle (clutch, brake, gear, etc.) - ECM	Comes on	DTC stored	AX-60
P0787	Shift / Timing Solenoid Low (Shift Solenoid Valve ST)	- Short in shift solenoid valve ST circuit - Shift solenoid valve ST - ECM	Comes on	DTC stored	AX-63
P0788	Shift / Timing Solenoid High (Shift Solenoid Valve ST)	- Open in shift solenoid valve ST circuit - Shift solenoid valve ST - ECM	Comes on	DTC stored	AX-63
P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	- Short in shift solenoid valve S1 circuit - Shift solenoid valve S1 - ECM	Comes on	DTC stored	AX-66
P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)	- Open in shift solenoid valve S1 circuit - Shift solenoid valve S1 - ECM	Comes on	DTC stored	AX-66
P0976	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	- Short in shift solenoid valve S2 circuit - Shift solenoid valve S2 - ECM	Comes on	DTC stored	AX-70
P0977	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)	- Open in shift solenoid valve S2 circuit - Shift solenoid valve S2 - ECM	Comes on	DTC stored	AX-70
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	- Open or short in shift solenoid valve SLT circuit - Shift solenoid valve SLT - ECM	Comes on	DTC stored	AX-73
P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	- Short in shift solenoid valve SL circuit - Shift solenoid valve SL - ECM	Comes on	DTC stored	AX-77
P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	- Open in shift solenoid valve SL circuit - Shift solenoid valve SL - ECM	Comes on	DTC stored	AX-77

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	2 or more switches are ON simultaneously for P (NSW), R, N (NSW), D, 2 and L positions (2 trip detection logic)	• Short in park/neutral position switch circuit • park/neutral position switch • ECM

MONITOR DESCRIPTION

These DTCs indicate a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that the engine can be started only when the shift lever is on P or N.
The park/neutral position switch sends a signal to the ECM according to the shift lever position (R, D, 2 or L).
The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705: Park/Neutral position switch/Verify switch input
Required sensors/Components	Park/Neutral position switch
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available	-

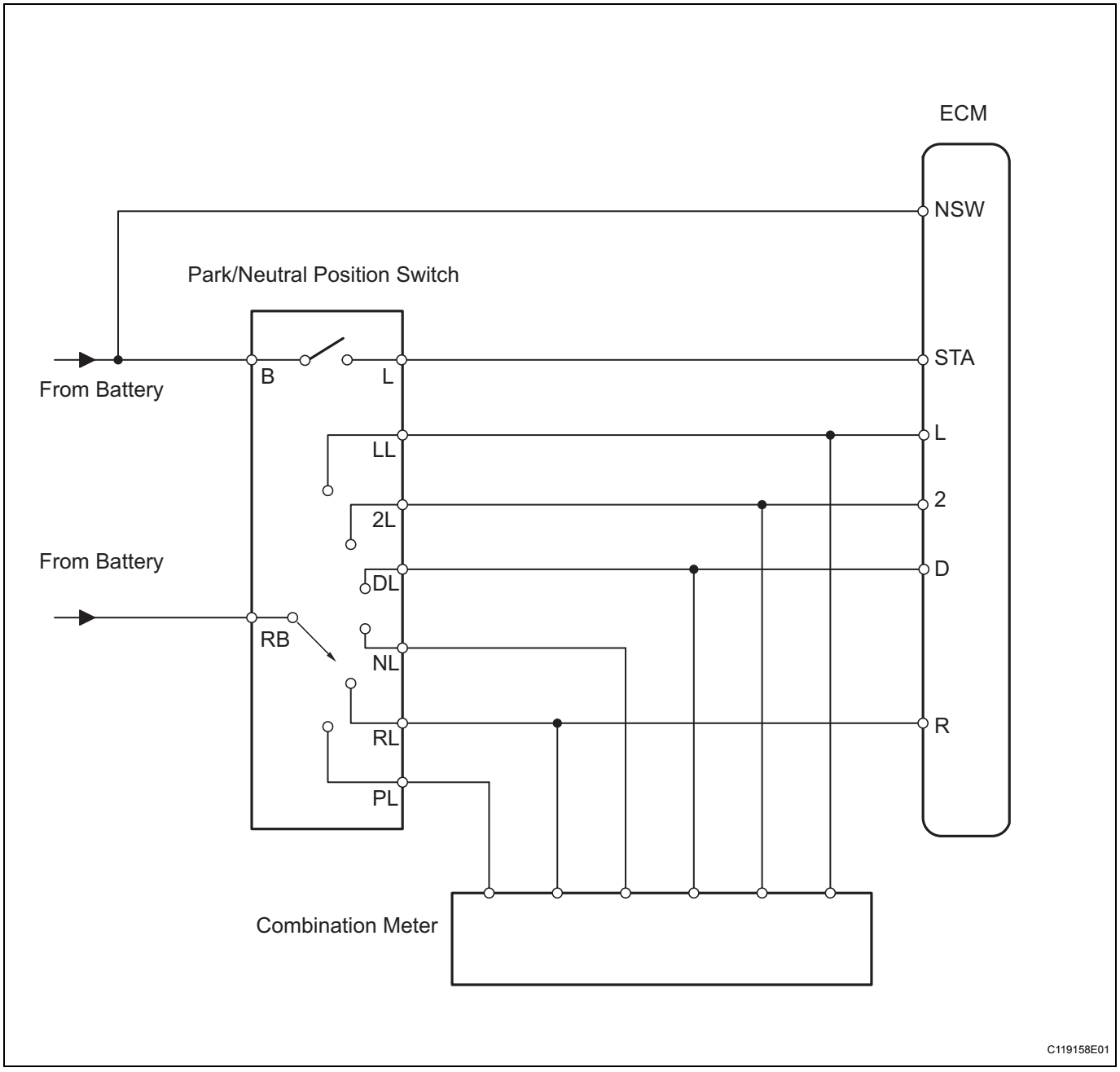
TYPICAL MALFUNCTION THRESHOLDS

When either condition below is met:	A or B
A. Number of the following signal inputs at the same time	2 or more
Park/Neutral position switch	ON
R switch	ON
D switch	ON
2 switch	ON
L switch	ON
B. All of the following conditions are met:	-
Park/Neutral position switch	OFF
R switch	OFF
D switch	OFF
2 switch	OFF
L switch	OFF

COMPONENT OPERATING RANGE

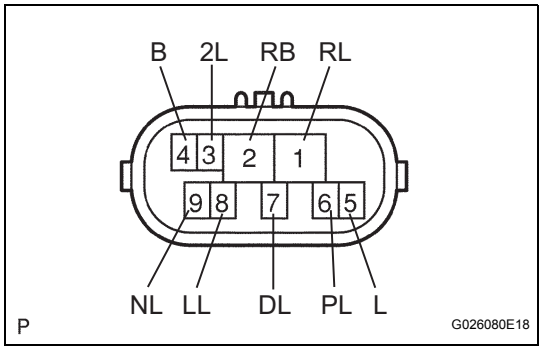
Park/Neutral position switch	Park/Neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT PARK/NEUTRAL POSITION SWITCH



(a) Disconnect the P1 park/neutral position switch connector.
(b) Measure the resistance of the park/neutral position switch when the shift lever is moved to each position.
Standard resistance

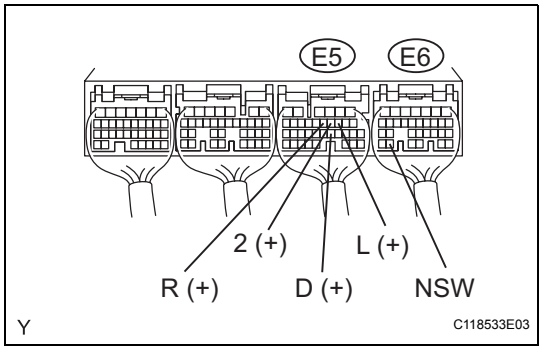
Tester Connection	Shift Lever Position	Specified Condition
2 (RB) - 6 (PL) and 4 (B) - 5 (L)	P	Below 1 Ω
2 (RB) - 6 (PL) and 4 (B) - 5 (L)	Not on P	10 kΩ or higher
1 (RL) - 2 (RB)	R	Below 1 Ω
1 (RL) - 2 (RB)	Not on R	10 kΩ or higher
2 (RB) - 9 (NL) and 4 (B) - 5 (L)	N	Below 1 Ω
2 (RB) - 9 (NL) and 4 (B) - 5 (L)	Not on N	10 kΩ or higher
2 (RB) - 7 (DL)	D	Below 1 Ω
2 (RB) - 7 (DL)	Not on D	10 kΩ or higher
2 (RB) - 3 (2L)	2	Below 1 Ω
2 (RB) - 3 (2L)	Not on 2	10 kΩ or higher
2 (RB) - 8 (LL)	L	Below 1 Ω
2 (RB) - 8 (LL)	Not on L	10 kΩ or higher

NG → REPLACE PARK/NEUTRAL POSITION SWITCH

AX

OK

2 CHECK WIRE HARNESS (PARK/NEUTRAL POSITION SWITCH - BATTERY)



(a) Turn the ignition switch ON.
(b) Measure the voltage of the wire harness side connectors.
Standard voltage

Tester Connection	Shift Lever Position	Specified Condition
E6-30 (NSW) - Body ground	P or N	Below 1 V
E6-30 (NSW) - Body ground	Not on P or N	10 to 14 V
E5-11 (R) - Body ground	R	10 to 14 V*
E5-11 (R) - Body ground	Not on R	Below 1 V
E5-21 (D) - Body ground	D or 3	10 to 14 V
E5-21 (D) - Body ground	Not on D or 3	Below 1 V
E5-10 (2) - Body ground	2	10 to 14 V
E5-10 (2) - Body ground	Not on 2	Below 1 V
E5-9 (L) - Body ground	L	10 to 14 V
E5-9 (L) - Body ground	Not on L	Below 1 V

HINT:
*: The voltage will drop slightly due to the illumination of the back-up light.

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

DTC	P0710	Transmission Fluid Temperature Sensor "A" Circuit

DTC	P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC	P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input

DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts the ATF temperature into a resistance value which is input into the ECM.
The ECM applies a voltage to the temperature sensor through ECM terminal THO1.
The sensor resistance changes with the ATF temperature.
One terminal of the sensor is grounded so that the sensor resistance and voltage decrease as the temperature becomes higher.
The ECM calculates the ATF based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	ATF temperature sensor resistance changes from (a) to (b) or from (b) to (a) in less than 0.5 sec., and P0712 and P0713 are not detected (1 trip detection logic): (a) ATF temperature sensor resistance is less than 79 Ω (b) ATF temperature sensor resistance is more than 156 kΩ	• Open or short in ATF temperature sensor circuit • ATF temperature sensor • ECM
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1 trip detection logic)	• Short in ATF temperature sensor circuit • ATF temperature sensor • ECM
P0713	• ATF temperature sensor resistance is more than 156 kΩ for 15 min. or more after engine start • DTC is detected for 0.5 sec. or more (1 trip detection logic)	• Open in ATF temperature sensor circuit • ATF temperature sensor • ECM

AX

MONITOR DESCRIPTION

ATF temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will illuminate the MIL and store the DTC.
HINT:

- *1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.
- *2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.
- The ATF temperature can be checked on the intelligent tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Chattering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710, P0712: Range check (Chattering, Low resistance)

The monitor will run whenever the following DTCs are not present.	None
The typical enabling condition is not available.	-

P0713: Range check (High resistance)

The monitor will run whenever the following DTCs are not present.	None
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710: Range check (Chattering)

ATF temperature sensor resistance	Less than 79 Ω or more than 156 kΩ

P0712: Range check (Low resistance)

ATF temperature sensor resistance	Less than 79 Ω

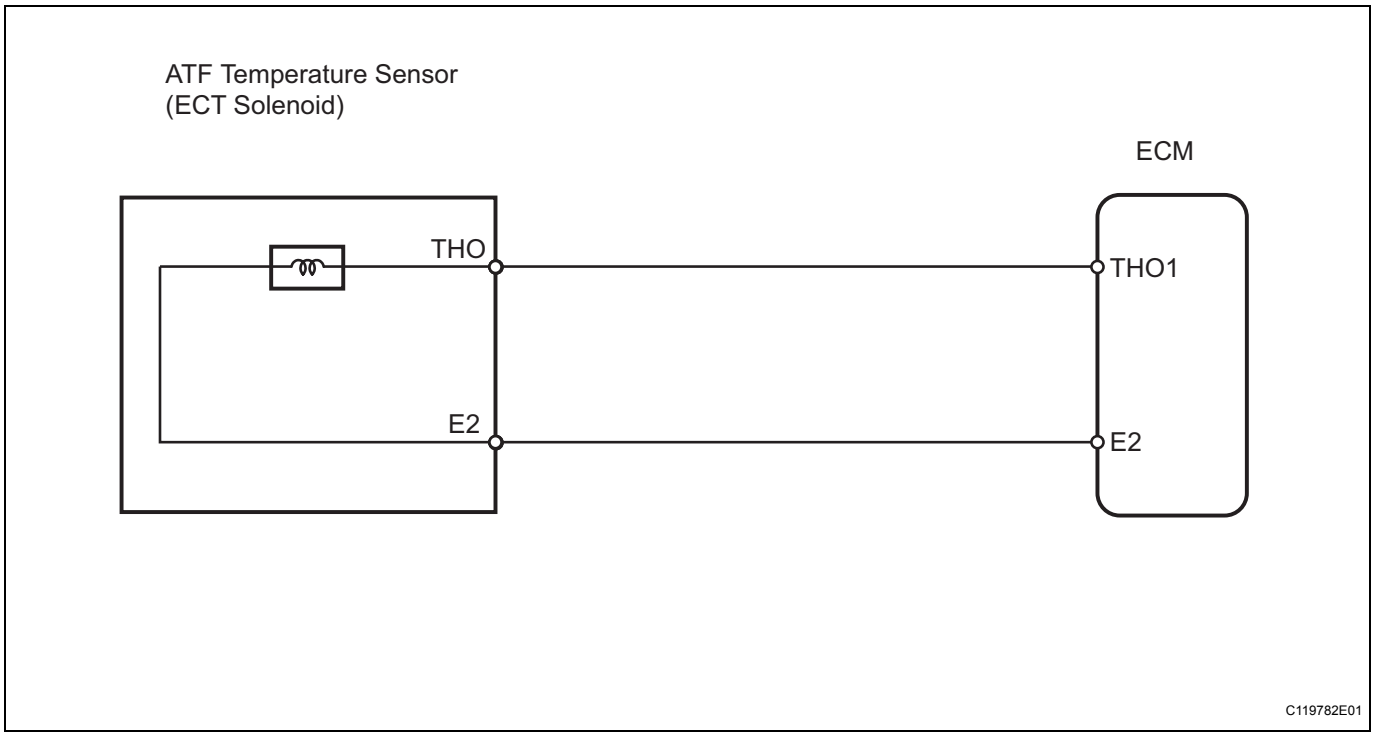
P0713: Range check (High resistance)

ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

ATF temperature sensor	Resistance: 79 Ω to 156 kΩ

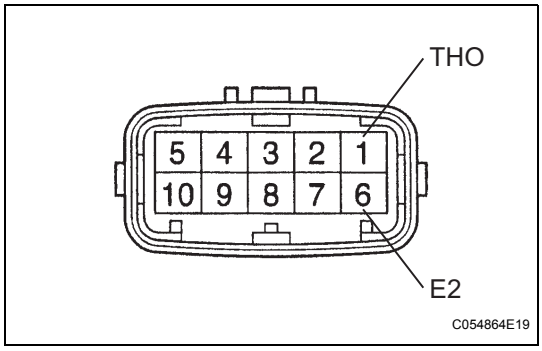
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

Tester Connection	Specified Condition
1 (THO) - 6 (E2)	79 Ω to 156 kΩ
1 (THO) - Body ground	10 kΩ or higher
6 (E2) - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range of either of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.
Standard resistance

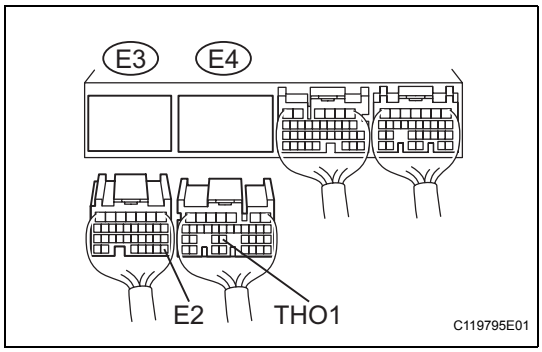
ATF Temperature	Specified Condition
10°C (68°F)	6.4 kΩ
110°C (230°F)	0.2 kΩ

NG → **REPAIR OR REPLACE TRANSMISSION WIRE**

OK

2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)

AX



(a) Disconnect the E3 and E4 ECM connectors.
(b) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
E4-24 (THO1) - E3-28 (E2)	79 Ω to 156 kΩ
E4-24 (THO1) - Body ground	10 kΩ or higher
E3-28 (E2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance

DESCRIPTION

Refer to DTC P0710 (see page AX-42).

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected (2 trip detection logic): (a) 12 sec. after engine start, temperature of atmosphere and that of engine coolant temperature are more than -10°C (14°F) (b) After normal driving for over 17 min. and 9 km (5.6 miles), ATF temperature is less than 10°C (50°F)	• Transaxle fluid level • ATF temperature sensor • ECM

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output from the ATF temperature sensor and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects open and short circuits of the ATF temperature circuit or faults in the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 10°C (50°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor
Frequency of operation	Continuous
Duration	Continuous
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Time after engine start	16 min. and 40 sec. or more
ECT	-15°C (5°F) or more
ATF temperature circuit	Not circuit malfunction
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction
Throttle sensor circuit	Not circuit malfunction
IAT (Intake air temperature) sensor circuit	Not circuit malfunction
Driving distance after engine start	9 km (5.6 miles) or more
IAT (12 sec. after engine start)	-10°C (14°F) or more
ECT (12 sec. after engine start)	-10°C (14°F) or more

TYPICAL MALFUNCTION THRESHOLDS

ATF temperature	Less than 10°C (50°F)

COMPONENT OPERATING RANGE

ATF temperature	Resistance: 79 Ω to 156 kΩ

WIRING DIAGRAM

Refer to DTC P0710 (see page AX-43).

INSPECTION PROCEDURE

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

1. Warm up the engine.
2. Turn the ignition switch OFF.
3. Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
4. Turn the ignition switch ON.
5. Turn the intelligent tester ON.
6. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
7. Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
AT FLUID TEMP	ATF temperature sensor value/ Min.: -40°C (-40°F) Max.: 215°C (419°F)	• After stall test: Approximately 80°C (176°F) • Equal to ambient temperature during cold soak	If value is -40°C (-40°F) or 215°C (419°F), ATF temperature sensor circuit is opened or short circuited

HINT:

- When DTC P0712 is output and the intelligent tester output is 150°C (302°F) or more, there is a short circuit.
- When DTC P0713 is output and the intelligent tester output is -40°C (-40°F), there is an open circuit. Measure the resistance between terminal THO1 (THO) and the body ground.

AX

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is set in approximately 0.5 seconds.

It is not necessary to inspect the circuit when P0711 is set.

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0711)

(a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch ON and push the intelligent tester main switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only P0711 is output	A
P0711 and other DTCs	B

HINT:
If any other codes besides P0711 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2	CHECK TRANSAXLE FLUID LEVEL

OK:
Automatic transaxle fluid level is correct.

NG → ADD FLUID

OK

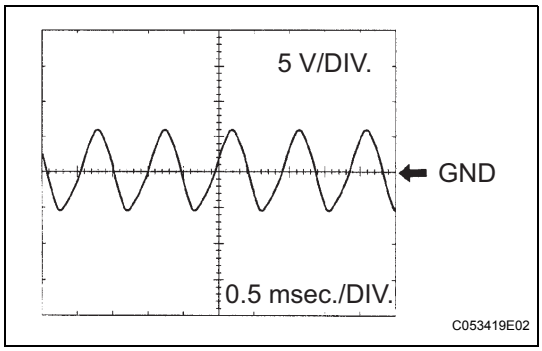
REPLACE TRANSMISSION WIRE

DTC P0717 Input Speed Sensor Circuit No Signal

DESCRIPTION

This sensor detects the rotation speed of the turbine. By comparing the input turbine speed signal (NT) with the output shaft speed signal, the ECM detects the shift timing of the gears and controls the engine torque and hydraulic pressure according to various conditions. As a result, smooth gear shift is achieved.

DTC No.	DTC Detection Condition	Trouble Area
P0717	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more (1 trip detection logic): (a) Vehicle speed: 50 km/h (31 mph) or more (b) Solenoid valves and park/neutral position switch are normal (c) Speed sensor NT: Less than 300 rpm	• Open or short in speed sensor NT circuit • Speed sensor NT • ECM • Automatic transaxle (clutch, brake, gear, etc.)



1. Reference: Inspect using an oscilloscope.
Check the waveform of the ECM connector.
OK:
Refer to illustration

Item	Content
Tester Connection	**E4-35 (NT+) - E4-27 (NT-)**
Tool Setting	**5 V/DIV., 0.5 msec./DIV.**
Condition	**Vehicle speed 20 km/h (12 mph)**

MONITOR DESCRIPTION

The input speed sensor detects the transmission input shaft speed. The ECM determines the gear shift timing based on a comparison of the input speed sensor (input shaft speed) with the output speed sensor (output shaft speed).
When the output shaft speed is higher than the expected value and the input shaft speed is 300 rpm or less while running with the shift lever on D, the ECM will conclude that there is malfunction of the input turbine speed sensor (NT). The ECM will illuminate the MIL.

AX

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT)/Verify pulse input
Required sensors/Components	Speed sensor (NT)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present.	P0500: VSS P0748: Shift solenoid SL1 P0778: Shift solenoid SL2 P0982, P0983: Shift solenoid S4
Shift change	Shift change is completed before starting next shift change operation
ECM selected gear	3rd or 4th
Output shaft rpm	1,000 rpm or more
NSW switch	OFF
R switch	OFF
L switch	OFF

Engine	Running
Transmission range switch	Not detected

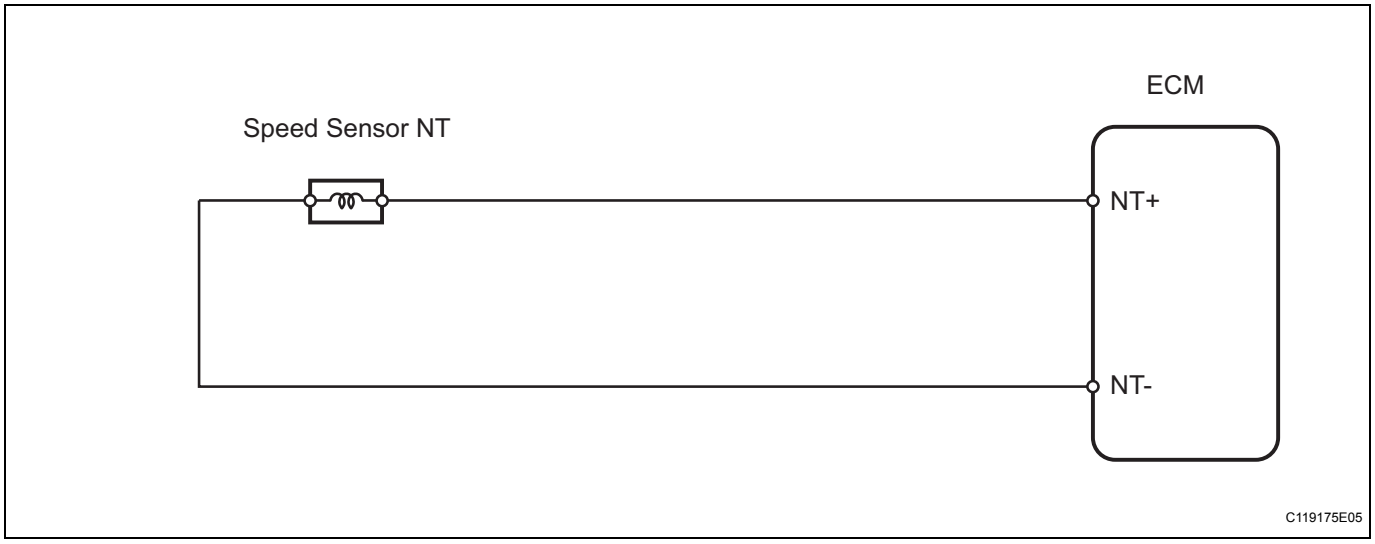
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

Speed sensor (NT)	Resistance: 560 Ω to 680 kΩ

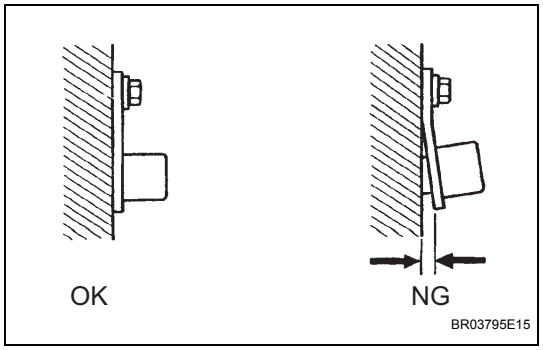
WIRING DIAGRAM



INSPECTION PROCEDURE

AX

1	INSPECT SPEED SENSOR NT (INSTALLATION)

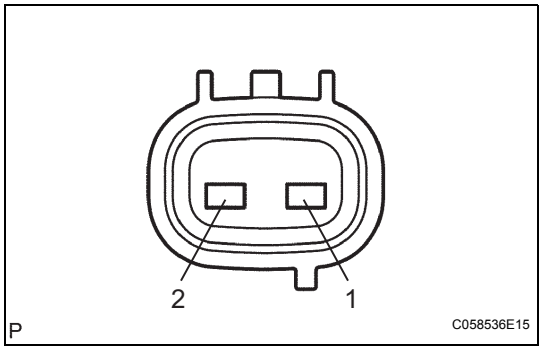


(a) Check the speed sensor NT installation.
OK:
Installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **SECURELY INSTALL SPEED SENSOR OR REPLACE SPEED SENSOR**

OK

2	INSPECT SPEED SENSOR NT



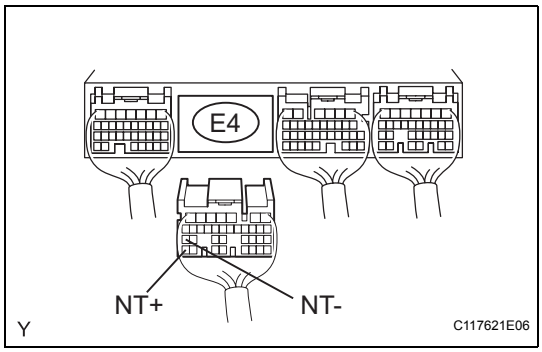
(a) Disconnect the T2 sensor connector.
(b) Measure the resistance of the sensor.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

NG → **REPLACE SPEED SENSOR NT**

OK

3	CHECK WIRE HARNESS (SPEED SENSOR NT - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
E4-35 (NT+) - E4-27 (NT-)	560 to 680 Ω
E4-35 (NT+) - Body ground	10 kΩ or higher
E4-27 (NT-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

AX

OK

REPLACE ECM

DTC	P0724	Brake Switch "B" Circuit High

DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in the lock-up condition when the brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	Stop light switch remains ON even when vehicle is driven in GO (30 km/h (18.65 mph) or more) and STOP (less than 3 km/h (1.86 mph)) pattern 5 times (2 trip detection logic)	• Short in stop light switch circuit • Stop light switch • ECM

MONITOR DESCRIPTION

The circuit prevents the engine from stopping when the vehicle is stopped by sudden braking when the torque converter clutch is in the "lock-up" mode. The ECM receives the signal from the stop light switch when the brake pedal is depressed. Then, the ECM sends a signal to the lock-up solenoid valve to turn lock-up off.
This DTC indicates that the stop light switch remains ON. When the stop light switch remains ON during GO and STOP driving, the ECM interprets this as a fault in the stop light switch. Then the MIL illuminates and the ECM stores the DTC. The vehicle must GO (30 km/h (18.65 mph) or more) and STOP (less than 3 km/h (1.86 mph)) 5 times for 2 driving cycles in order for the DTC to be output.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

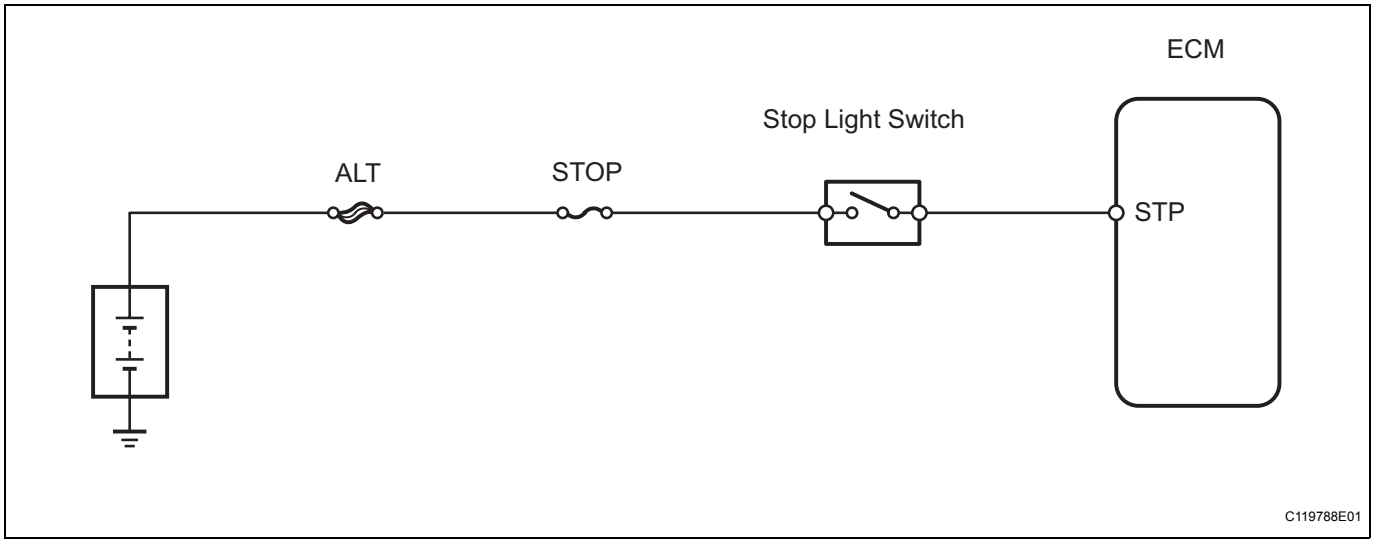
The stop light switch remains on while GO and STOP is repeated 5 times.
GO and STOP are defined as follows:

The monitor will run whenever the following DTCs are not present	None
GO: Vehicle speed	30 km/h (18.65 mph) or more
STOP: Vehicle speed	Less than 3 km/h (1.86 mph)

TYPICAL MALFUNCTION THRESHOLDS

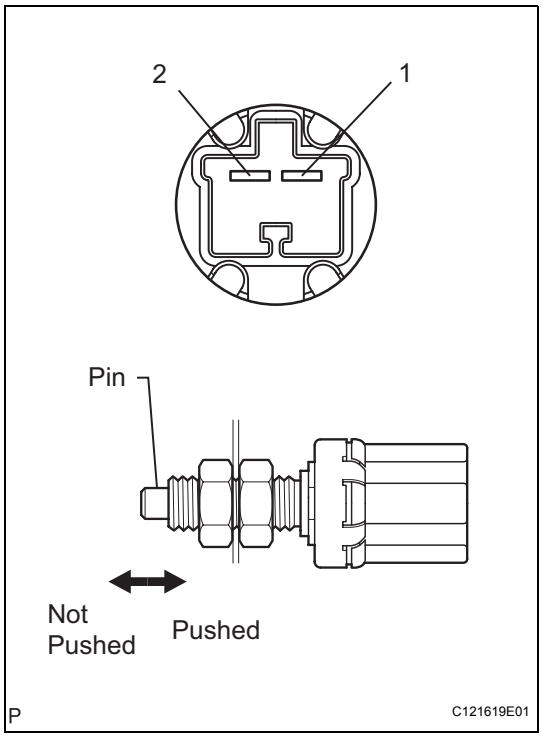
Brake switch status	Stuck ON

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT STOP LIGHT SWITCH



(a) Remove the S6 stop light switch.
(b) Measure the resistance of the switch.

Standard resistance

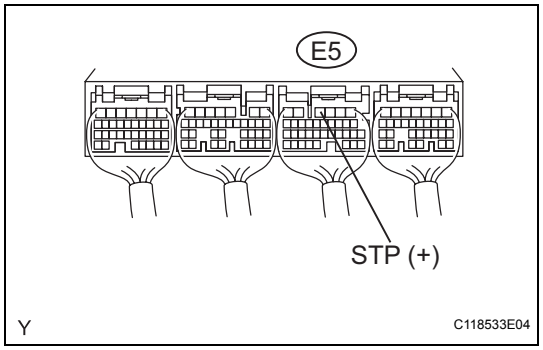
Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin pushed (pedal released)	10 kΩ or higher
1 - 2	Pin not pushed (pedal depressed)	Below 1 Ω
3 - 4	Pin pushed (pedal released)	10 kΩ or higher
3 - 4	Pin not pushed (pedal depressed)	Below 1 Ω

NG → REPLACE STOP LIGHT SWITCH

OK

AX

2	CHECK WIRE HARNESS (STOP LIGHT SWITCH - ECM)



(a) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
E5-4 (STP) - Body ground	Brake pedal is depressed	7.5 to 14 V
E5-4 (STP) - Body ground	Brake pedal is released	Below 1.5 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

DTC	P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)

DESCRIPTION

The ECM uses the signals from the throttle position sensor, air flow meter, turbine (input) speed sensor, intermediate (counter) shaft speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.
Then the ECM compares the engagement conditions of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical problems of the shift solenoid valve SL, valve body and torque converter clutch.

DTC No.	DTC Detection Condition	Trouble Area
P0741	• Lock-up does not occur when driving in lock-up range (normal driving at 80 km/h [50 mph]), or lock-up remains ON in lock-up OFF range (2 trip detection logic) • When lock-up is ON, clutch or brake slips or gear is broken (2 trip detection logic)	• Shift solenoid valve SL remains open or closed • Valve body is blocked • Shift solenoid valve SL • Torque converter clutch • Automatic transaxle (clutch, brake, gear, etc.) • ECM

MONITOR DESCRIPTION

Based on the signals from the throttle position sensor, air flow meter and crankshaft position sensor, the ECM sends a signal to the shift solenoid valve SL to regulate the hydraulic pressure and provide smoother gear shifts. The shift solenoid valve SL responds to commands from the ECM. The valve controls the lock-up relay valve to perform torque-converter lock-up and flexible lock-up functions.
The ECM compares the engine rpm (NE) signal and the input turbine speed signal to detect torque converter lock-up. The ECM then compares the lock-up status against the lock-up schedule in the ECM memory. If the ECM does not detect lock-up at the appropriate time, it will conclude that there is a malfunction in shift solenoid valve SL. The ECM will illuminate the MIL.

AX

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve SL/OFF malfunction Shift solenoid valve SL/ON malfunction
Required sensors/Components	Shift solenoid valve SL
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec. ON malfunction 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below:

The monitor will run whenever the following DTCs are not present	None
ECT (Engine coolant temperature)	60°C (140°F) or higher
Vehicle speed	25 km/h (15.5 mph) or more
Transmission range	"D"
ECM selected gear	3rd or 4th
Shift solenoid S1 circuit	Not circuit malfunction
Shift solenoid S2 circuit	Not circuit malfunction

Shift solenoid SL circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Input (turbine) speed sensor circuit	Not circuit malfunction
Internal counter shaft speed sensor circuit	Not circuit malfunction
Throttle position sensor circuit	Not circuit malfunction

OFF malfunction

ECM lock-up command	ON

ON malfunction

ECM lock-up command	OFF
Throttle valve opening angle	8% or more
Vehicle speed	Less than 60 km/h (37.3 mph)

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction

Engine speed - input (turbine) speed	100 rpm or more

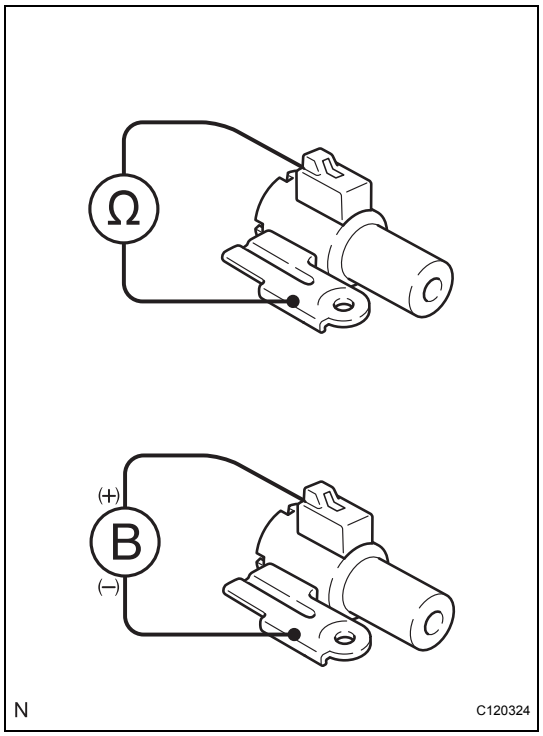
ON malfunction

2 detections are necessary per driving cycle:
1st detection; temporary flag ON
2nd detection; pending fault code ON
Vehicle speed must be under 10 km/h (6.2 mph) once before 2nd detection

Difference between engine speed and input (turbine) speed	Less than 35 rpm

INSPECTION PROCEDURE

1	INSPECT SHIFT SOLENOID VALVE SL



(a) Remove the shift solenoid valve SL.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG	REPLACE SHIFT SOLENOID VALVE SL

AX

OK

2	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

(a) Check the transmission valve body assembly.

OK:

There are no foreign objects on each valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

3	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Check the torque converter clutch assembly (see page AX-146).

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR AUTOMATIC TRANSAXLE ASSEMBLY

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

(a) The Electronic Controlled Automatic Transmission (ECT) is an automatic transaxle that electronically controls shift timing using the Engine Control Module (ECM). The ECM detects electrical signals that indicate engine and driving conditions, and controls the shift point based on driver habits and road conditions. As a result, fuel efficiency and power transaxle performance are improved.
Shift shock is reduced by controlling the engine and transaxle simultaneously.
In addition, the ECT has the following features:

- Diagnostic function.
- Fail-safe function when a malfunction occurs.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The ECM of this system is connected to the CAN and multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN and multiplex communication system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

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

NEXT

4	CONNECT INTELLIGENT TESTER TO DLC3*

NEXT

5	CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

(a) Refer to the DTC CHECK/CLEAR (see page AX-30).

NEXT

6	VISUAL INSPECTION

NEXT

7	SETTING CHECK MODE DIAGNOSIS*

(a) Refer to the CHECK MODE PROCEDURE (see page AX-31).

NEXT

8	PROBLEM SYMPTOM CONFIRMATION

(a) Refer to the ROAD TEST (see page AX-14).
Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → GO TO STEP 10

A

9	SYMPTOM SIMULATION

(a) Refer to the ELECTRONIC CIRCUIT INSPECTION PROCEDURE (see page IN-33).

NEXT

10	DTC CHECK*

(a) Refer to the DTC CHECK / CLEAR (see page AX-30).
Result

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

B → GO TO STEP 18

A

11	BASIC INSPECTION

(a) Refer to the AUTOMATIC TRANSAXLE FLUID (see page AX-82).
(b) Refer to the PARK/NEUTRAL POSITION SWITCH (see page AX-87).
(c) Refer to the FLOOR SHIFT ASSEMBLY (see page AX-116).

NG → GO TO STEP 21

OK

12	MECHANICAL SYSTEM TEST

(a) Refer to the MECHANICAL SYSTEM TESTS (see page AX-16).

NG → GO TO STEP 17

OK

13	HYDRAULIC TEST

(a) Refer to the HYDRAULIC TEST (see page AX-18).

NG → GO TO STEP 17

OK

14	MANUAL SHIFTING TEST

(a) Refer to the MANUAL SHIFTING TEST (see page AX-19).

NG → GO TO STEP 16

OK

15	PROBLEM SYMPTOMS TABLE CHAPTER 1

(a) Refer to the PROBLEM SYMPTOMS TABLE (see page AX-23).

NG → GO TO STEP 19

OK

AX

16	PROBLEM SYMPTOMS TABLE CHAPTER 2

(a) Refer to the PROBLEM SYMPTOMS TABLE (see page AX-23).

NEXT

17	PART INSPECTION

NG → GO TO STEP 20

OK

18	DTC CHART

(a) Refer to the DIAGNOSTIC TROUBLE CODE CHART (see page AX-36).

NEXT

19	CIRCUIT INSPECTION

NEXT

20	IDENTIFICATION OF PROBLEM

NEXT

21	REPAIR OR REPLACE

NEXT

22	CONFIRMATION TEST

NEXT

END

DTC	P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)

DESCRIPTION

The ECM uses signals from the vehicle speed sensor and speed sensor NT to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and the valve body or automatic transaxle (clutch, brake, gear, etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0751	The gear required by the ECM does not match the actual gear when driving (2 trip detection logic)	• Shift solenoid valve S1 remains open or closed • Valve body is blocked • Shift solenoid valve S1 • Automatic transaxle (clutch, brake, gear, etc.) • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0751: Shift solenoid valve S1/OFF malfunction Shift solenoid valve S1/ON malfunction
Required sensor/Components	Shift solenoid valve S1
Frequency of operation	Continuous
Duration	OFF malfunction (A): 0.85 sec. OFF malfunction (B): 0.8 sec. ON malfunction (A) (B): 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below.

The monitor will run whenever the following DTCs are not present	None
ECT (Engine coolant temperature)	60°C (140°F) or more
Transmission range	"D"
Shift solenoid S1 circuit	Not circuit malfunction
Shift solenoid S2 circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Input (turbine) speed sensor circuit	Not circuit malfunction
Internal counter shaft speed sensor circuit	Not circuit malfunction
Throttle position sensor circuit	Not circuit malfunction

OFF malfunction (A)

ECM selected gear	1st
Vehicle speed	9 to 40 km/h (5.6 to 24.9 mph)

AX

Throttle valve opening angle	25% or more 7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

OFF malfunction (B)

Current ECM selected gear	4th
Last ECM selected gear	3rd

ON malfunction (A)

Current ECM selected gear	4th
Last ECM selected gear	3rd

ON malfunction (B)

ECM selected gear	4th
V current - V last V current: Vehicle speed at current ECM selected gear V last: Vehicle speed at last ECM selected gear	Less than 15 km/h (9.3 mph)
TH current - TH last TH current: Throttle valve opening angle at current ECM selected gear TH last: Throttle valve opening angle at last ECM selected gear	Less than 30%
Vehicle speed (current)	Less than 85 km/h (52.8 mph)
Throttle valve opening angle (current)	Less than 45%
Engine speed (current)	3,200 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

[OFF malfunction]
Following conditions met: OFF malfunction (A) and (B).
2 detections are necessary per driving cycle:
1st detection; temporary flag ON
2nd detection; pending fault code ON

AX

OFF malfunction (A)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.64 to 0.78

OFF malfunction (B)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	Changes as follows 0.95 to 1.09 (Last) to 0.64 to 0.78 (Current)

[ON malfunction]
Following conditions met: ON malfunction (A) and (B).

ON malfunction (A)

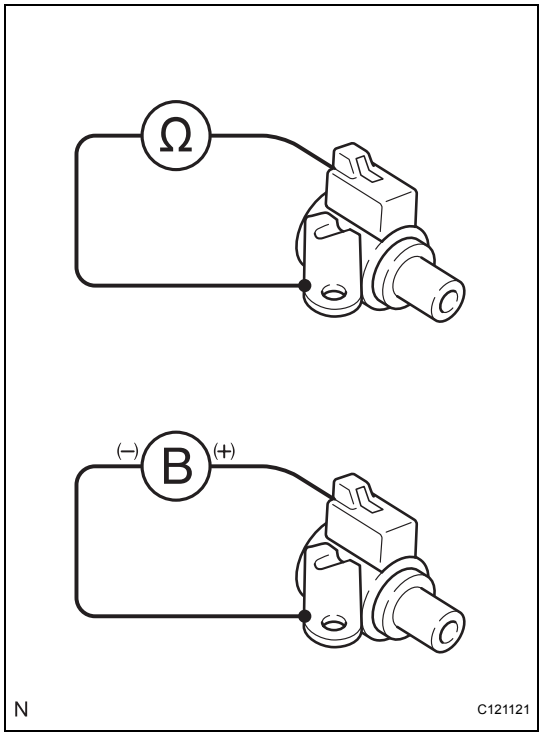
Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	Does not change as follows 0.95 to 1.09 (Last) to 0.64 to 0.78 (Current)

ON malfunction (B)

NE current - NE last NE current: Engine speed at current ECM selected gear NE last: Engine speed at last ECM last selected gear	1,100 rpm or more

INSPECTION PROCEDURE

1	INSPECT SHIFT SOLENOID VALVE S1



(a) Remove the shift solenoid valve S1.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S1**

OK

2	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

(a) Check the transmission valve body assembly.
OK:
There are no foreign objects on each valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

AX

DTC	P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)

DESCRIPTION

The ECM uses signals from the vehicle speed sensor and speed sensor NT to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and the valve body or automatic transaxle (clutch, brake, gear, etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0756	The gear required by the ECM does not match the actual gear when driving (2 trip detection logic)	• Shift solenoid valve S2 remains open or closed • Valve body is blocked • Shift solenoid valve S2 • Automatic transaxle (clutch, brake, gear, etc.) • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0756: Shift solenoid valve S2/OFF malfunction Shift solenoid valve S2/ON malfunction
Required sensor/Components	Shift solenoid valve S2
Frequency of operation	Continuous
Duration	0.85 sec.
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below.

The monitor will run whenever the following DTCs are not present	None
ECT (Engine coolant temperature)	60°C (140°F) or more
Transmission range	"D"
Shift solenoid S1 circuit	Not circuit malfunction
Shift solenoid S2 circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Input (turbine) speed sensor circuit	Not circuit malfunction
Internal counter shaft speed sensor circuit	Not circuit malfunction
Throttle position sensor circuit	Not circuit malfunction

OFF malfunction (A)

ECM selected gear	1st
Vehicle speed	9 to 40 km/h (5.6 to 24.9 mph)
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

OFF malfunction (B)

ECM selected gear	3rd
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

OFF malfunction (C)

ECM selected gear	4th
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

ON malfunction (A)

ECM selected gear	2nd
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

ON malfunction (B)

ECM selected gear	3rd
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

ON malfunction (C)

ECM selected gear	4th
Vehicle speed	9 km/h (5.6 mph) or more
Throttle valve opening angle	7% or more at engine speed 1,900 rpm (Condition varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

[OFF malfunction]
Following conditions met: OFF malfunction (A), (B) and (C).
2 detections are necessary per driving cycle:
1st detection; temporary flag ON
2nd detection; pending fault code ON

OFF malfunction (A)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	1.50 to 1.80

OFF malfunction (B)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.95 to 1.09

OFF malfunction (C)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.95 to 1.09

[ON malfunction]
Following conditions met: ON malfunction (A), (B) and (C).

ON malfunction (A)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	2.75 to 3.35

ON malfunction (B)

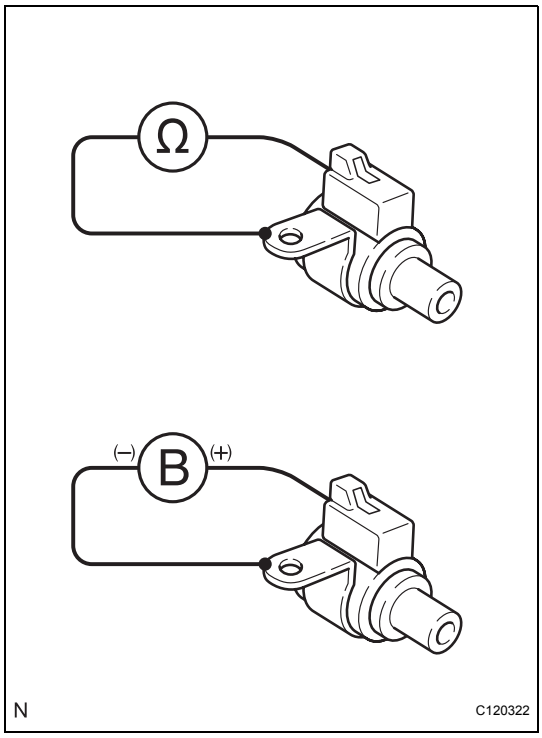
Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.64 to 0.78

ON malfunction (C)

Input speed/Output speed (NT/NO) NT: Input (turbine) speed NO: Internal counter shaft speed	0.64 to 0.78

INSPECTION PROCEDURE

1 INSPECT SHIFT SOLENOID VALVE S2



(a) Remove the shift solenoid valve S2.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S2**

OK

2 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

(a) Check the transmission valve body assembly.
OK:
There are no foreign objects on each valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

AX

AUTOMATIC TRANSAXLE FLUID

ADJUSTMENT

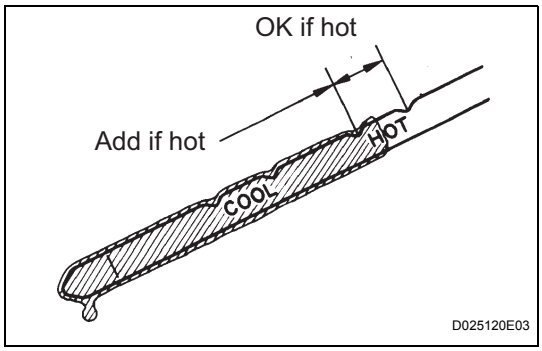
1. CHECK TRANSAXLE FLUID LEVEL

HINT:

Drive the vehicle so that the engine and transaxle are at normal operating temperature.

Fluid temperature:

70 to 80°C (158 to 176°F)



(a) Park the vehicle on a level surface and set the parking brake.

(b) With the engine idling and the brake pedal depressed, adjust the shift lever to each position from P to L position, and return it to the P position.

(c) Take out the ATF dipstick and wipe it clean.

(d) Fully insert it back into the pipe.

(e) Take it out and check that the fluid level is at the HOT position.

If there are leaks, it is necessary to repair or replace O-rings, FIPGs, oil seals, plugs and/or other parts.

DTC	P0787	Shift / Timing Solenoid Low (Shift Solenoid Valve ST)

DTC	P0788	Shift / Timing Solenoid High (Shift Solenoid Valve ST)

DESCRIPTION

Shift solenoid valve ST is switched ON/OFF by a signal from the ECM so that letting in or out timing of 2nd brake is adjusted by operating the orifice control valve. Therefore, shift solenoid valve ST operates when letting in or out the reverse clutch.
If the shift solenoid ST is broken, the shift shock increases.

DTC No.	DTC Detection Condition	Trouble Area
P0787	ECM detects short in solenoid valve ST circuit 2 times when solenoid valve ST is operated (1 trip detection logic)	• Short in shift solenoid valve ST circuit • Shift solenoid valve ST • ECM
P0788	ECM detects open in solenoid valve ST circuit 2 times when solenoid valve ST is not operated (1 trip detection logic)	• Open in shift solenoid valve ST circuit • Shift solenoid valve ST • ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve ST circuit. The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of an open or short circuit, the ECM stops sending current to the circuit (see page AX-32).

MONITOR STRATEGY

Related DTCs	P0787: Shift timing solenoid valve ST/Range check (Low resistance) P0788: Shift timing solenoid valve ST/Range check (High resistance)
Required sensor/Components	Shift solenoid valve ST
Frequency of operation	Continuous
Duration	2 times
MIL operation	Immediate
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

P0787: Range check (Low resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 sec.

P0788: Range check (High resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	OFF
Time after solenoid ON to OFF	More than 0.008 sec.

TYPICAL MALFUNCTION THRESHOLDS

P0787: Range check (Low resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less

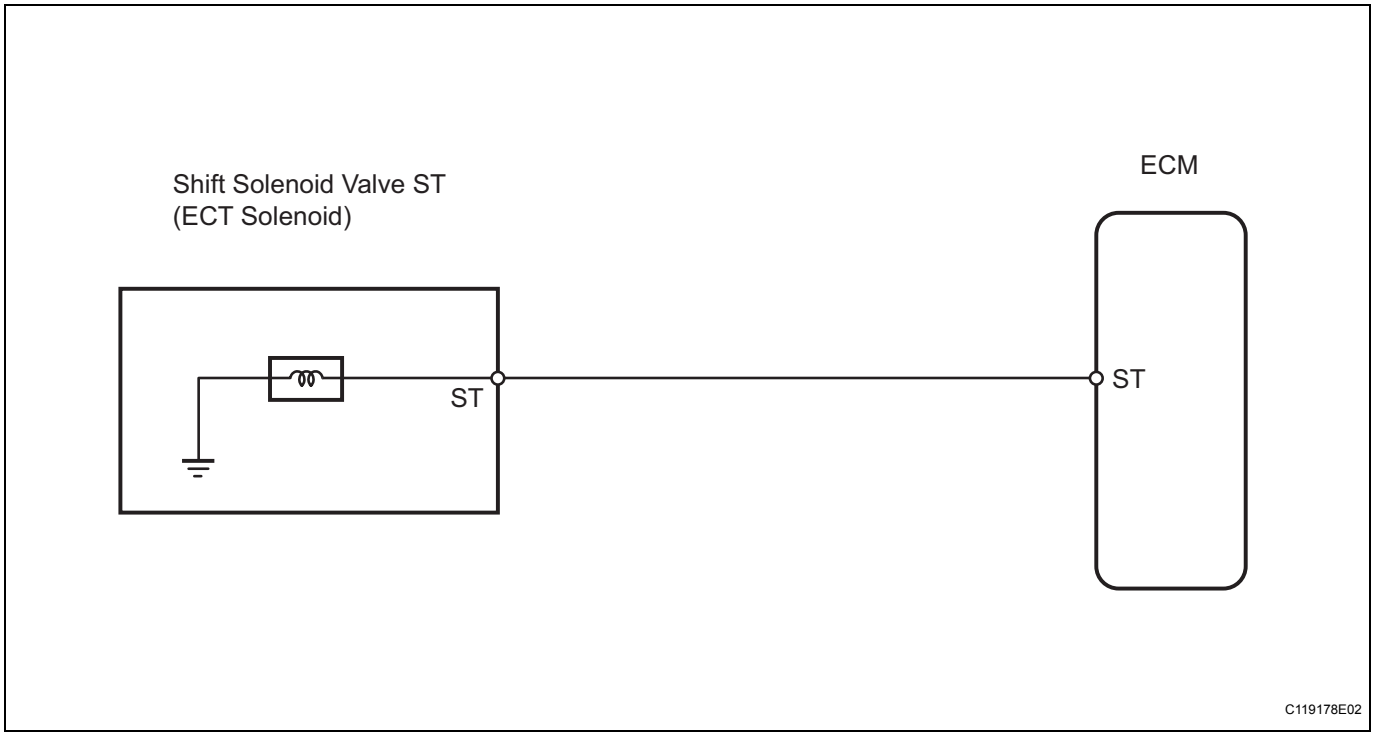
P0788: Range check (High resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve ST	Resistance: 11 to 15 Ω at 20°C (68°F)

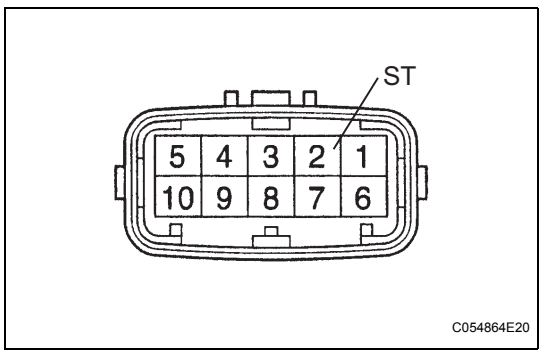
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE ST)



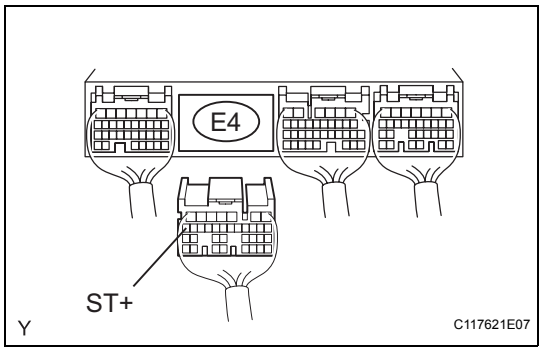
(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

Tester Connection	Condition	Specified Condition
2 (ST) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **Go to step 3**

OK

2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

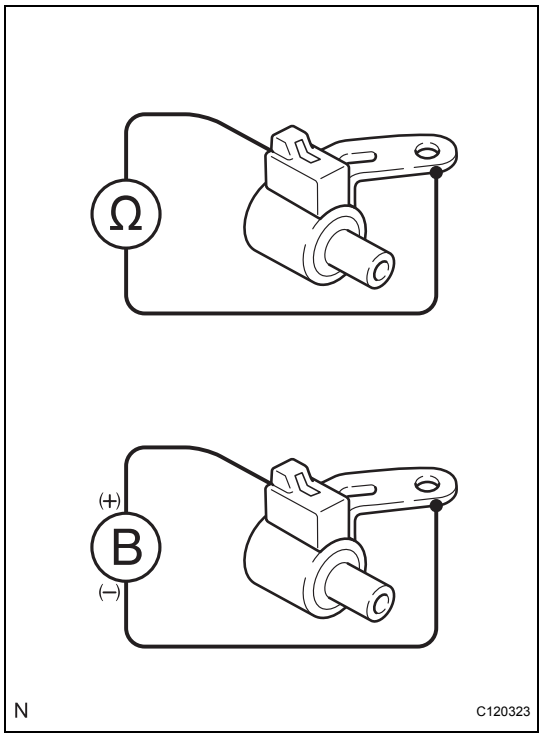
Tester Connection	Condition	Specified Condition
E4-19 (ST) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE ST



(a) Remove the shift solenoid valve ST.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE ST**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

DTC	P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC	P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

DESCRIPTION

Shifting from 1st to O/D is performed in combination with the ON and OFF operation of the shift solenoid valve S1 and S2 controlled by the ECM. If an open or short circuit occurs in either of the solenoid valves, the ECM controls the remaining normal solenoid valve to allow the vehicle to be operated safely (see page AX-32).

Fail-safe function:

If either of the solenoid valve circuits develops an open or short, the ECM turns the other solenoid valve ON and OFF to shift to the gear positions shown in the table below. The ECM also turns the shift solenoid valve ST OFF at the same time. If both solenoids are malfunctioning, hydraulic control cannot be performed electronically and must be done manually.

Manual shifting as shown in the table below must be done. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid.

Position	Normal			Shift Solenoid Valve S1 Malfunctioning			Shift Solenoid Valve S2 Malfunctioning			Both Solenoid Valves Malfunctioning
	Solenoid Valve		Gear	Solenoid Valve		Gear	Solenoid Valve		Gear	Gear when shift selector is manually operated
	S1	S2		S1	S2		S1	S2		
D	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
	OFF	ON	O/D	X	ON	O/D	OFF	X	3rd	3rd
2	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd
	OFF	OFF	3rd	X	OFF	3rd	OFF	X	3rd	3rd
L	ON	ON	1st	X	ON ↓ OFF	3rd	ON	X	2nd	3rd
	ON	OFF	2nd	X	OFF	3rd	ON	X	2nd	3rd

HINT:

- X: OFF (the ECM stops sending current to a malfunctioning solenoid valve)
- ↓: Condition in the electrical operation is shown above the "↓".
- ↓: Condition in the fail-safe mode is shown below the "↓".

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve S1 circuit 2 times when solenoid valve S1 is operated (1 trip detection logic)	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	ECM detects open in solenoid valve S1 circuit 2 times when solenoid valve S1 is not operated (1 trip detection logic)	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid.

MONITOR STRATEGY

Related DTCs	P0973: Shift solenoid valve S1/Range check (Low resistance) P0974: Shift solenoid valve S1/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1
Frequency of operation	Continuous
Duration	2 times or more
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0973: Range check (Low resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 sec.

P0974: Range check (High resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	OFF
Time after solenoid ON to OFF	More than 0.008 sec.

TYPICAL MALFUNCTION THRESHOLDS

P0973: Range check (Low resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less

P0974: Range check (High resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

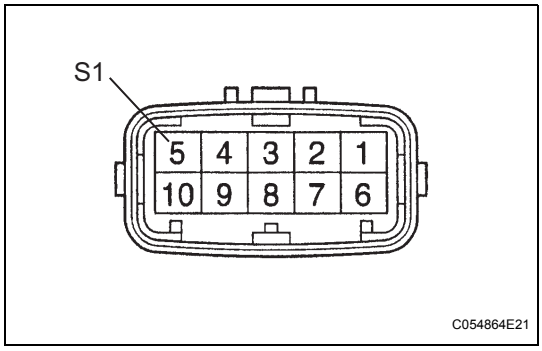
COMPONENT OPERATING RANGE

Shift solenoid valve S1	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE S1)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.

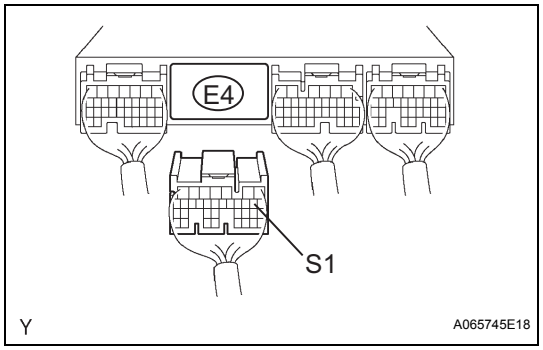
Standard resistance

Tester Connection	Condition	Specified Condition
5 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

OK → **Go to step 3**

OK

2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

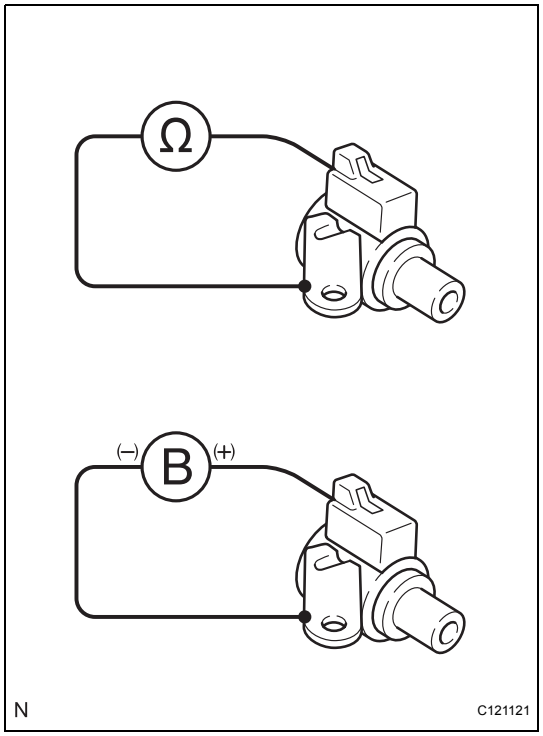
Tester Connection	Condition	Specified Condition
E4-9 (S1) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE S1



(a) Remove the shift solenoid valve S1.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S1**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

DTC	P0976	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)

DTC	P0977	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)

DESCRIPTION

Refer to DTC P0973 (see page AX-66).

DTC No.	DTC Detection Condition	Trouble Area
P0976	ECM detects short in solenoid valve S2 circuit 2 times when solenoid valve S2 is operated (1 trip detection logic)	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	ECM detects open in solenoid valve S2 circuit 2 times when solenoid valve S2 is not operated (1 trip detection logic)	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ON/OFF. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem, illuminates the MIL and stores the DTC. Also, the ECM performs the fail-safe function and turns the other normal shift solenoid valves ON/OFF. In case of a short circuit, the ECM stops sending the current to the short circuited solenoid.

MONITOR STRATEGY

Related DTCs	P0976: Shift solenoid valve S2/Range check (Low resistance) P0977: Shift solenoid valve S2/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S2
Frequency of operation	Continuous
Duration	2 times or more
MIL operation	1 driving cycle
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

P0976: Range check (Low resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 sec.

P0977: Range check (High resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	OFF
Time after solenoid ON to OFF	More than 0.008 sec.

TYPICAL MALFUNCTION THRESHOLDS

P0976: Range check (Low resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less

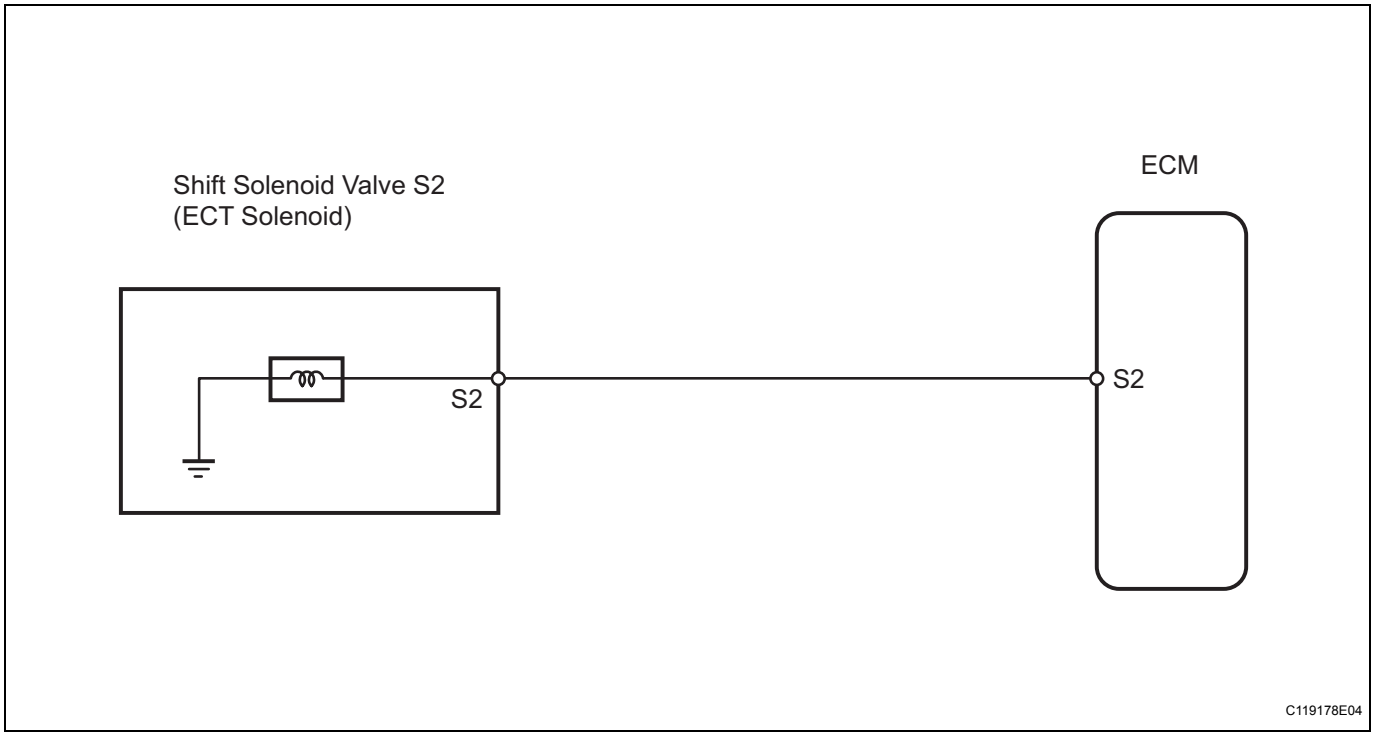
P0977: Range check (High resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve S2	Resistance: 11 to 15 Ω at 20°C (68°F)

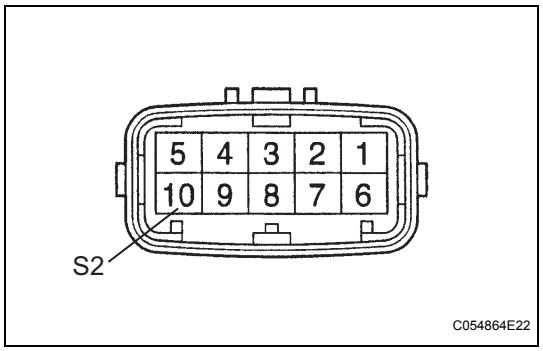
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE S2)



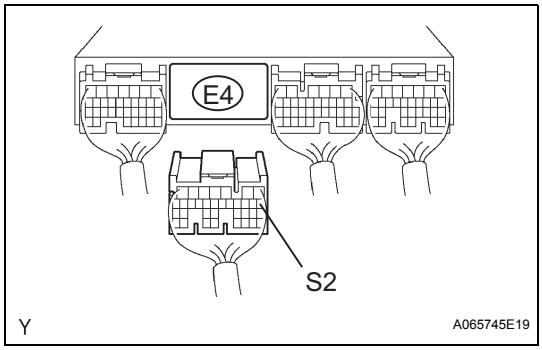
(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

Tester Connection	Condition	Specified Condition
10 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **Go to step 3**

OK

2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

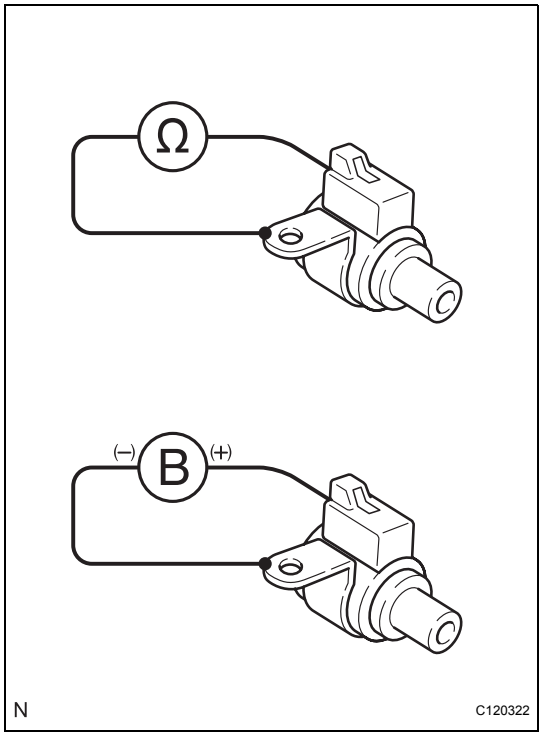
Tester Connection	Condition	Specified Condition
E4-8 (S2) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE S2



(a) Remove the shift solenoid valve S2.
(b) Measure the resistance between the solenoid valve terminal and solenoid valve body.
Standard resistance:
11 to 15 Ωat 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE S2**

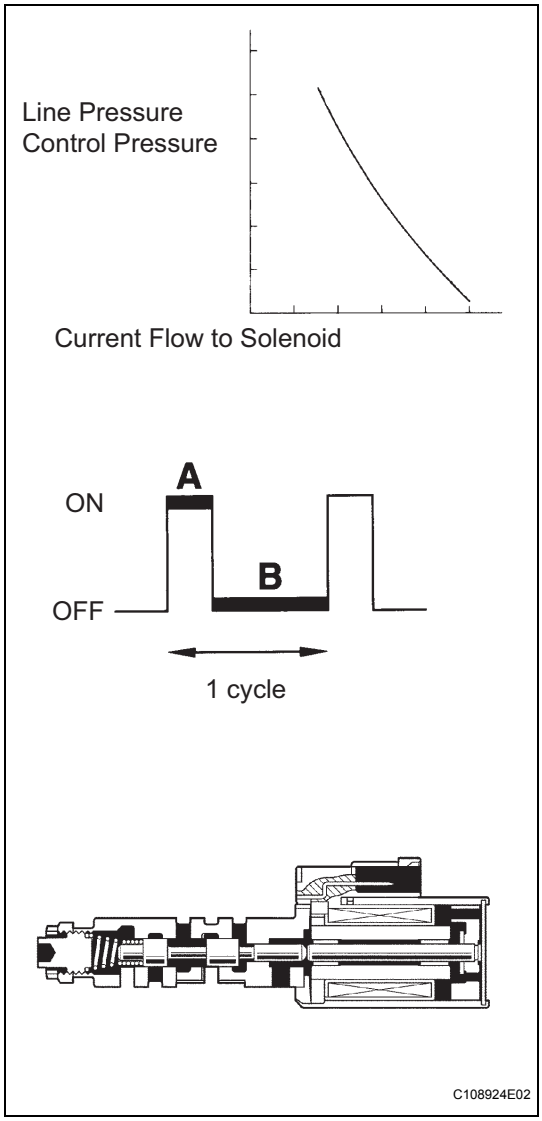
OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

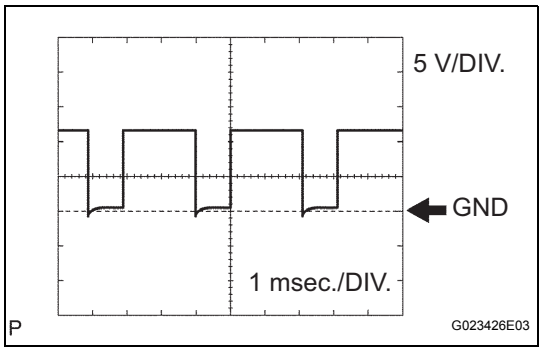
DTC	P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)

DESCRIPTION



The throttle pressure that is applied to the primary regulator valve (which modulates the line pressure) causes the solenoid valve SLT, under electronic control, to precisely modulate and generate the line pressure according to the extent that the accelerator pedal is depressed or the output of engine power. This controls the line pressure and provides smooth shifting characteristics.
Upon receiving a signal of the throttle valve opening angle, the ECM controls the line pressure by sending a predetermined duty ratio* to the solenoid valve, modulating the line pressure and generating throttle pressure.
HINT:
*: The duty ratio is the ratio of the current ON time (A) to the total of the current ON and OFF time (A + B).
Duty Ratio (%) = A / (A + B) x 100

DTC No.	DTC Detection Condition	Trouble Area
P2716	Condition (a) or (b) below is detected for 1 sec. or more (1 trip detection logic): (a) SLT - terminal: 0 V (b) SLT - terminal: 12 V	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM



1. **Reference: Inspect using an oscilloscope.**
   Check the waveform of the ECM connector.
   OK:
   Refer to illustration.

Item	Content
Tester Connection	**E4-12 (SLT+) - E4-13 (SLT-)**
Tool Setting	**5 V/DIV., 1 msec./DIV.**
Condition	**Engine idle speed**

MONITOR DESCRIPTION

The shift solenoid valve SLT controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The ECM adjusts the duty cycle of the solenoid valve SLT to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs. When an open or short in the shift solenoid valve SLT circuit is detected, the ECM interprets this as a fault. The ECM will illuminate the MIL.

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present.	None
Solenoid current cut status	Not cut
Battery voltage	11 V or more

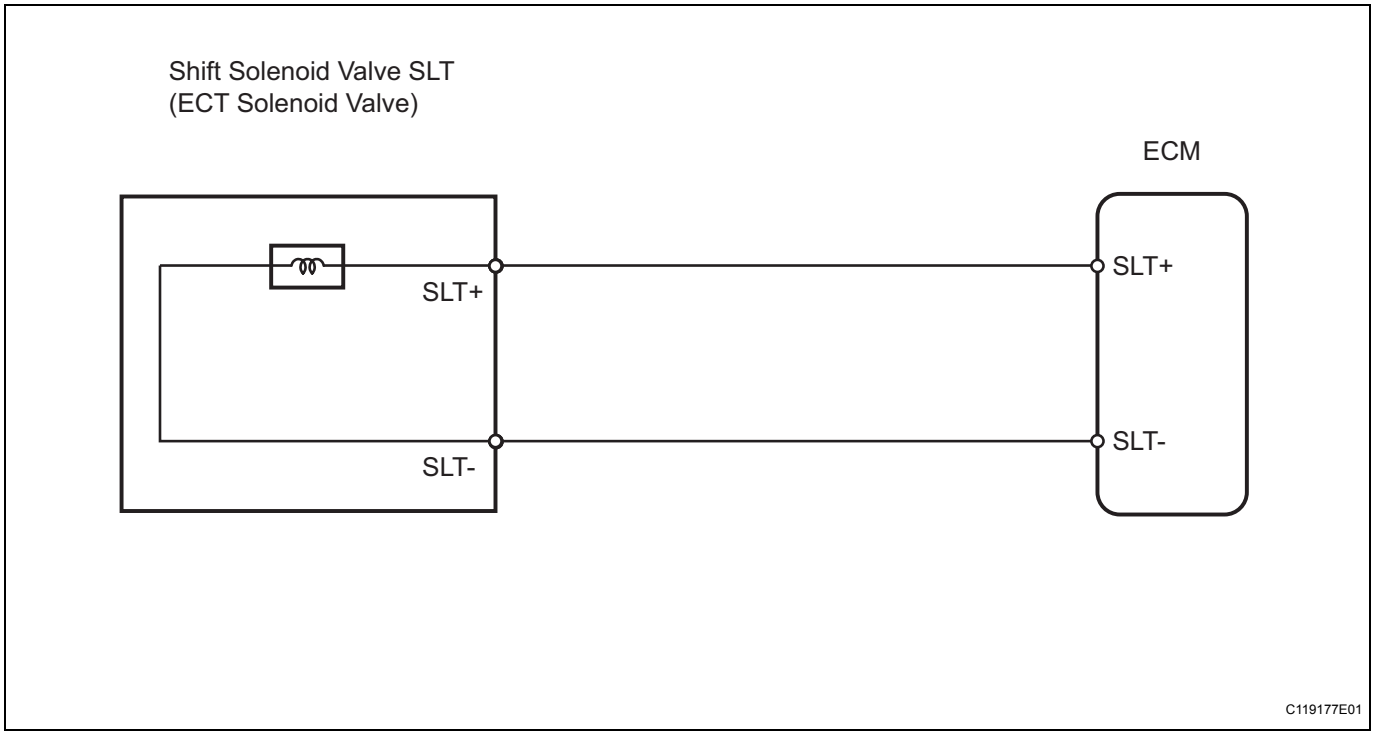
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status (SLT) from MIC	Fail (open or short) (Output signal duty equal to 100%)

COMPONENT OPERATING RANGE

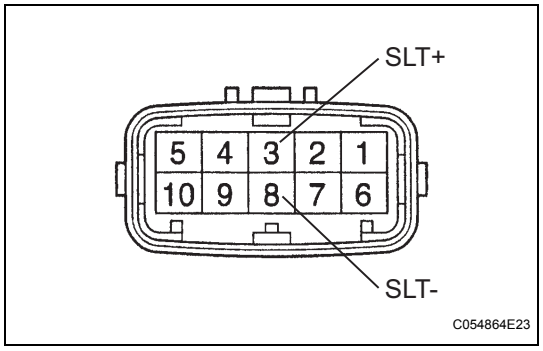
Shift solenoid valve SLT	Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SLT)



(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

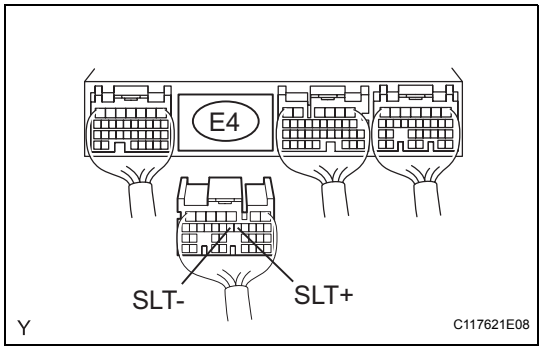
Tester Connection	Condition	Specified Condition
3 (SLT+) - 8 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
3 (SLT+) - Body ground	20°C (68°F)	10 kΩ or higher
8 (SLT-) - Body ground	20°C (68°F)	10 kΩ or higher

NG → **Go to step 3**

OK

AX

2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

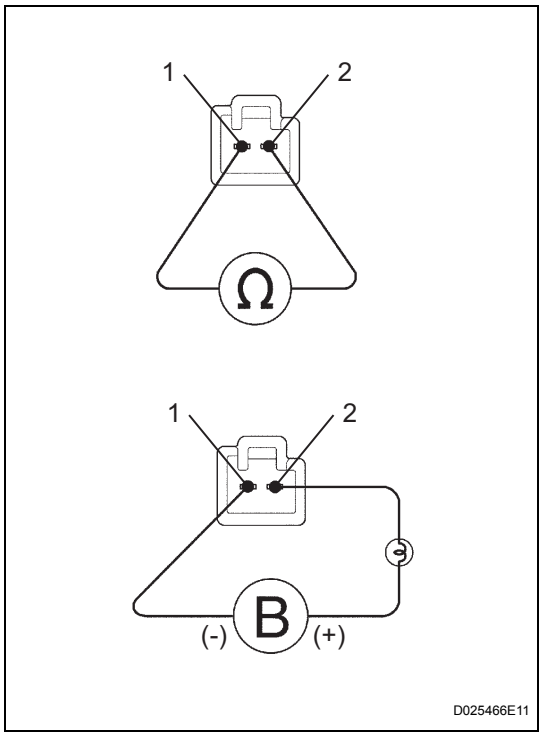
Tester Connection	Condition	Specified Condition
E4-12 (SLT+) - E4-13 (SLT-)	20°C (68°F)	5.0 to 5.6 Ω
E4-12 (SLT+) - Body ground	20°C (68°F)	10 kΩ or higher
E4-13 (SLT-) - Body ground	20°C (68°F)	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE SLT



(a) Remove the shift solenoid valve SLT.
(b) Measure the resistance of the solenoid valve.
Standard resistance:
5.0 to 5.6 Ωat 20°C (68°F)
(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
(d) Check the operating noise of terminal 1 of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SLT**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

DTC	P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)

DTC	P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)

DESCRIPTION

The shift solenoid valve SL is turned ON and OFF by signals from the ECM to control the hydraulic pressure acting on the lock-up relay valve, which then controls operation of the lock-up clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2769	ECM detects short in shift solenoid valve SL circuit when shift solenoid valve SL is operated (2 trip detection logic)	• Short in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM
P2770	ECM detects open in shift solenoid valve SL circuit when shift solenoid valve SL is not operated (2 trip detection logic)	• Open in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM

Fail-safe function:
If the ECM detects a malfunction, it turns the shift solenoid valve SL OFF.

MONITOR DESCRIPTION

Based on the signals from the throttle position sensor, the air flow meter and the crankshaft position sensor, the ECM sends a signal to the solenoid valve SL to regulate the hydraulic pressure and provide smoother gear shifts. The shift solenoid valve SL responds to commands from the ECM. The valve controls the lock-up relay valve to perform the torque-converter lock-up function. If the ECM detects an open or short circuit for shift solenoid valve SL, it will illuminate the MIL.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve SL/Range check (Low resistance) P2770: Shift solenoid valve SL/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SL
Frequency of operation	Continuous
Duration	1 time
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

P2769: Range check (Low resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 sec.

P2770: Range check (High resistance)

The monitor will run whenever the following DTCs are not present	None
Solenoid	OFF
Time after solenoid ON to OFF	More than 0.008 sec.

TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less

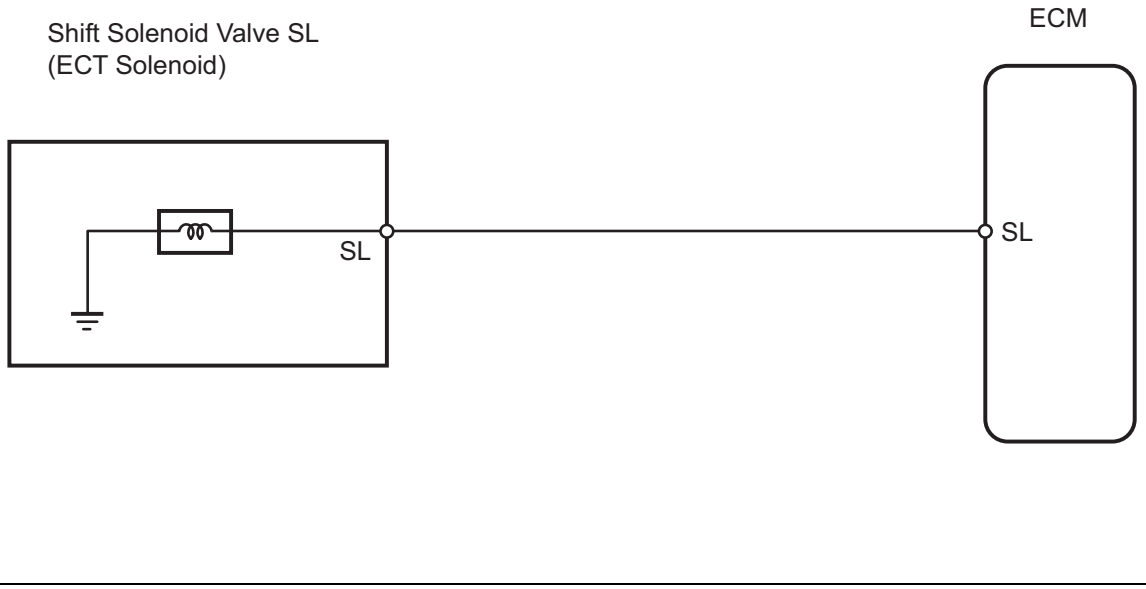
P2770: Range check (High resistance)

Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve SL	Resistance: 11 to 15 Ω at 20°C (68°F)

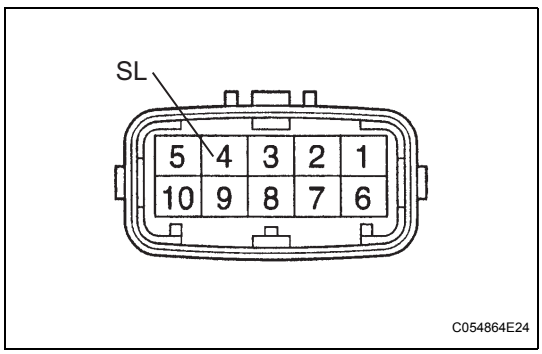
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL)



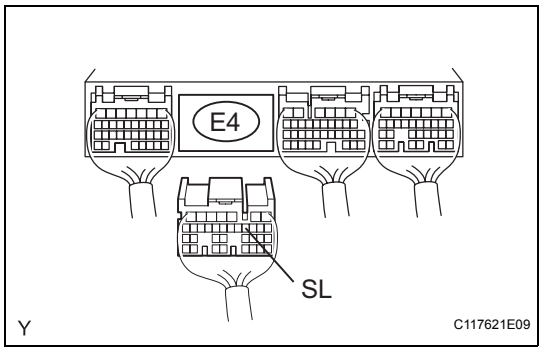
(a) Disconnect the E1 wire connector.
(b) Measure the resistance of the transmission wire.
Standard resistance

Tester Connection	Condition	Specified Condition
4 (SL) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **Go to step 3**

OK

2	CHECK WIRE HARNESS (TRANSMISSION WIRE - ECM)



(a) Disconnect the E4 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

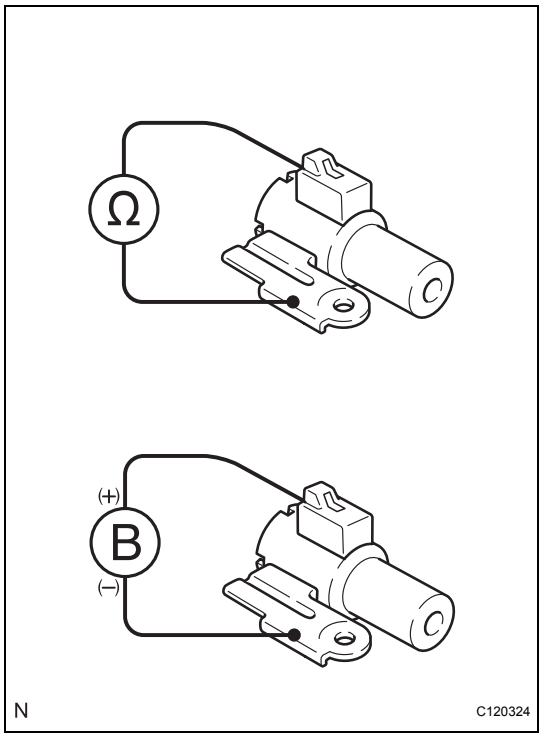
Tester Connection	Condition	Specified Condition
E4-11 (SL) - Body ground	20°C (68°F)	11 to 15 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE SL



(a) Remove the shift solenoid valve SL.
(b) Measure the resistance between the solenoid valve terminal and solenoid valve body.
Standard resistance:
11 to 15 Ω at 20°C (68°F)
(c) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.
(d) Check the operating noise of the solenoid valve.
OK:
Solenoid makes operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

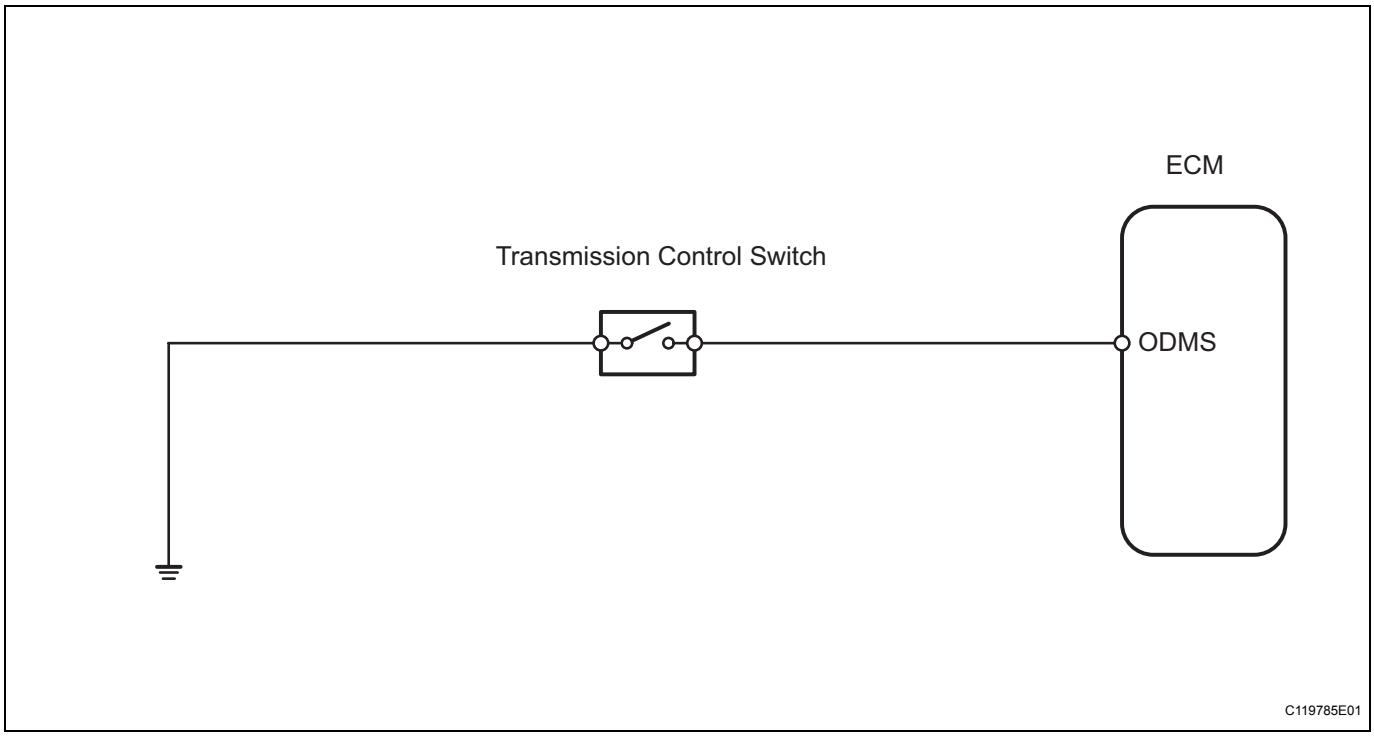
AX

O/D Main Switch Circuit

DESCRIPTION

The O/D main switch (transmission control switch) is a momentary type switch. When pressing the O/D main switch, the O/D OFF indicator light illuminates and the ECM prohibits shifting into O/D. When it is pressed again, the O/D OFF indicator light goes off and the ECM allows shifting into O/D. Turning the ignition switch OFF will reset the O/D OFF indicator light.

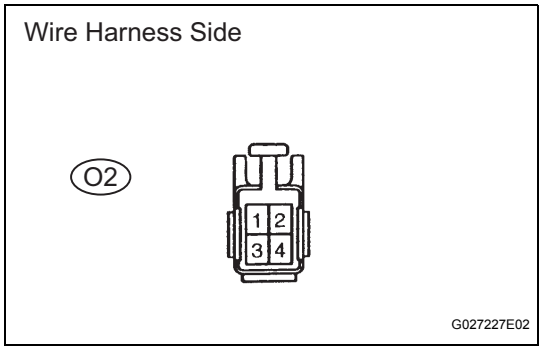
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (TRANSMISSION CONTROL SWITCH - BODY GROUND)



(a) Disconnect the O2 switch connector.
(b) Measure the resistance of the wire harness side connector.

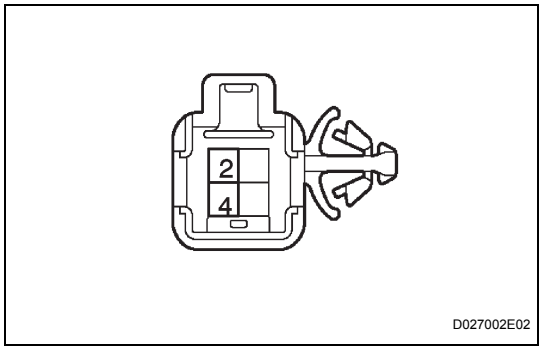
Standard resistance

Tester Connection	Specified Condition
4 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2 INSPECT TRANSMISSION CONTROL SWITCH (O/D MAIN SWITCH)



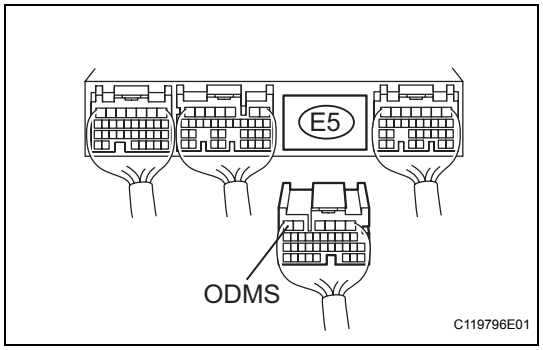
(a) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
2 - 4	Continuously press transmission control switch	Below 1 Ω
2 - 4	Release transmission control switch	10 kΩ or higher

NG → **REPLACE TRANSMISSION CONTROL SWITCH**

OK

3 CHECK WIRE HARNESS (TRANSMISSION CONTROL SWITCH - ECM)



(a) Disconnect the E5 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
E5-6 (ODMS) - Body ground	Continuously press transmission control switch	Below 1 Ω
E5-6 (ODMS) - Body ground	Release transmission control switch	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AX

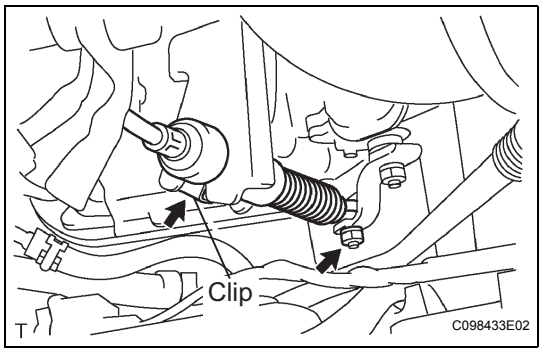
REMOVAL

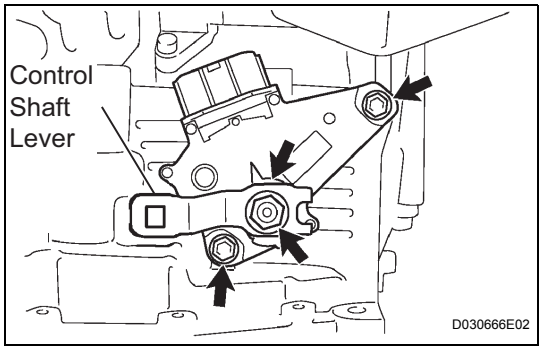
1. REMOVE BATTERY

2. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Remove the nut and disconnect the control cable from the control shaft lever.

(b) Remove the clip and disconnect the control cable from the control cable bracket.





3. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Disconnect the connector from the park/neutral position switch.

(b) Remove the nut, washer and control shaft lever.

(c) Pry out the lock washer and remove the manual valve shaft nut.

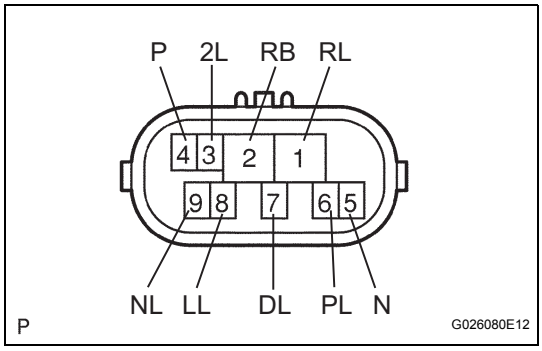
(d) Remove the 2 bolts and pull out the park/neutral position switch.

INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

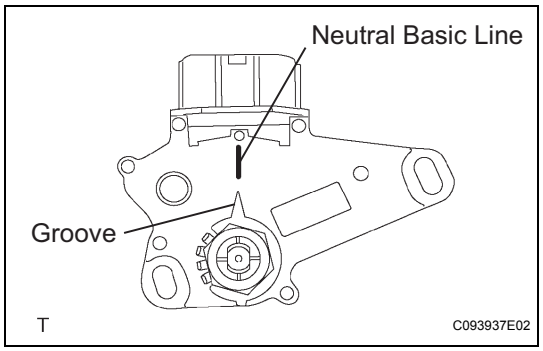
Standard resistance



Tester Connection	Shift Lever Position	Specified Condition
2 (RB) - 6 (PL)	P	Below 1 Ω
4 (P) - 5 (N)	P	Below 1 Ω
2 (RB) - 6 (PL)	Not on P	10 kΩ or higher
4 (P) - 5 (N)	Not on P	10 kΩ or higher
1 (RL) - 2 (RB)	R	Below 1 Ω
1 (RL) - 2 (RB)	Not on R	10 kΩ or higher
2 (RB) - 9 (NL)	N	Below 1 Ω
4 (P) - 5 (N)	N	Below 1 Ω
2 (RB) - 9 (NL)	Not on N	10 kΩ or higher
4 (P) - 5 (N)	Not on N	10 kΩ or higher
2 (RB) - 7 (DL)	D	Below 1 Ω
2 (RB) - 7 (DL)	Not on D	10 kΩ or higher
2 (RB) - 3 (2L)	2	Below 1 Ω
2 (RB) - 3 (2L)	Not on 2	10 kΩ or higher
2 (RB) - 8 (LL)	L	Below 1 Ω
2 (RB) - 8 (LL)	Not on L	10 kΩ or higher

If the result is not as specified, replace the switch assembly.

AX



ADJUSTMENT

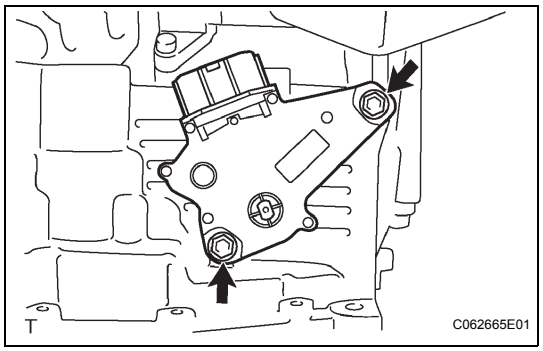
1. ADJUST PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Loosen the 2 bolts of the park/neutral position switch and set the shift lever to the N position.
(b) Align the groove and neutral basic line.
(c) Hold the switch in this position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
(d) After adjustment, perform the inspection (see page AX-87).

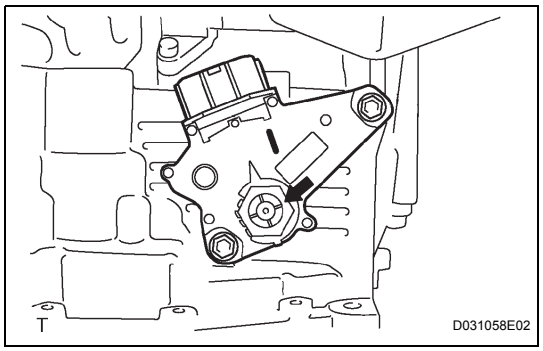
INSTALLATION

1. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

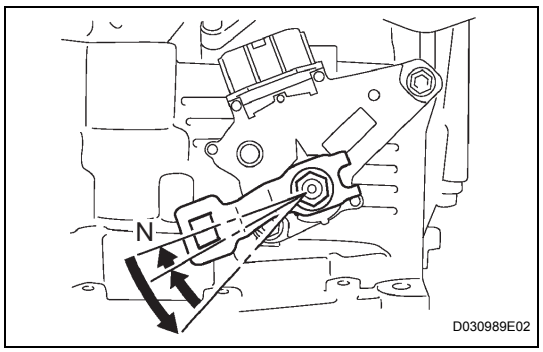
(a) Install the park/neutral position switch to the manual valve shaft.
(b) Temporarily install the 2 bolts.



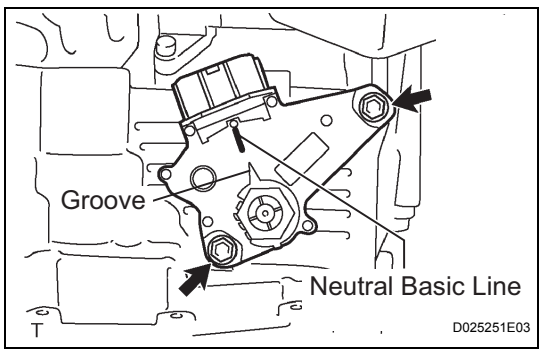
(c) Install a new lock washer and tighten the manual valve shaft nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)
(d) Temporarily install the control shaft lever.



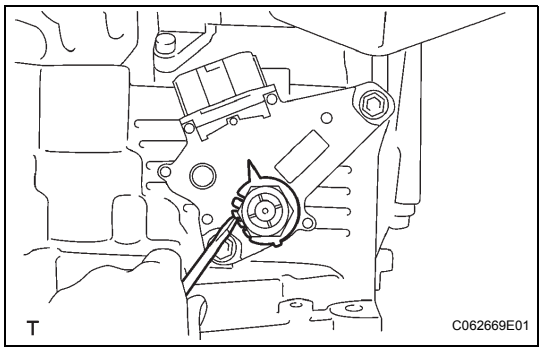
(e) Turn the lever counterclockwise until it stops, and then turn it clockwise 2 notches.
(f) Remove the control shaft lever.



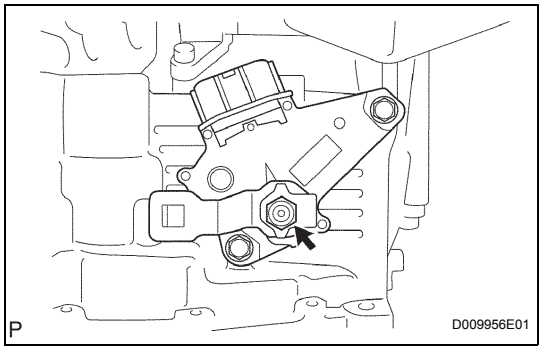
(g) Align the groove with neutral basic line.
(h) Hold the switch in this position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



AX

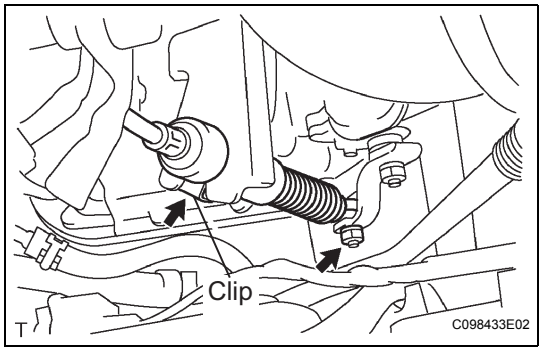


(i) Using a screwdriver, stake the nut with the lock washer.



(j) Install the control shaft lever with the washer and nut.
Torque: 12.7 N*m (130 kgf*cm, 9 ft.*lbf)

(k) Connect the connector to the park/neutral position switch.



2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Temporarily install the control cable to the control shaft lever with the nut.

(b) Install the control cable to the bracket with a new clip.

3. INSTALL BATTERY

4. ADJUST SHIFT LEVER POSITION

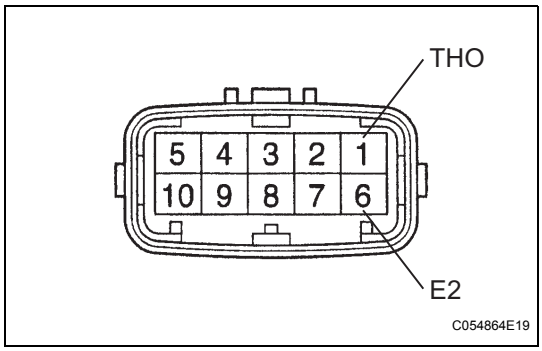
(a) Adjust the shift lever position (see page AX-121).

5. INSPECT SHIFT LEVER POSITION

(a) Inspect the shift lever position (see page AX-121).

6. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Inspect the switch (see page AX-87).



INSPECTION

1. INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)

(a) Disconnect the E1 wire connector.

(b) Measure the resistance of the transmission wire.

Standard resistance

Tester Connection	Specified Condition
1 (THO) - 6 (E2)	79 to 156 kΩ
1 (THO) - Body ground	10 kΩ or higher
6 (E2) - Body ground	10 kΩ or higher

HINT:

If the resistance is not as specified for either of the ATF temperatures shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

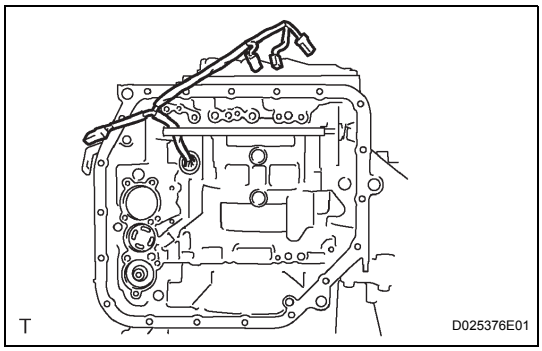
ATF Temperature	Specified Condition
10°C (68°F)	6.4 kΩ
110°C (230°F)	0.2 kΩ

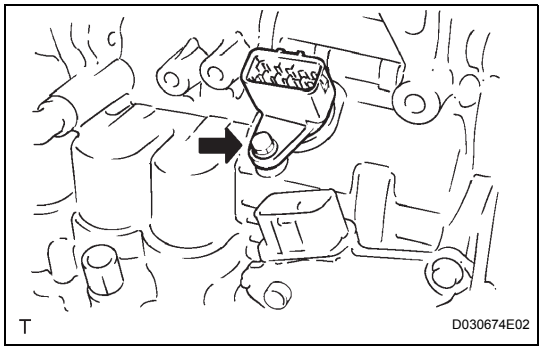
INSTALLATION

1. INSTALL TRANSMISSION WIRE

(a) Coat an O-ring with ATF.

(b) Install the transmission wire.





(c) Install the bolt.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

2. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Align the groove of the manual valve with the pin of the manual valve lever.

(b) Temporarily install the valve body with the 13 bolts.

HINT:

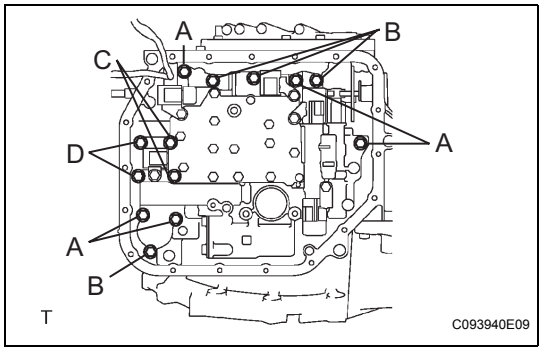
Bolt length:

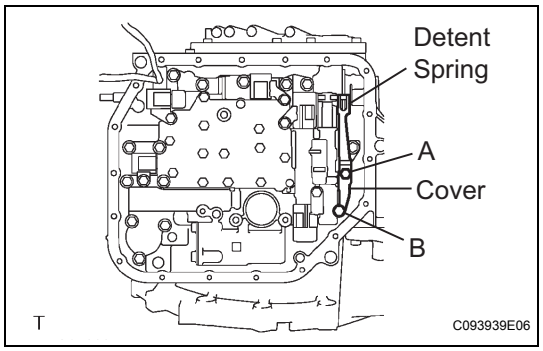
32 mm (1.26 in.) for bolt A

22 mm (0.87 in.) for bolt B

55 mm (2.17 in.) for bolt C

45 mm (1.77 in.) for bolt D

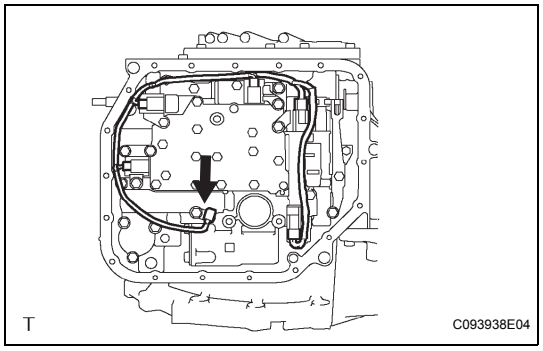




(c) Temporarily install the detent spring and cover with the 2 bolts.
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
45 mm (1.77 in.) for bolt B

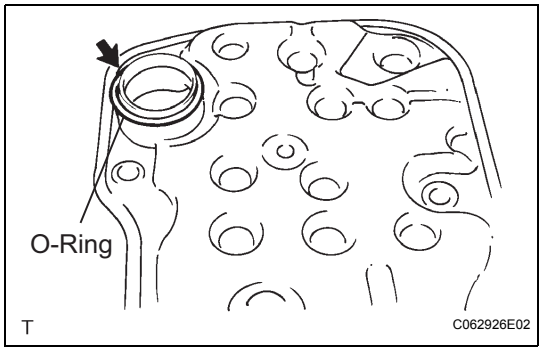
(d) Check that the manual valve lever contacts the center of the roller at the tip of the detent spring.

(e) Tighten the 15 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



(f) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

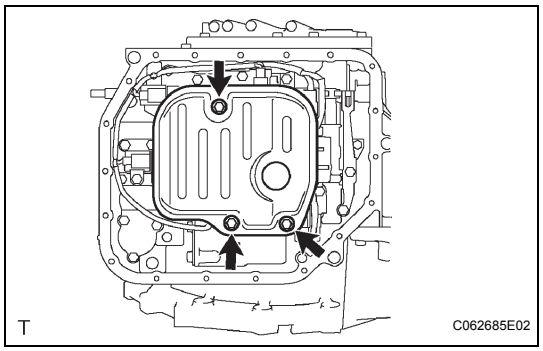
(g) Connect the 5 shift solenoid valve connectors.



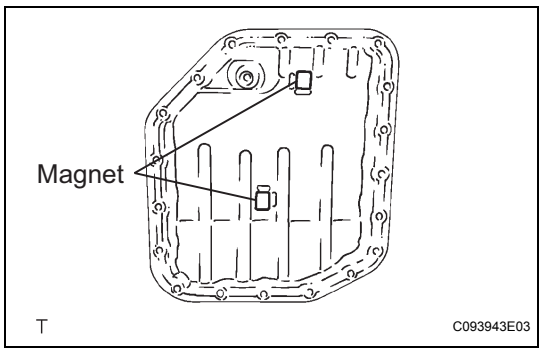
3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

(a) Coat a new O-ring with ATF.

(b) Install the O-ring on the oil strainer.



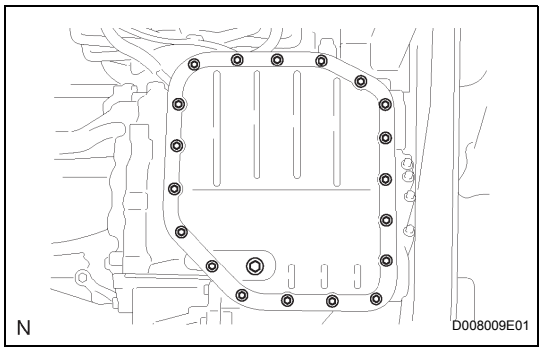
(c) Install the oil strainer with the 3 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



4. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the oil pan, as shown in the illustration.

AX



(b) Install a new gasket and the oil pan with the 19 bolts.
Torque: 7.8 N*m (8 kgf*cm, 69 in.*lbf)

5. **INSTALL ENGINE UNDER COVER LH**

6. **ADD AUTOMATIC TRANSAXLE FLUID**
Fluid type:
Toyota Genuine ATF TYPE T-IV
Standard capacity:
2.9 liters (3.1 US qts, 2.6 Imp. qts)

7. **INSPECT AUTOMATIC TRANSAXLE FLUID**
(a) Inspect the automatic transaxle fluid (see page AX-82).

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

(a) Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transaxle does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

2. ROAD TEST

NOTICE:

Perform the test at the normal operating ATF temperature of 50 to 80°C (122 to 176°F).

(a) D position test

Move the shift lever to D and fully depress the accelerator pedal. Check the following:

(1) Check up-shift operation.

Check that the 1 → 2, 2 → 3 and 3 → O/D up-shifts take place at the shift point shown in the automatic shift schedule (see page SS-19).

HINT:

O/D Gear Up-shift Prohibition Control

- Engine coolant temperature is 60°C (140°F) or less.
- ATF temperature is 10°C (50°F) or less.

O/D and 3rd Gear Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60°C (140°F) or less.
- ATF temperature is 10°C (50°F) or less.

3rd Gear Lock-up Prohibition Control

- O/D main switch OFF (O/D ON).

(2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up-shifts.

(3) Check for abnormal noise and vibration.

While driving the vehicle in the lock-up or O/D gear with the shift lever on D, check for abnormal noises and vibration.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.

While driving the vehicle in all gears with the shift lever on D, check that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick-downs conform to those indicated on the automatic shift schedule (see page SS-19).

(5) Check for abnormal shock and slip at kick-down.

AX

(6) Check the lock-up mechanism.
- Drive the vehicle in the O/D gear with the shift lever on D. Maintain a steady speed (lock-up ON) of about 60 km/h (37 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

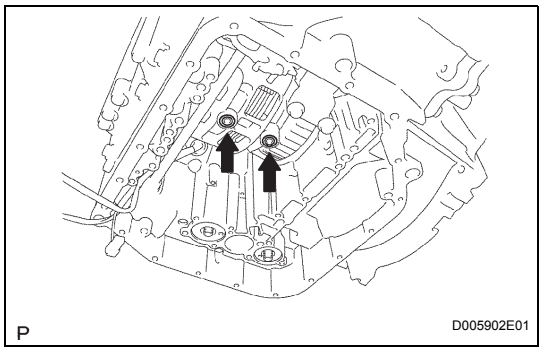
HINT:
If there is a sudden increase in engine speed, there is no lock-up.

(b) 2 position test
Move the shift lever to 2 and fully depress the accelerator pedal. Check the following:
(1) Check up-shift operation.
Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (see page SS-19).
HINT:
There is no O/D up-shift and lock-up when the shift lever on 2.
(2) Check engine braking.
While driving the vehicle in the 2nd gear with the shift lever on 2, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

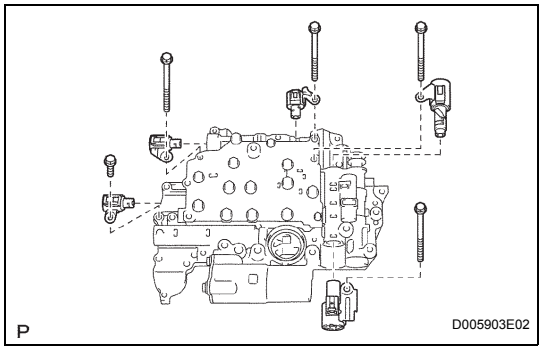
(c) L position test
Move the shift lever to L and fully depress the accelerator pedal. Check the following:
(1) Check that there is no up-shift.
While driving the vehicle with the shift lever on L, check that there is no up-shift to 2nd gear.
(2) Check engine braking.
While driving the vehicle with the shift lever on L, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration.

(d) R position test
Move the shift lever to R and lightly depress the accelerator pedal. Check that the vehicle moves backward without any abnormal noise or vibration.
CAUTION:
Before conducting this test, ensure that no people or obstacles are in the test area.

(e) P position test
Stop the vehicle on an incline (more than 5°). Then move the shift lever to P and release the parking brake. Check that the parking lock pawl holds the vehicle in place.



(f) Remove the 2 apply gaskets.

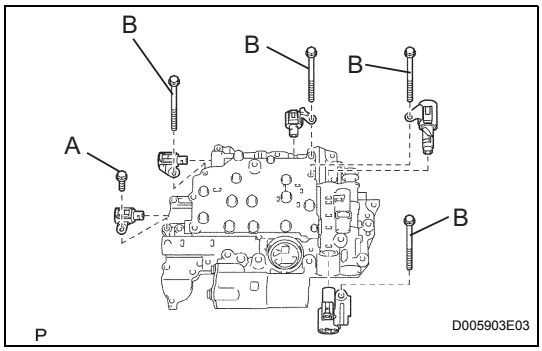


(g) Remove the 5 bolts and 5 shift solenoid valves.

INSTALLATION

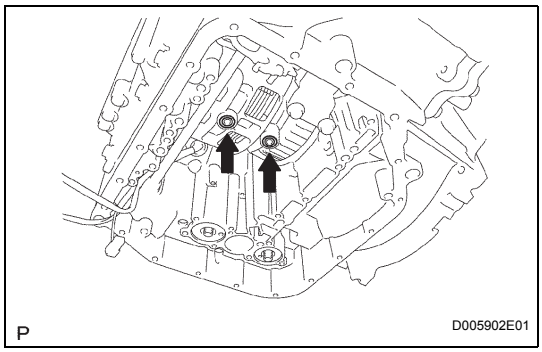
1. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Install the 5 shift solenoid valves with the 5 bolts.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
55 mm (2.17 in.) for bolt B

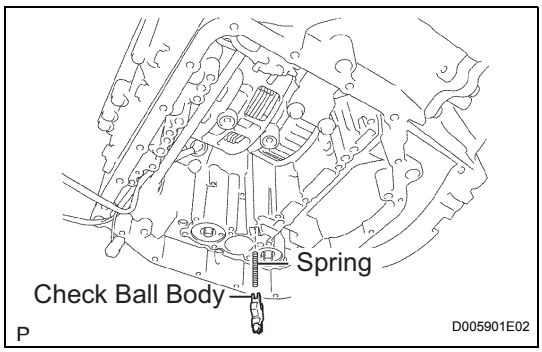


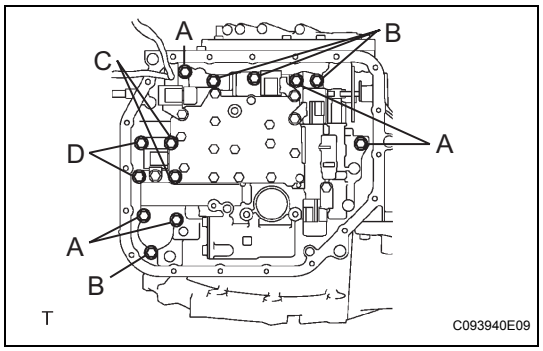
AX

(b) Coat 2 new apply gaskets with ATF.
(c) Install the gaskets on the transaxle case.



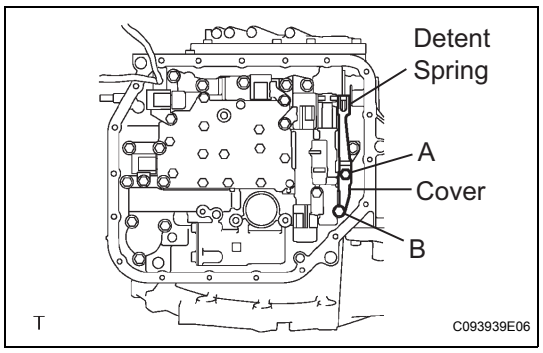
(d) Install the spring and check ball body.





(e) Align the groove of the manual valve with the pin of the manual valve lever.

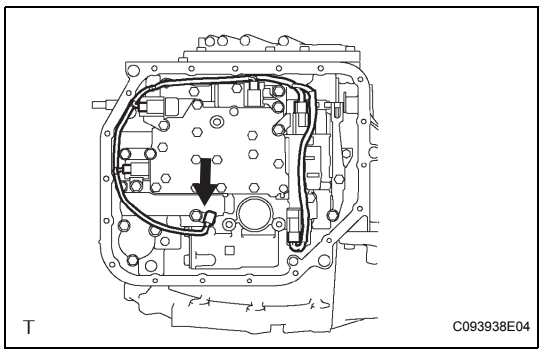
(f) Temporarily install the valve body with the 13 bolts.
HINT:
Bolt length:
32 mm (1.26 in.) for bolt A
22 mm (0.87 in.) for bolt B
55 mm (2.17 in.) for bolt C
45 mm (1.77 in.) for bolt D



(g) Temporarily install the detent spring and cover with the 2 bolts.
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
45 mm (1.77 in.) for bolt B

(h) Check that the manual valve lever contacts the center of the roller at the tip of the detent spring.

(i) Tighten the 15 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



(j) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

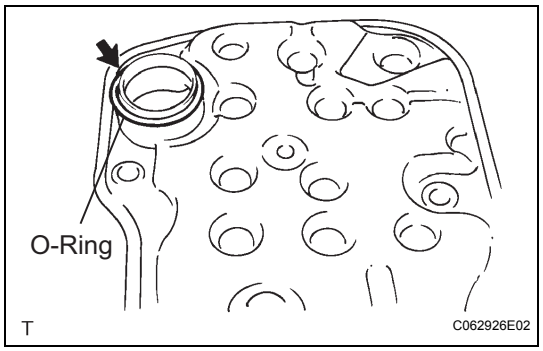
(k) Connect the 5 shift solenoid valve connectors.

AX

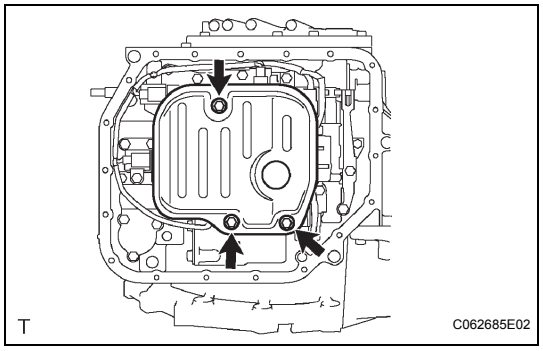
2. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

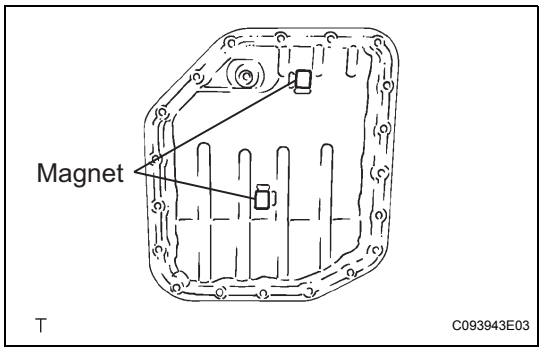
(a) Coat a new O-ring with ATF.

(b) Install the O-ring on the oil strainer.

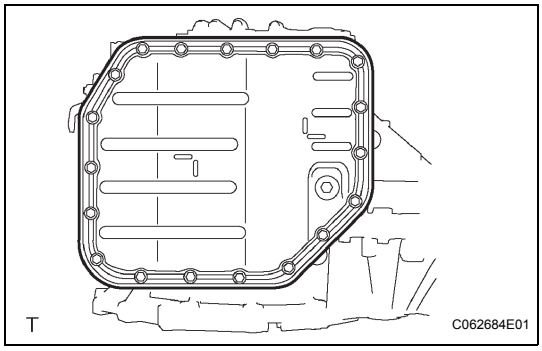


(c) Install the oil strainer with the 3 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)





3. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY**
   (a) Install the 2 magnets in the oil pan, as shown in the illustration.



   (b) Install a new gasket and the oil pan with the 19 bolts.
   Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

4. **INSTALL ENGINE UNDER COVER LH**

5. **ADD AUTOMATIC TRANSAXLE FLUID**
   Fluid type:
   Toyota Genuine ATF TYPE T-IV

6. **INSPECT AUTOMATIC TRANSAXLE FLUID**
   (a) Inspect the automatic transaxle fluid (see page AX-82).

ON-VEHICLE INSPECTION

1. CHECK SHIFT LOCK OPERATION

(a) Adjust the shift lever to the P position.
(b) Turn the ignition switch to the LOCK position.
(c) Check that the shift lever cannot be adjusted to any position other than P.
(d) Turn the ignition switch to the ON position, depress the brake pedal and check that the shift lever can be adjusted to all positions.
If the operation cannot be done as specified, inspect the shift lock control switch.

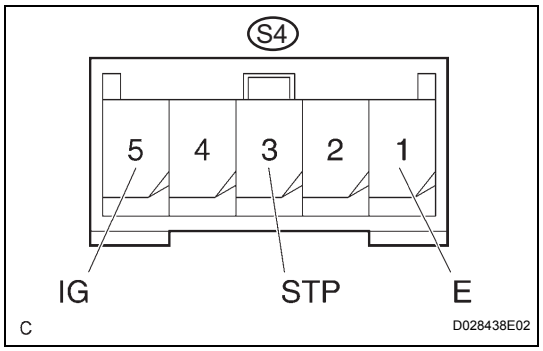
2. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

(a) When operating the shift lever with the shift lock release button pressed and the ignition switch in the ACC or ON position, check that the lever can be adjusted to all positions.
If the operation cannot be done as specified, check the shift lever assembly installation condition.

3. CHECK KEY INTERLOCK OPERATION

(a) Turn the ignition switch to the ON position.
(b) Depress the brake pedal and adjust the shift lever to any position other than P.
(c) Check that the ignition switch cannot be turned to the LOCK position.
(d) Adjust the shift lever to the P position, turn the ignition switch to the LOCK position and check that the ignition key can be removed.
If the operation cannot be done as specified, inspect the shift lock control switch.

AX

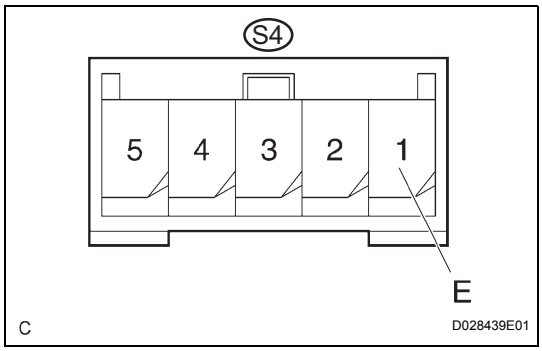


4. INSPECT SHIFT LOCK CONTROL SWITCH

(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control switch connector.

Standard voltage

Tester Connection	Condition	Specified Condition
5 (IG) - 1 (E)	Ignition switch ON	10 to 14 V
5 (IG) - 1 (E)	Ignition switch OFF	Below 1 V
3 (STP) - 1 (E)	Depress brake pedal	10 to 14 V
3 (STP) - 1 (E)	Release brake pedal	Below 1 V



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Condition	Specified Condition
1 (E) - Body ground	Always	Below 1 Ω

If the result is not as specified, replace the shift lock control switch.

INSPECTION

1. INSPECT SHIFT LOCK CONTROL SWITCH

(a) Disconnect the connector A and connector B of the shift lock control switch.

(b) Measure the resistance according to the value(s) in the table below.

HINT:

"Switch ON" means push the button on top of the switch.

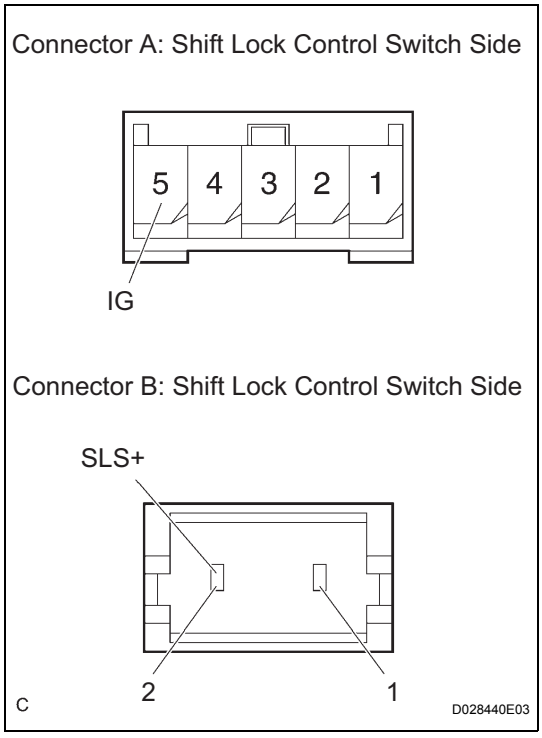
NOTICE:

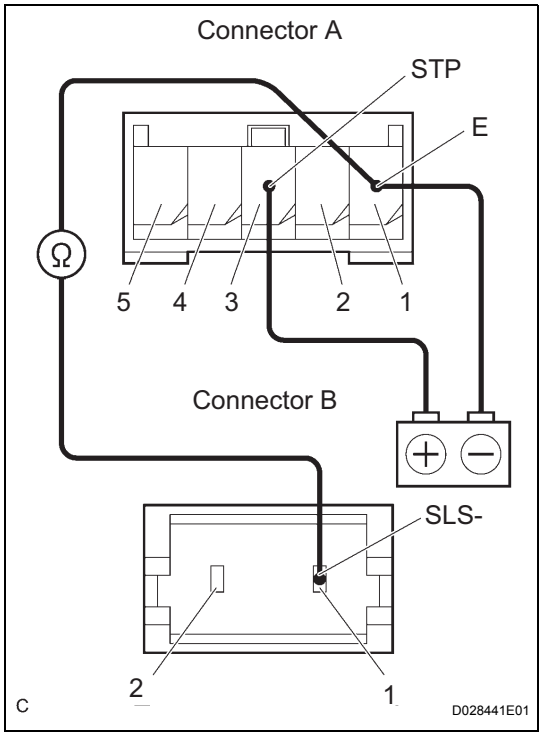
Match the tester probe with current direction as the shift lock control switch circuit has a diode.

Standard resistance

Tester Condition	Condition	Specified Condition
A5 (IG) - B2 (SLS+)	Switch ON	Below 1 Ω
A5 (IG) - B2 (SLS+)	Switch OFF	10 kΩ or higher

If the result is not as specified, replace the shift lock control switch.





(c) Connect the battery's positive (+) lead to terminal 3 (STP) and the negative (-) lead to terminal 1 (E).

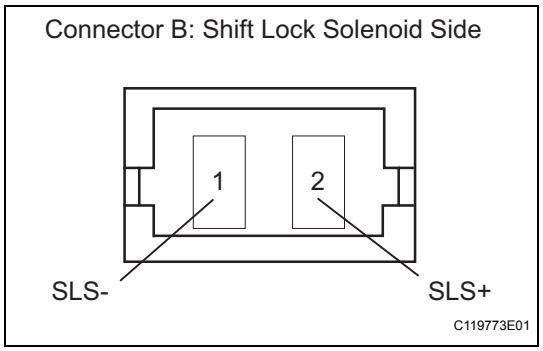
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Condition	Specified Condition
A1 (E) - B1 (SLS-)	Connect battery	Below 1 Ω
A1 (E) - B1 (SLS-)	Disconnect battery	10 kΩ or higher

If the result is not as specified, replace the shift lock control switch.

AX



2. INSPECT SHIFT LOCK SOLENOID

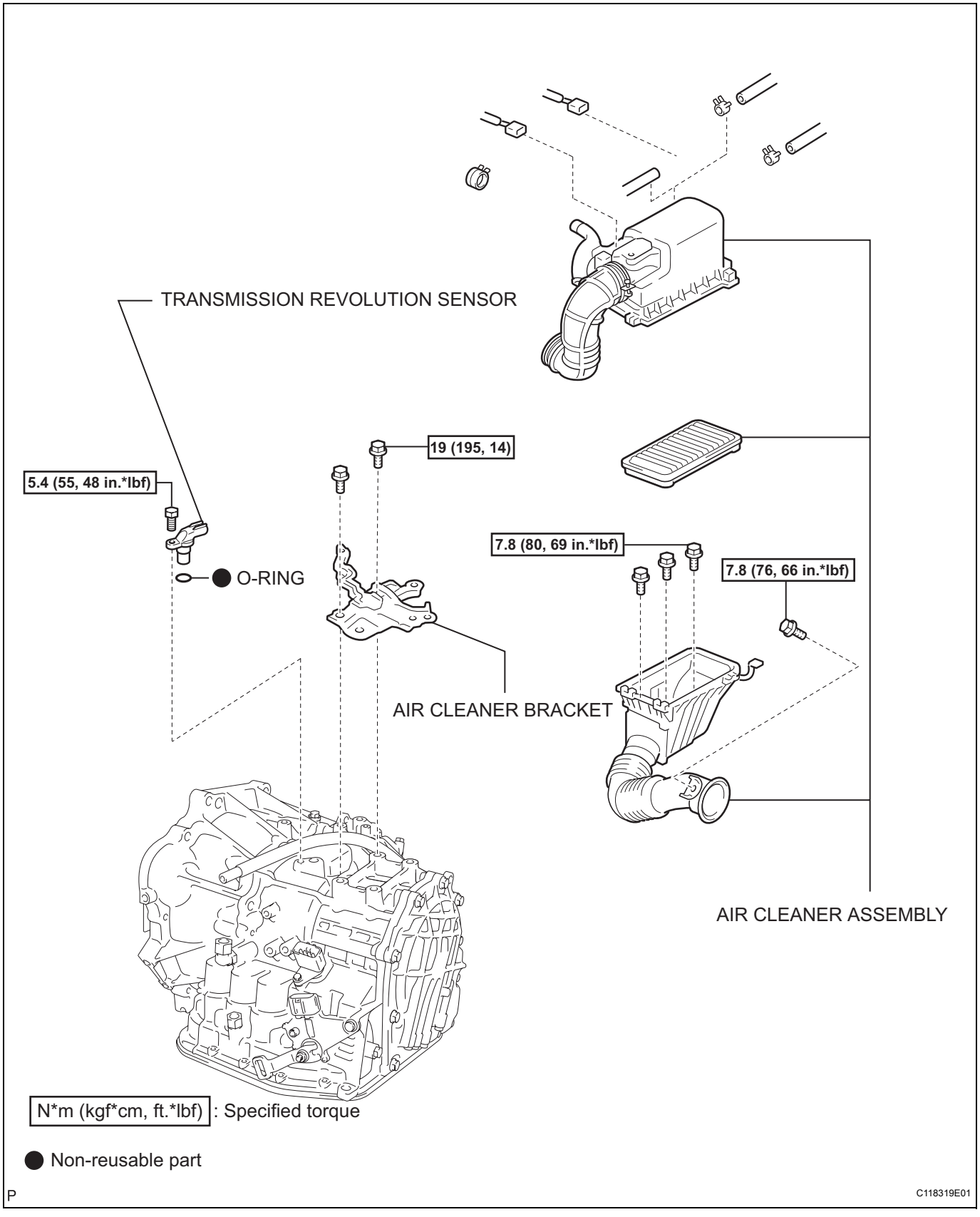
(a) Disconnect the solenoid connector.

(b) Connect the battery's positive (+) lead to terminal 2 (SLS+) and the negative (-) lead to terminal 1 (SLS-).

(c) Check that the operating noise of the solenoid can be heard.
If the solenoid does not operate, replace the solenoid.

TRANSMISSION REVOLUTION SENSOR

COMPONENTS



AX

REMOVAL

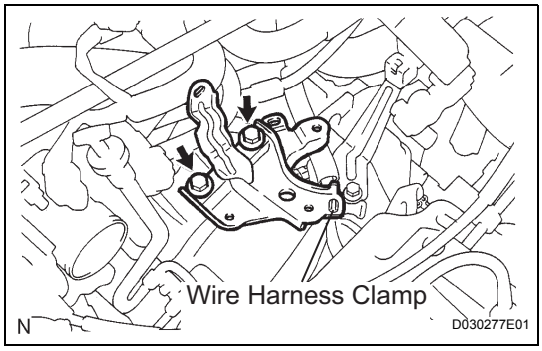
1. REMOVE AIR CLEANER ASSEMBLY

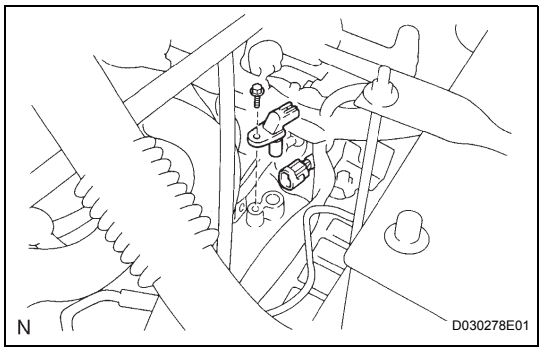
(a) Remove the air cleaner (see page ES-346).

2. REMOVE AIR CLEANER BRACKET

(a) Disconnect the wire harness clamp.

(b) Remove the 2 bolts and air cleaner bracket.





3. REMOVE TRANSMISSION REVOLUTION SENSOR

(a) Disconnect the connector.

(b) Remove the bolt and transmission revolution sensor.

(c) Remove the O-ring from the sensor.

INSPECTION

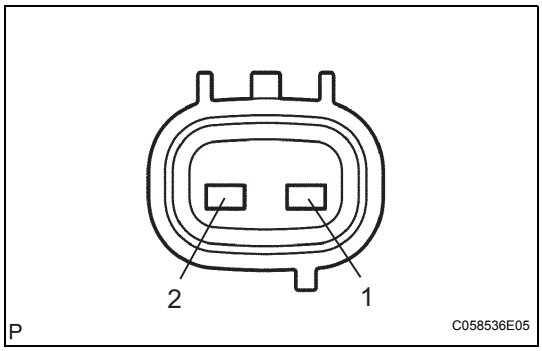
1. INSPECT TRANSMISSION REVOLUTION SENSOR

(a) Measure the resistance of the sensor.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	560 to 680 Ω

If the result is not as specified, replace the sensor.



INSTALLATION

1. INSTALL TRANSMISSION REVOLUTION SENSOR

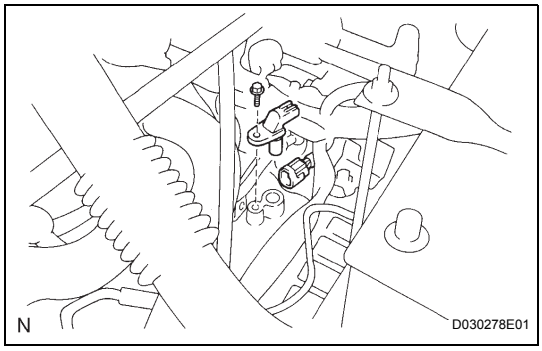
(a) Coat a new O-ring with ATF.

(b) Install the O-ring to the transmission revolution sensor.

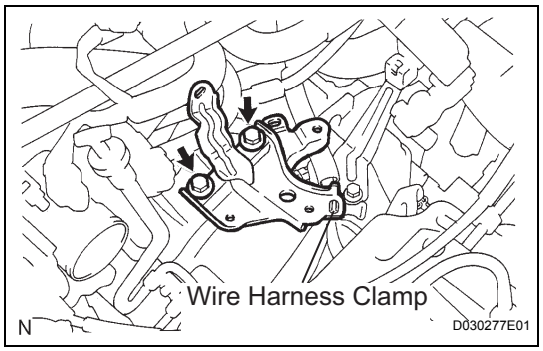
(c) Install the sensor with the bolt.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

(d) Connect the connector.



AX



2. **INSTALL AIR CLEANER BRACKET**
   (a) Install the air cleaner bracket with the 2 bolts.
   Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
   (b) Connect the wire harness clamp to the air cleaner bracket.

3. **INSTALL AIR CLEANER ASSEMBLY**
   (a) Install the air cleaner (see page ES-348).

MECHANICAL SYSTEM TESTS

1. STALL SPEED TEST

HINT:

This test is to check the overall performance of the engine and transaxle.

NOTICE:

- **Do not perform the stall speed test longer than 5 seconds.**
- **To ensure safety, perform this test in an open and level area that provides good traction.**
- **The stall speed test should always be performed with at least 2 people. One person should observe the condition of the wheels and wheel chocks while the other is performing the test.**

(a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Run the vehicle until the ATF temperature has reached 50 to 80°C (122 to 176°F).

(c) Allow the engine to idle with the air conditioning OFF.

(d) Chock all 4 wheels.

(e) Set the parking brake and keep the brake pedal depressed firmly with your left foot.

(f) Move the shift lever to the drive position.

(g) Depress the accelerator pedal as much as possible with your right foot.

(h) Read the engine rpm (stall speed) and release the accelerator pedal immediately.

Standard value:

2,050 to 2,550 rpm

AX

Evaluation:

Test Result	Possible Cause
Stall speed is lower than standard value	• Stator one-way clutch is not operating properly • Torque converter is faulty (stall speed is less than standard value by 600 rpm or more) • Engine power may be insufficient
Stall speed is higher than standard value	• Line pressure is low • Forward clutch slipping • No. 2 one-way clutch is not operating properly

2. SHIFT TIME LAG TEST

HINT:

This test is to check the condition of the direct clutch, forward clutch, 1st brake and reverse brake.

(a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Run the vehicle until the ATF temperature has reached 50 to 80°C (122 to 176°F).

(c) Allow the engine to idle with the air conditioning OFF.

(d) Set the parking brake and keep the brake pedal depressed firmly.

(e) Check the D range time lag.

(1) Move the shift lever to N and wait for 1 minute.

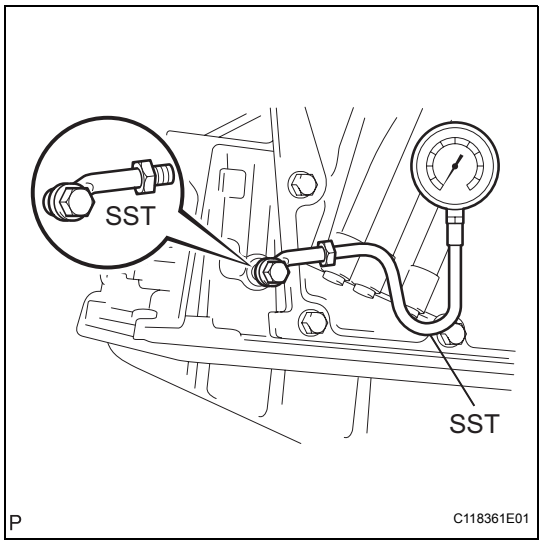
(2) Move the shift lever to D and measure the time until the shock is felt.
(3) Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.

(f) Check the R range time lag.
(1) Move the shift lever to N and wait for 1 minute.
(2) Move the shift lever to R and measure the time until the shock is felt.
(3) Repeat the 2 procedures above 3 times, and calculate the average time of the 3 tests.

Standard value:
D range time lag is less than 1.2 seconds
R range time lag is less than 1.5 seconds

Evaluation:

Test Result	Possible Cause
D range time lag exceeds standard value	• Line pressure is low • Forward clutch is worn • No. 2 one-way clutch is not operating properly
R range time lag exceeds standard value	• Line pressure is low • Direct clutch worn • 1st and reverse brake worn



HYDRAULIC TEST

1. MEASURE LINE PRESSURE

NOTICE:
- **Perform the test at the normal operating ATF temperature: 50 to 80°C (122 to 176°F).**
- **The line pressure test should always be performed with at least 2 people. One person should observe the condition of the wheels or wheel chocks while the other is performing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**
- **This test must be performed after checking and adjusting the engine.**
- **Perform the test with the A/C OFF.**
- **When conducting the stall test, do not continue for more than 10 seconds.**

(a) Warm up the ATF.
(b) Remove the test plug on the transaxle case center right side and connect SST.
SST 09992-00095 (09992-00231, 09992-00271)
(c) Fully apply the parking brake and chock the 4 wheels.
(d) Start the engine and check idling speed.
(e) Keep your left foot firmly on the brake pedal and move the shift lever to D.
(f) Measure the line pressure when the engine is idling.
(g) Depress the accelerator pedal as much as possible with your right foot. Quickly read the highest line pressure reading when the engine speed reaches stall speed.

(h) Perform the measure line pressure test again with the shift lever on R.

Specified line pressure:

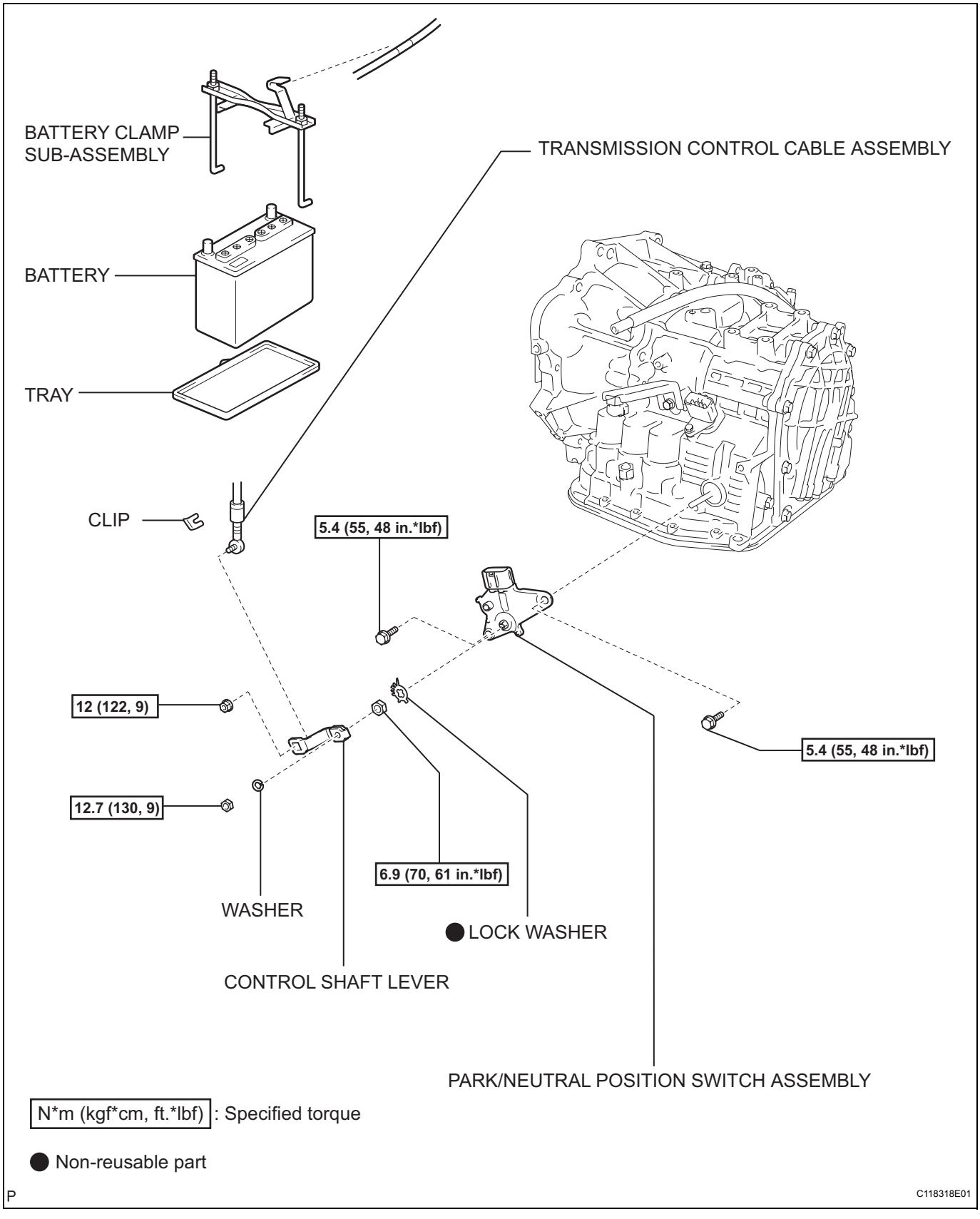
Condition	Shift Lever on D	Shift Lever on R
Idling	372 to 407 kPa (3.8 to 4.2 kgf/cm^2, 54 to 60 psi)	541 to 636 kPa (5.5 to 6.5 kgf/cm^2, 78 to 92 psi)
Stall	1,107 to 1,225 kPa (11.3 to 12.5 kgf/cm^2, 161 to 178 psi)	1,695 to 1,813 kPa (17.3 to 18.5 kgf/cm^2, 246 to 263 psi)

Evaluation:

Problem	Possible Cause
Measured values at all positions are higher than specified	• Shift solenoid valve SLT defective • Regulator valve defective
Measured values at all positions are lower than specified	• Shift solenoid valve SLT defective • Regulator valve defective • Oil pump defective
Pressure is low when shift lever is on D only	• D position circuit fluid leak • Forward clutch defective
Pressure is low when shift lever is on R only	• R position circuit fluid leak • Direct clutch defective • 1st and reverse brake defective

PARK / NEUTRAL POSITION SWITCH

COMPONENTS



AX

ON-VEHICLE INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Apply the parking brake and turn the ignition switch ON.

(b) Depress the brake pedal and check that the engine starts when the shift lever is on N or P, but does not start in other positions.

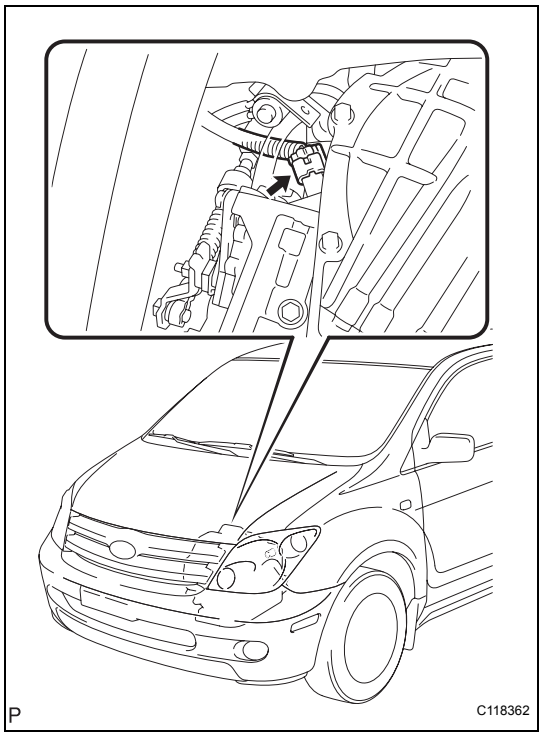
(c) Check that the back-up light illuminates and the reverse warning buzzer sounds when the shift lever is on R, but do not function in other positions.

MANUAL SHIFTING TEST

1. MANUAL SHIFTING TEST

HINT:

- Through this test, it can be determined whether the trouble occurs in an electrical circuit or if it is a mechanical problem in the transaxle.
- If any abnormalities are found in the following test, the problem is in the transaxle itself.



(a) Disconnect the connector of the transmission wire.
HINT:
It is possible to deactivate the electrical shift control by disconnecting the transmission wire. The gear positions can then be changed mechanically with the shift lever.

(b) Drive with the transmission wire disconnected. Move the shift lever to each position to check whether the gear position changes as shown in the table below.

Shift Lever Position	Gear Position
D	3rd
2	3rd
L	3rd
R	R
P	P

HINT:
If the gear positions L, 2 and D are difficult to distinguish, do the following ROAD TEST.
If any abnormality is found in the above test, the problem is in the transaxle itself.

(c) Connect the connector of the transmission wire.

(d) Clear the DTC (see page AX-30).

AX

INITIALIZATION

1. RESET MEMORY

NOTICE:

- **Perform the RESET MEMORY procedures (A/T initialization) when replacing the automatic transaxle assembly, engine assembly or ECM.**
- **RESET MEMORY can be performed only with the intelligent tester.**

HINT:

The ECM memorizes the vehicle conditions when the ECT controls the automatic transaxle assembly and engine assembly. Therefore, when the automatic transaxle assembly, engine assembly, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

The reset procedures are as follows.

(a) Turn the ignition switch OFF.

(b) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(c) Turn the ignition switch ON and push the tester main switch ON.

(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II.

(e) Perform the reset memory procedure from the ENGINE menu.

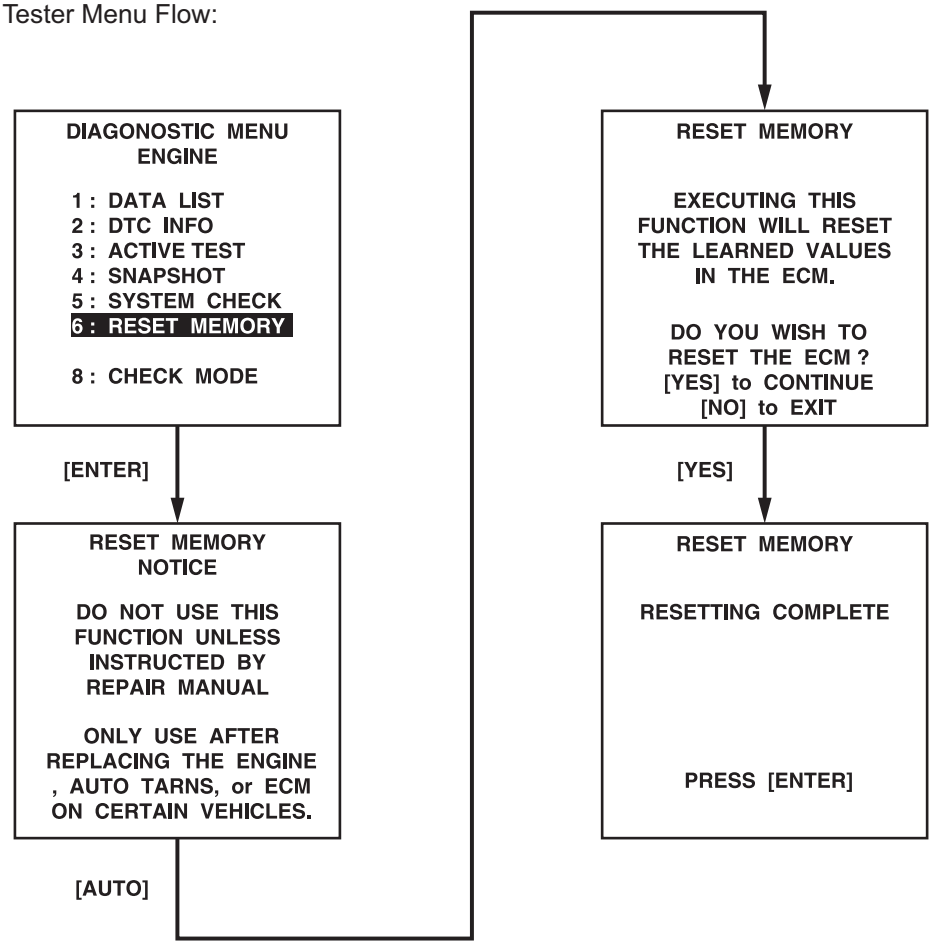
CAUTION:

After performing the RESET MEMORY procedures, be sure to perform the ROAD TEST (see page AX-14) as described earlier.

HINT:

The ECM learns through the ROAD TEST.

Tester Menu Flow:



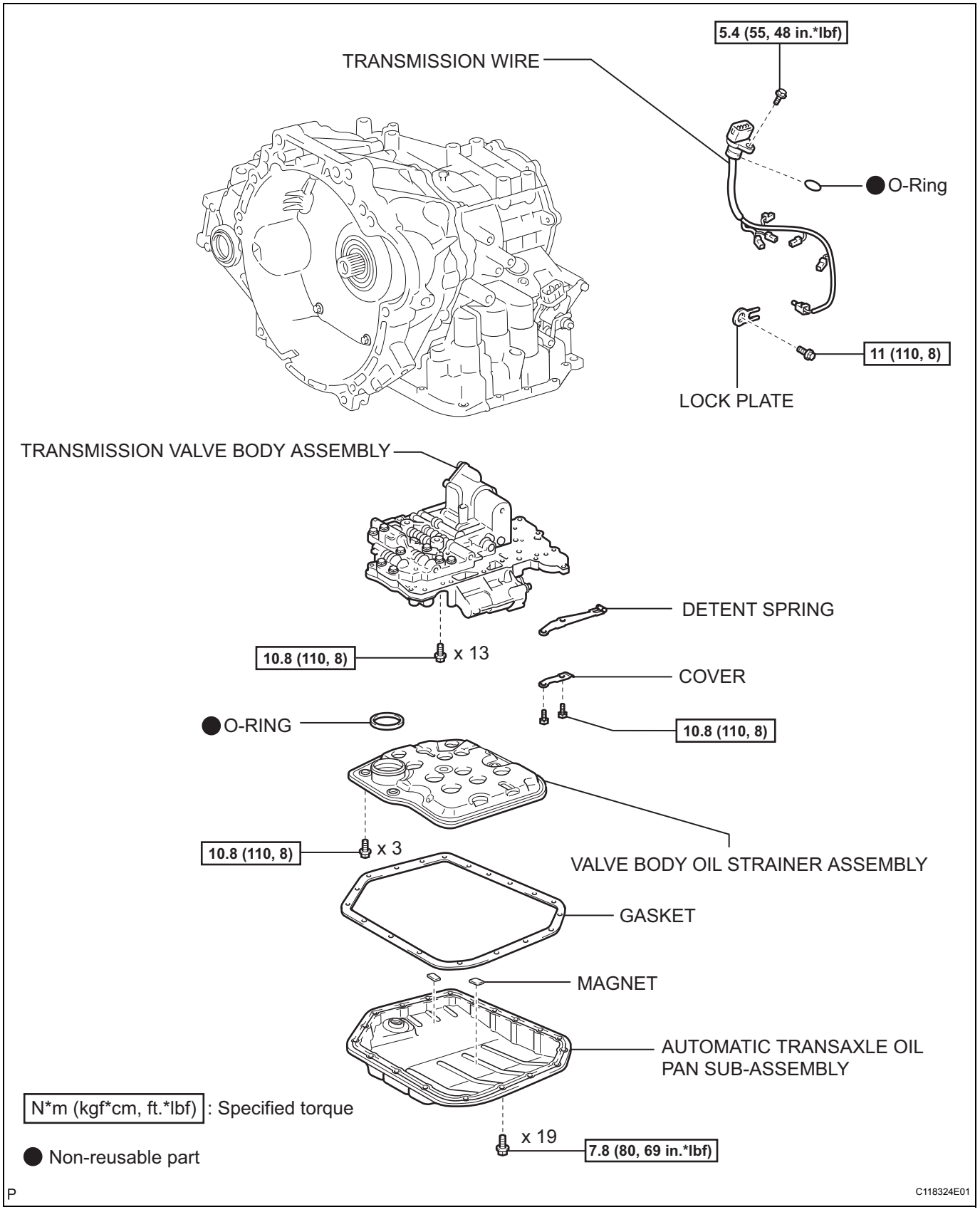
AX

P

C115865E01

TRANSMISSION WIRE

COMPONENTS



AX

REMOVAL

1. REMOVE ENGINE UNDER COVER LH

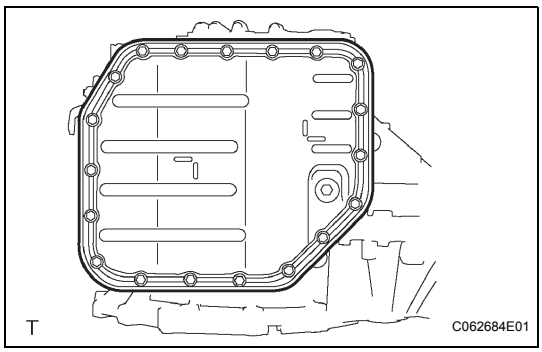
2. DRAIN AUTOMATIC TRANSAXLE FLUID

(a) Remove the drain plug and gasket, and drain ATF.

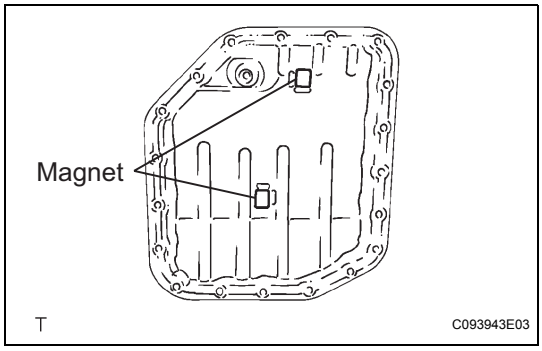
(b) Install a new gasket and the drain plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

3. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Remove the 19 bolts, oil pan and gasket.
NOTICE:
Some fluid will remain in the oil pan. Remove all the oil pan bolts, and carefully remove the oil pan.

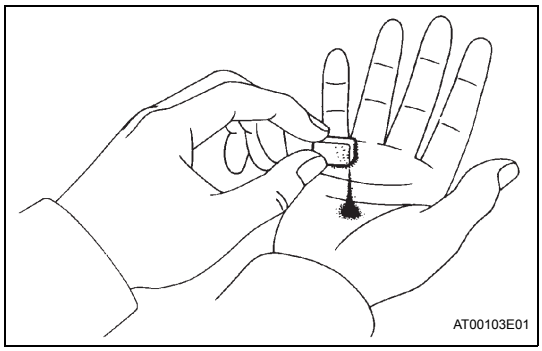


(b) Remove the 2 magnets from the oil pan.



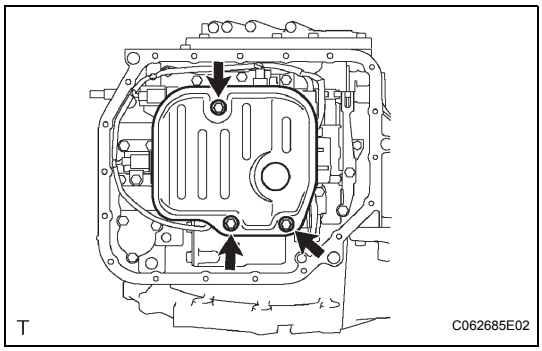
(c) Examine particles in the pan.

(1) Use the removed magnets to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.
Steel (magnetic): bearing, gear and plate wear
Brass (non-magnetic): bushing wear

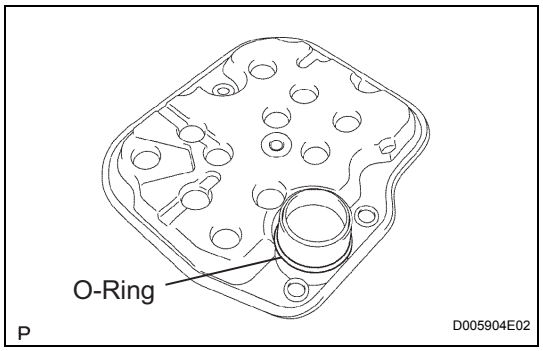


4. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

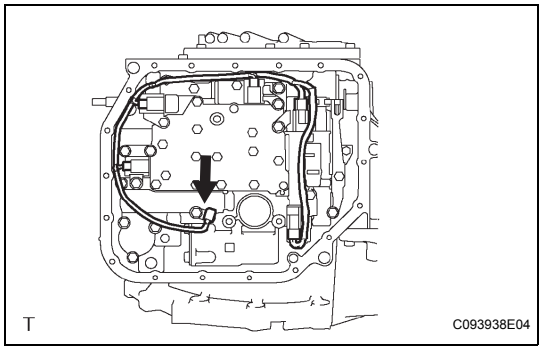
(a) Remove the 3 bolts and oil strainer.
NOTICE:
Be careful as some fluid will come out with the oil strainer.



AX



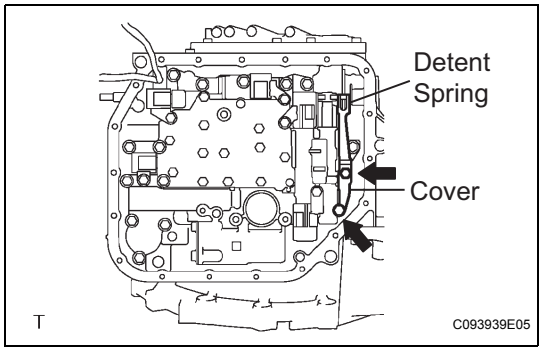
(b) Remove the O-ring from the oil strainer.



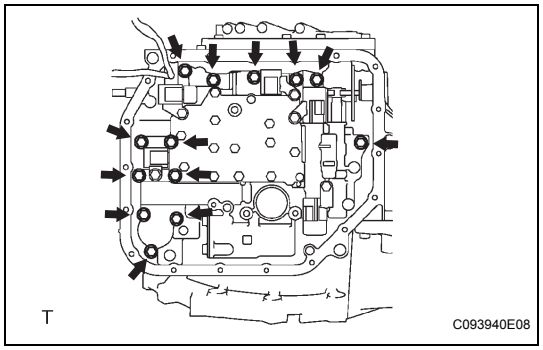
5. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Disconnect the 5 connectors.

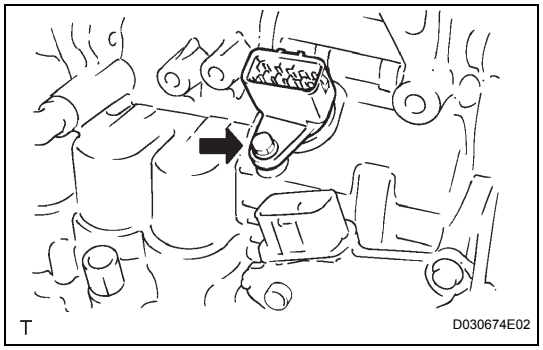
(b) Remove the bolt and lock plate, and remove the ATF temperature sensor.



(c) Remove the 2 bolts, cover and detent spring.



(d) Remove the 13 bolts and valve body.
NOTICE:
Be careful not to drop the check valve body, spring and accumulator piston.



6. REMOVE TRANSMISSION WIRE

(a) Remove the bolt and transmission wire.

AX

MONITOR DRIVE PATTERN

1. **TEST MONITOR DRIVE PATTERN FOR ECT**

CAUTION:

Perform this drive pattern on a level surface and strictly observe the posted speed limits and traffic laws while driving.

HINT:

Performing this drive pattern is one method to simulate the ECT's malfunction detection conditions.

The DTCs may not be detected through ordinary, everyday driving. Also, DTCs may not be detected through this drive pattern.

(a) Preparation for driving

(1) Warm up the engine sufficiently (engine coolant temperature is 60°C (140°F) or higher).

(2) Drive the vehicle when the atmospheric temperature is -10°C (14°F) or higher. Malfunctions are not detected when the atmospheric temperature is less than -10°C (14°F).

(b) Drive pattern

CAUTION:

Perform this drive pattern on a level road as much as possible and strictly observe the posted speed limits and traffic laws while driving.

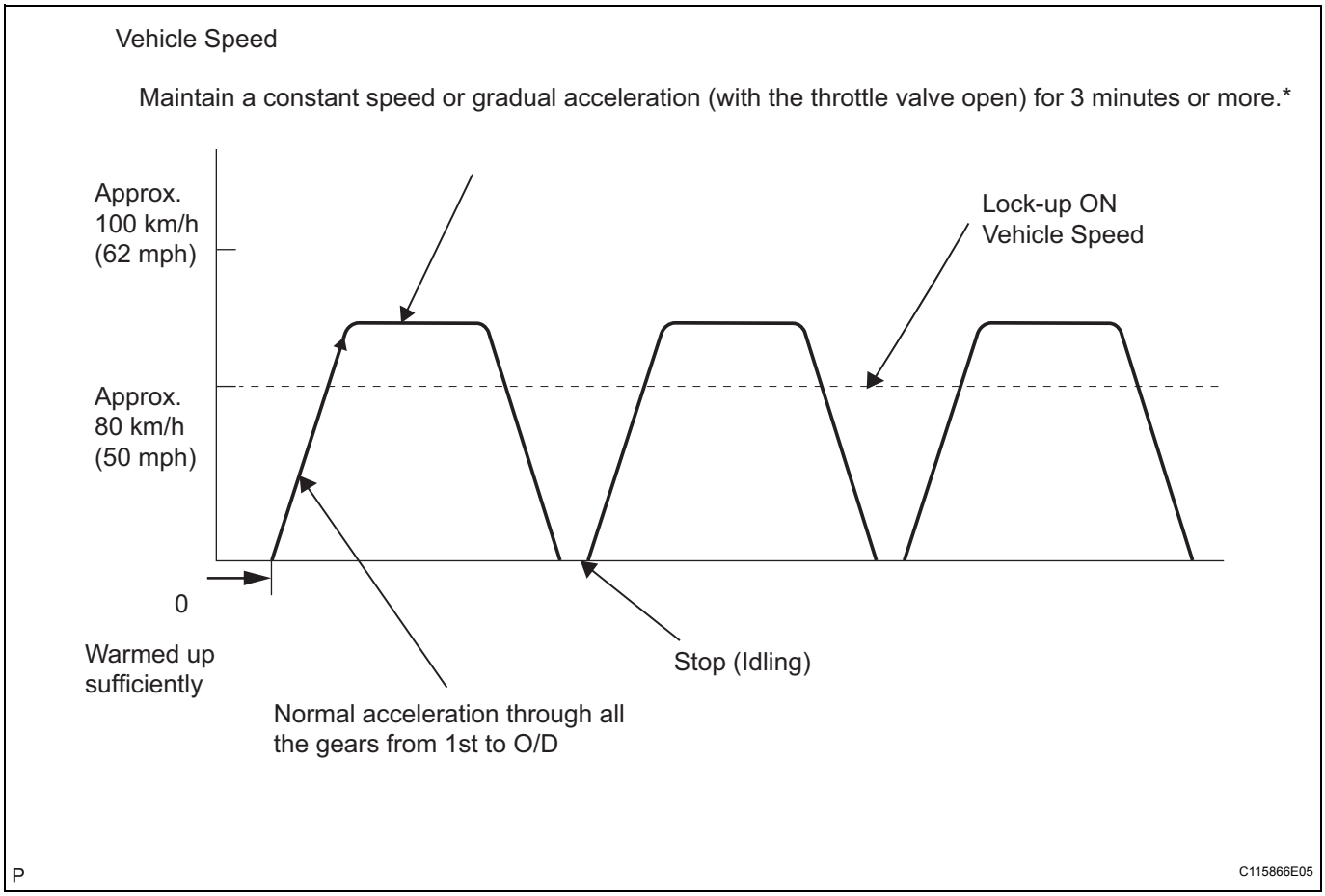
(1) Drive the vehicle through all the gears. Stop → 1st → 2nd → 3rd → O/D → O/D (lock-up ON).

(2) Repeat the above drive pattern 3 times or more.

NOTICE:

- **When using the intelligent tester, the monitor status can be found in the "ENHANCED OBD II / DATA LIST" or under "CARB OBD II".**
- **In the event that the drive pattern must be interrupted (due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.**

AX



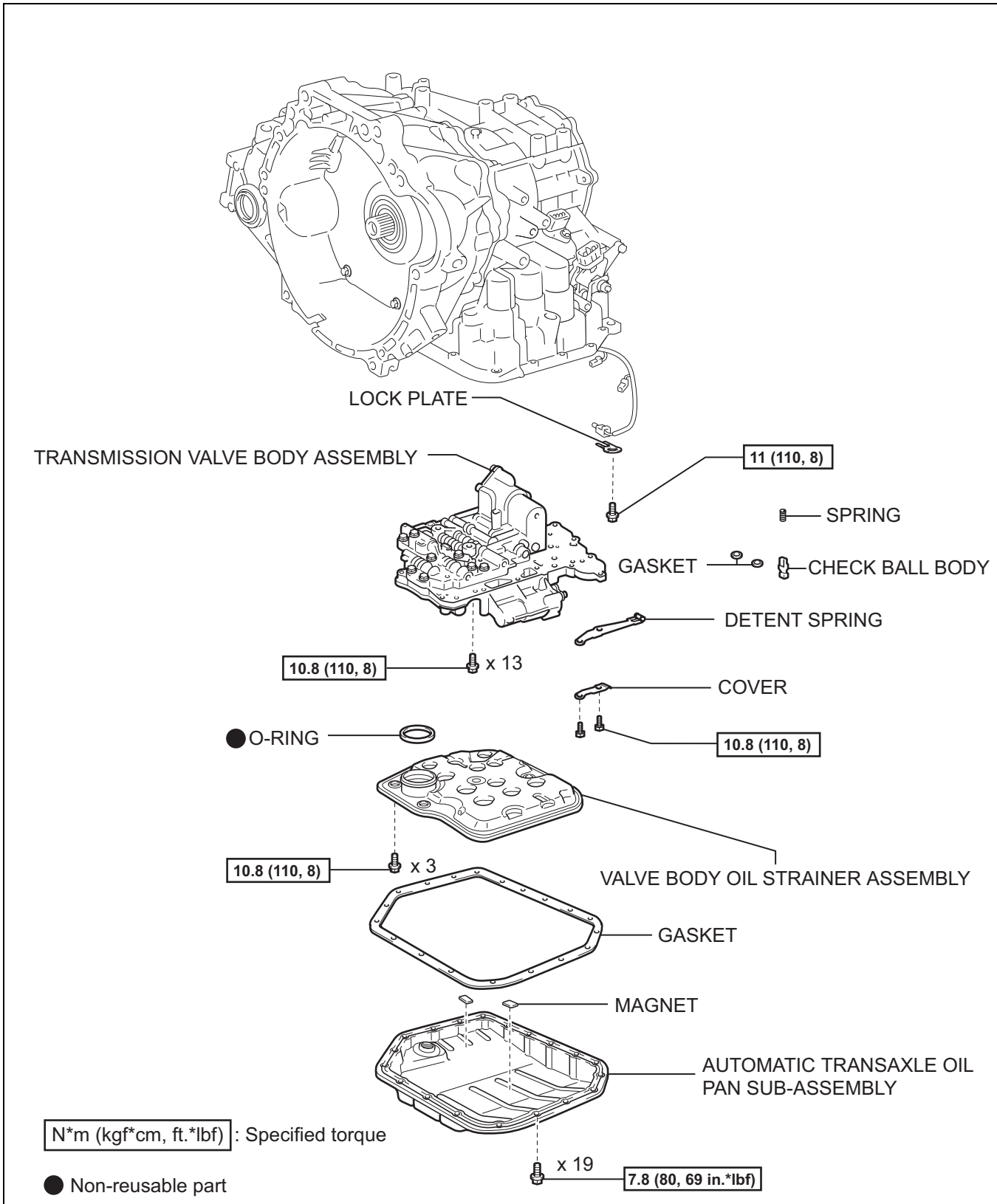
HINT:
*: Drive at such a speed in the uppermost gear to engage lock-up. The vehicle can be driven at a speed lower than the speed shown in the above diagram under the lock-up condition.

NOTICE:
It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

AX

VALVE BODY ASSEMBLY

COMPONENTS



AX

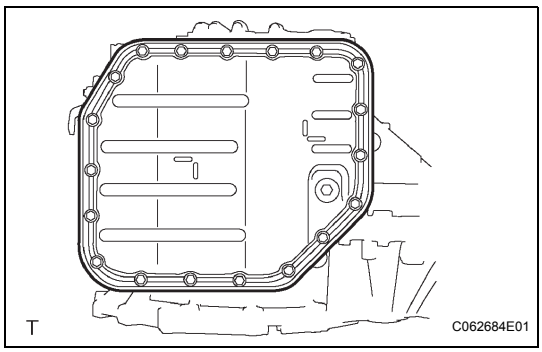
REMOVAL

1. REMOVE ENGINE UNDER COVER LH

2. DRAIN AUTOMATIC TRANSAXLE FLUID

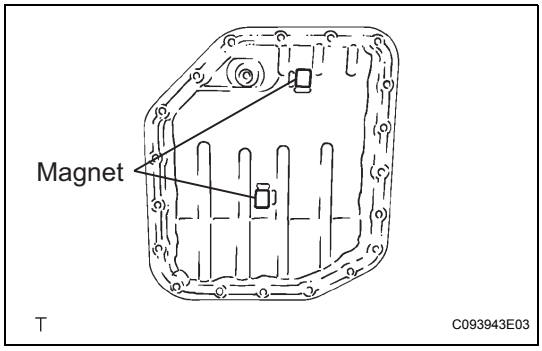
(a) Remove the drain plug and gasket, and drain ATF.

(b) Install a new gasket and the drain plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

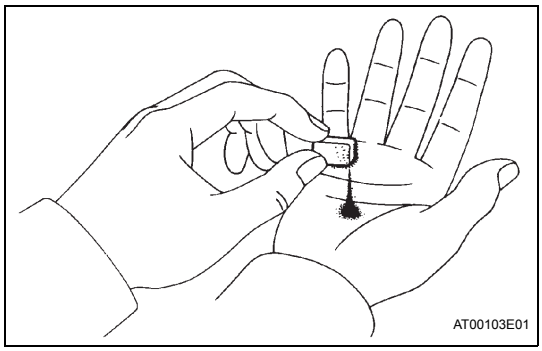


3. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Remove the 19 bolts, oil pan and gasket.
NOTICE:
Some fluid will remain in the oil pan. Remove all the oil pan bolts, and carefully remove the oil pan sub-assembly.

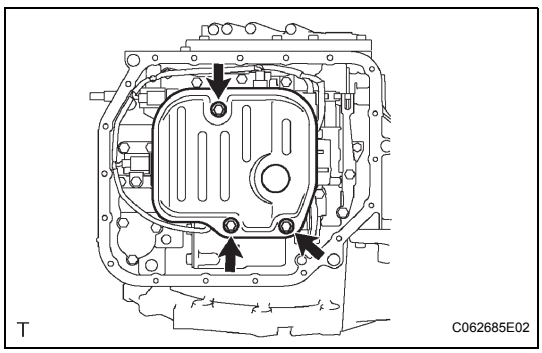


(b) Remove the 2 magnets from the oil pan.



(c) Examine particles in the pan.

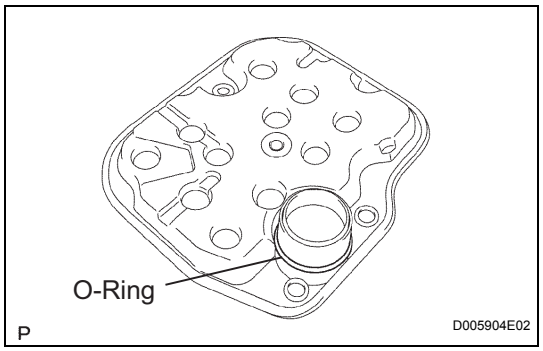
(1) Use the removed magnets to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.
Steel (magnetic): bearing, gear and plate wear
Brass (non-magnetic): bushing wear



4. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

(a) Remove the 3 bolts and oil strainer.
NOTICE:
Be careful as some fluid will come out with the oil strainer.

AX

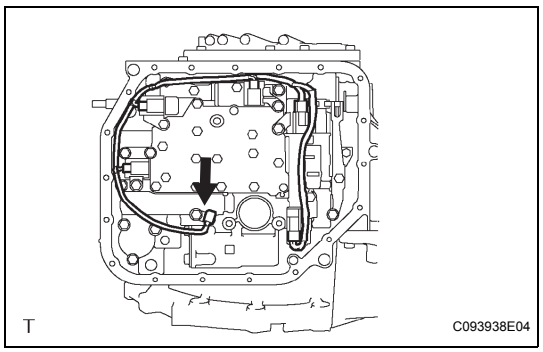


(b) Remove the O-ring from the oil strainer.

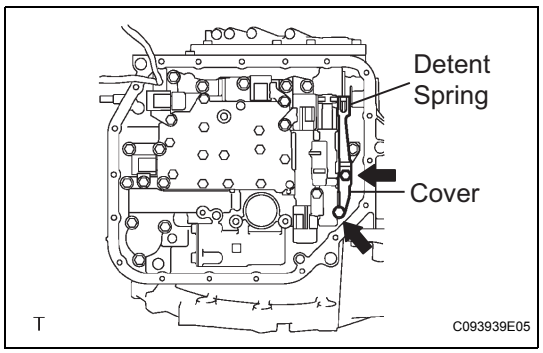
5. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Disconnect the 5 connectors.

(b) Remove the bolt, lock plate and ATF temperature sensor.



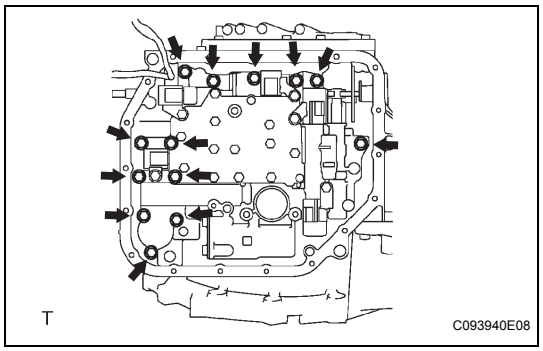
(c) Remove the 2 bolts, cover and detent spring.



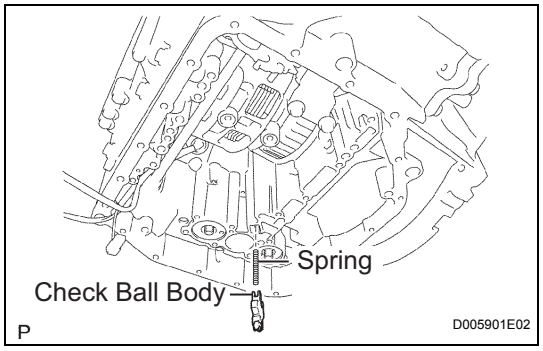
(d) Remove the 13 bolts and valve body.

NOTICE:

Be careful not to drop the check valve body, spring and accumulator piston.



(e) Remove the check ball body and spring.



AX

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- The Matrix Chart is divided into 3 chapters. When troubleshooting, check Chapter 1 first. If instructions are given in Chapter 2 to proceed to 3, proceed as instructed.
- If the instruction "Proceed to next circuit inspection shown in problem symptoms table" is given in the flowchart for each circuit, proceed to the next suspected area in the table.
- If the problem still occurs even though there are no malfunctions in any of the circuits, check the ECM and replace it if necessary.

CHAPTER 1: ELECTRICAL CIRCUIT MATRIX CHART

Symptom	Suspected area	See page
No up-shift (a particular gear, from 1st to 3rd gear, is not up-shifted)	ECM	IN-33
No up-shift (3rd -> O/D)	1. O/D main switch circuit	AX-80
	2. ECM	IN-33
No down-shift (O/D -> 3rd)	1. O/D main switch circuit	AX-80
	2. ECM	IN-33
No down-shift (a particular gear, from 3rd to 1st gear, is not down-shifted)	ECM	IN-33
No lock-up or no lock-up off	1. Stop light switch circuit	AX-51
	2. Engine coolant temperature sensor circuit	ES-47
	3. Throttle position sensor circuit	ES-47
	4. ECM	IN-33
Shift point too high or too low	ECM	IN-33
Up-shift to 2nd while shift lever on L	ECM	IN-33
Up-shift to 3rd while shift lever on 2	ECM	IN-33
Up-shift to O/D from 3rd while O/D main switch is OFF	1. O/D main switch circuit	AX-80
	2. ECM	IN-33
Up-shift to O/D from 3rd while engine is cold	ECM	IN-33
Harsh engagement (N -> D)	ECM	IN-33
Harsh engagement (lock-up)	ECM	IN-33
Harsh engagement (any driving position)	ECM	IN-33
Poor acceleration	ECM	IN-33
Engine stalls when starting off or stopping	ECM	IN-33
No kick-down	ECM	IN-33
Malfunction in shifting	1. Park/Neutral position switch circuit	AX-38
	2. ECM	IN-33

CHAPTER 2: ON-VEHICLE REPAIR AND OFF-VEHICLE REPAIR

Symptom	Suspected area	See page
Vehicle does not move in any forward position and reverse position	1. Manual valve	AX-148
	2. Valve body assembly (primary regulator valve)	AX-98
	3. Valve body assembly (secondary regulator valve)	AX-98
	4. Off-vehicle repair matrix chart	-
Vehicle does not move with shift lever on R	1. Manual valve	AX-148
	2. Off-vehicle repair matrix chart	-
No up-shift (1st -> 2nd)	1. Valve body assembly (1-2 shift valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No up-shift (2nd -> 3rd)	1. Valve body assembly (2-3 shift valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No up-shift (3rd -> O/D)	1. Valve body assembly (3-4 shift valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No down-shift (O/D -> 3rd)	Valve body assembly (3-4 shift valve)	AX-98
No down-shift (3rd -> 2nd)	Valve body assembly (2-3 shift valve)	AX-98
No down-shift (2nd -> 1st)	Valve body assembly (1-2 shift valve)	AX-98
No lock-up or no lock-up off	1. Valve body assembly (lock-up relay valve)	AX-98
	2. Valve body assembly (lock-up control valve)	AX-98
	3. Valve body assembly (solenoid relay valve)	AX-98
	4. Valve body assembly (solenoid modulator valve)	AX-98
	5. Off-vehicle repair matrix chart	-
Harsh engagement (N -> D)	1. Valve body assembly (C1 accumulator)	AX-98
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Off-vehicle repair matrix chart	-
Harsh engagement (N -> R)	1. C3 accumulator	AX-148
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Valve body assembly (reverse control valve)	AX-98
	4. Off-vehicle repair matrix chart	-
Harsh engagement (lock-up)	1. Valve body assembly (lock-up relay valve)	AX-98
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Valve body assembly (lock-up control valve)	AX-98
	4. Off-vehicle repair matrix chart	-
Harsh engagement (1st -> 2nd)	1. B2 accumulator	AX-148
	2. Valve body assembly (accumulator control valve)	AX-98
Harsh engagement (2nd -> 3rd)	1. C2 accumulator	AX-148
	2. Valve body assembly (accumulator control valve)	AX-98
Harsh engagement (3rd -> O/D)	1. Valve body assembly (B1 accumulator)	AX-98
	2. Valve body assembly (accumulator control valve)	AX-98
	3. Valve body assembly (3-4 shift timing valve)	AX-98
Harsh engagement (O/D -> 3)	1. Valve body assembly (3-4 shift timing valve)	AX-98
	2. Valve body assembly (4-3 shift timing valve)	AX-98
Harsh engagement (shift lever on D, 2, L)	Valve body assembly (coast relay valve)	AX-98
Slip or shudder (forward and reverse)	1. Valve body assembly (oil strainer)	AX-98
	2. Off-vehicle repair matrix chart	-
No engine braking (1st/shift lever on L)	1. Valve body assembly (reverse control valve)	AX-98
	2. Off-vehicle repair matrix chart	-
No engine braking (2nd/shift lever on 2)	Valve body assembly (3-4 shift valve)	AX-98
No kick-down	1. Valve body assembly (1-2 shift valve)	AX-98
	2. Valve body assembly (2-3 shift valve)	AX-98
	3. Valve body assembly (3-4 shift valve)	AX-98

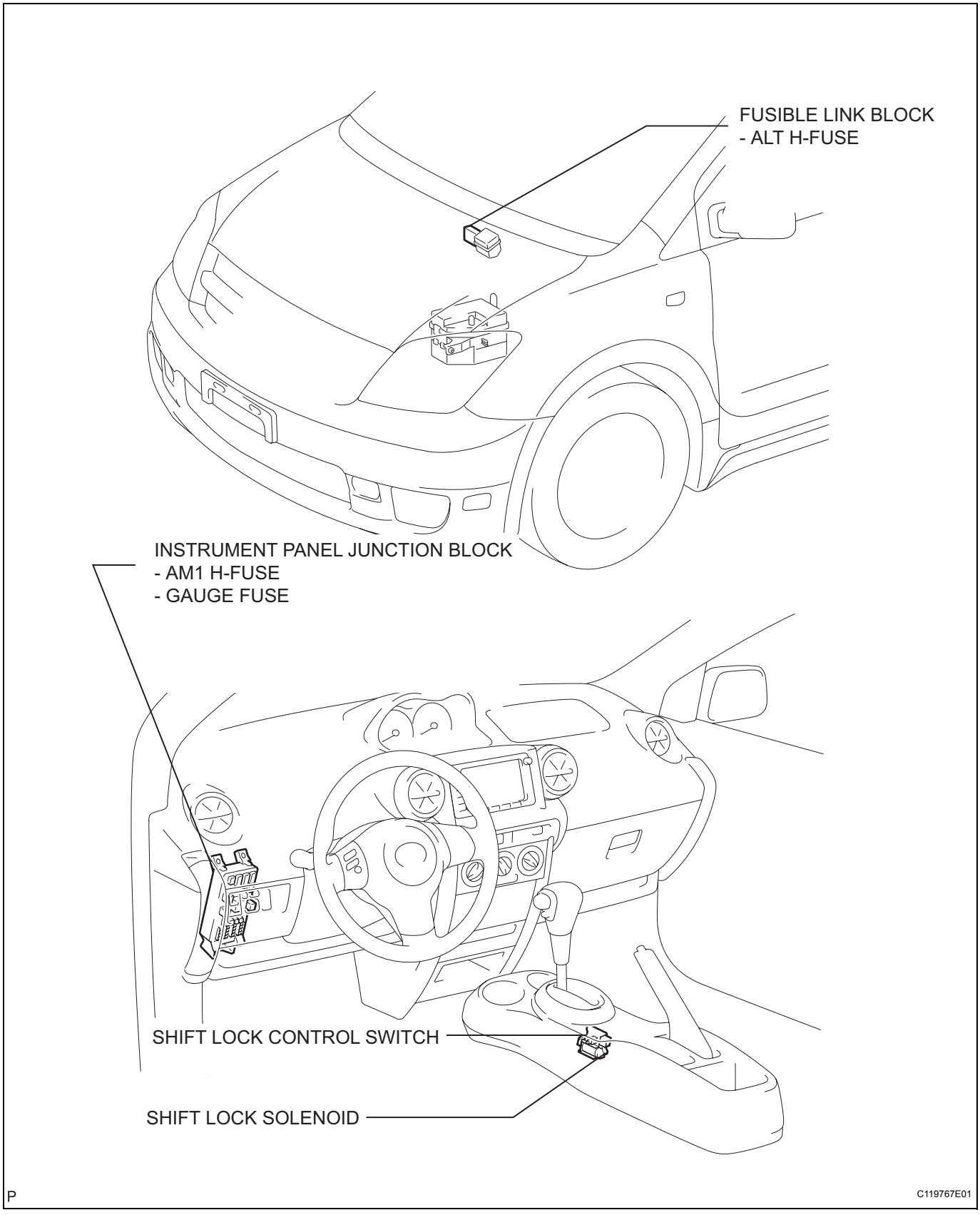
Symptom	Suspected area	See page
Poor acceleration	Valve body assembly (SLT damper)	AX-98

CHAPTER 3: OFF-VEHICLE REPAIR

Symptom	Suspected area	See page
Vehicle does not move in any forward position and reverse position	1. Planetary gear unit	AX-148
	2. Forward clutch	AX-148
	3. No. 2 one-way clutch	AX-148
	4. Reverse clutch	AX-148
	5. 1st and reverse brake	AX-148
Vehicle does not move with shift lever on R	1. Planetary gear unit	AX-148
	2. Reverse clutch	AX-148
	3. 1st and reverse brake	AX-148
No up-shift (1st -> 2nd)	1. 2nd brake	AX-148
	2. No. 1 one-way clutch	AX-148
No up-shift (2nd -> 3rd)	Direct clutch	AX-148
No up-shift (3rd -> O/D)	O/D and 2nd brake	AX-148
No lock-up or no lock-up off	Torque converter clutch	AX-146
Harsh engagement (N -> D)	1. Forward clutch	AX-148
	2. No. 2 one-way clutch	AX-148
Harsh engagement (N -> R)	1. Reverse clutch	AX-148
	2. 1st and reverse brake	AX-148
Harsh engagement (lock-up)	Torque converter clutch	AX-146
Harsh engagement (1st -> 2nd)	1. 2nd brake	AX-148
	2. No. 1 one-way clutch	AX-148
Harsh engagement (2nd -> 3rd)	Direct clutch	AX-148
Harsh engagement (3rd -> O/D)	O/D and 2nd brake	AX-148
Slip or shudder (forward position)	1. Torque converter clutch	AX-146
	2. Forward clutch	AX-148
	3. Direct clutch	AX-148
	4. O/D and 2nd brake	AX-148
	5. 2nd brake	AX-148
	6. No. 1 one-way clutch	AX-148
	7. No. 2 one-way clutch	AX-148
Slip or shudder (reverse position)	1. Reverse clutch	AX-148
	2. 1st and reverse brake	AX-148
Slip or shudder (1st)	No. 2 one-way clutch	AX-148
Slip or shudder (2nd)	1. 2nd brake	AX-148
	2. No. 1 one-way clutch	AX-148
Slip or shudder (3rd)	Direct clutch	AX-148
Slip or shudder (O/D)	O/D and 2nd brake	AX-148
No engine braking (1st/shift lever on L)	1st and reverse brake	AX-148
No engine braking (2nd/shift lever on 2)	O/D and 2nd brake	AX-148
Poor acceleration (all positions)	Torque converter clutch	AX-146
Large shift shock or engine stalls when starting off or stopping	Torque converter clutch	AX-146

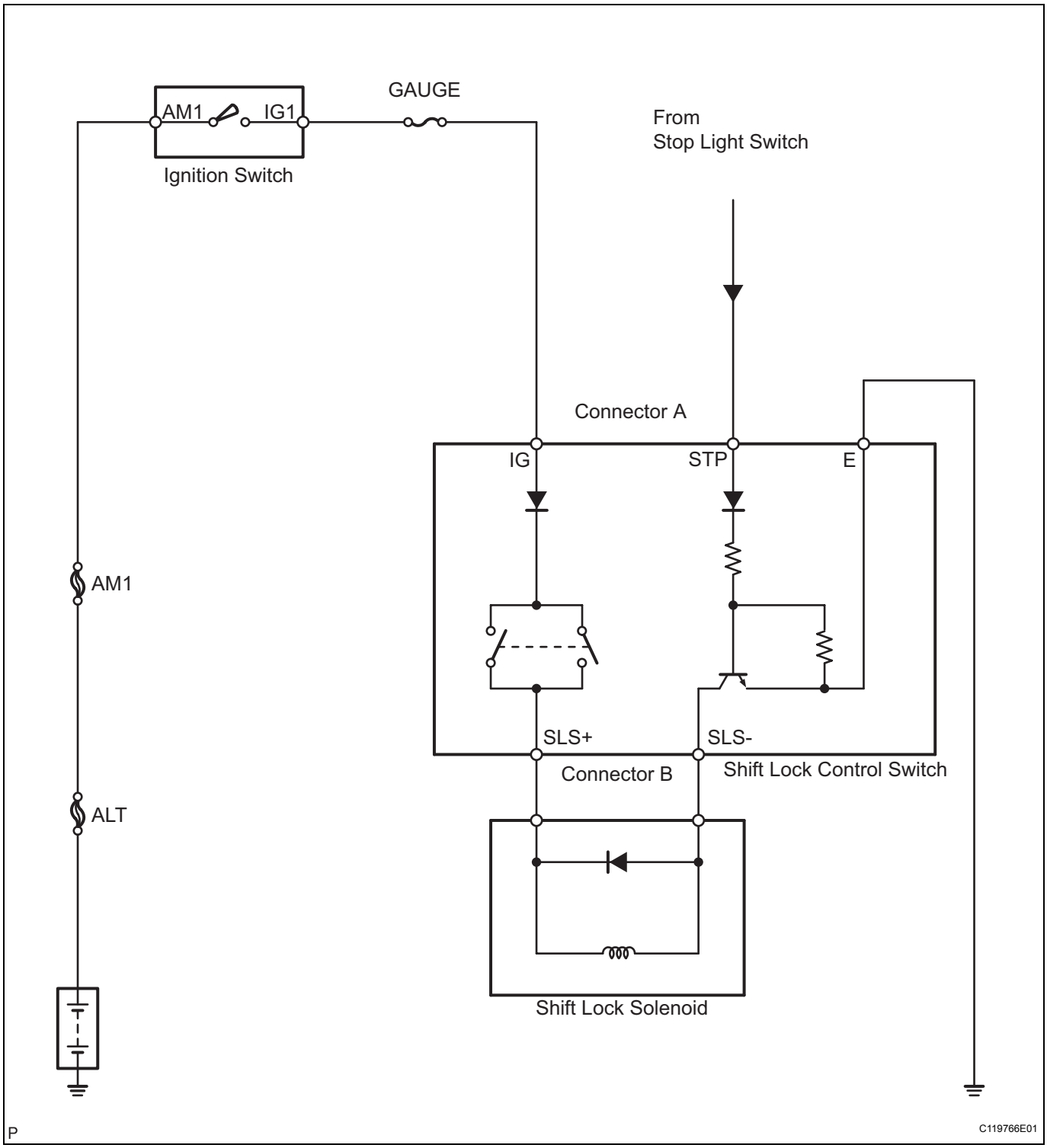
SHIFT LOCK SYSTEM

PARTS LOCATION



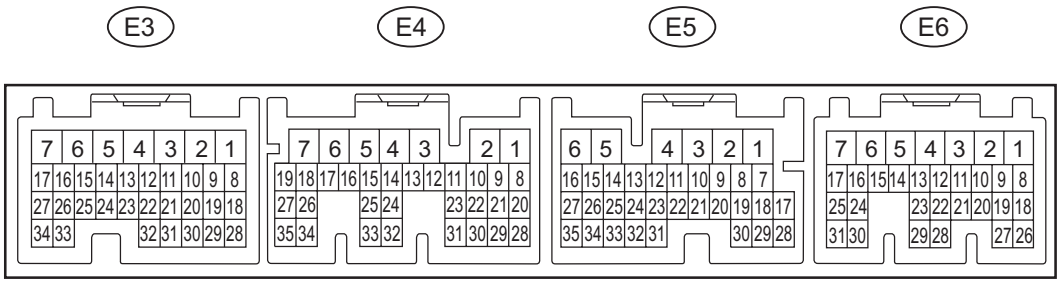
AX

SYSTEM DIAGRAM



HINT:
The shift lock control switch turns ON when the shift lever is in the P position, and turns OFF when the shift lever is not in the P position.

TERMINALS OF ECM

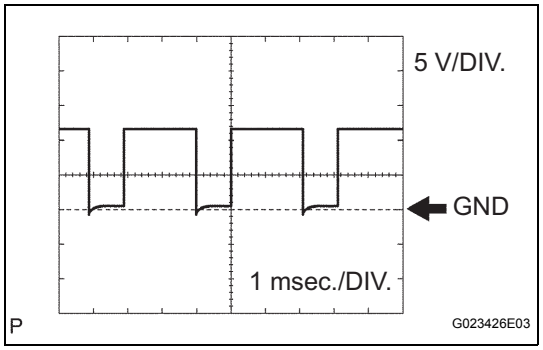


HINT:
Each ECM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
NSW (E6-30) - E1 (E3-3)	B - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever on P or N	Below 2 V
NSW (E6-30) - E1 (E3-3)	B - BR	Park/Neutral position switch signal	Ignition switch ON and shift lever not on P or N	10 to 14 V
L (E5-9) - E1 (E3-3)	G-W - BR	L shift position switch signal	Ignition switch ON and shift lever on L	10 to 14 V
L (E5-9) - E1 (E3-3)	G-W - BR	L shift position switch signal	Ignition switch ON and shift lever not on L	Below 1 V
2 (E5-10) - E1 (E3-3)	G - BR	2 shift position switch signal	Ignition switch ON and shift lever on 2	10 to 14 V
2 (E5-10) - E1 (E3-3)	G - BR	2 shift position switch signal	Ignition switch ON and shift lever not on 2	Below 1 V
D (E5-21) - E1 (E3-3)	R-Y - BR	D shift position switch signal	Ignition switch ON and shift lever on D	10 to 14 V
D (E5-21) - E1 (E3-3)	R-Y - BR	D shift position switch signal	Ignition switch ON and shift lever not on D	Below 1 V
R (E5-11) - E1 (E3-3)	R-W - BR	R shift position switch signal	Ignition switch ON and shift lever on R	10 to 14 V
R (E5-11) - E1 (E3-3)	R-W - BR	R shift position switch signal	Ignition switch ON and shift lever not on R	Below 1 V
S1 (E4-9) - E1 (E3-3)	W-G - BR	S1 solenoid signal	Ignition switch ON	10 to 14 V
S1 (E4-9) - E1 (E3-3)	W-G - BR	S1 solenoid signal	1st or 2nd gear	10 to 14 V
S1 (E4-9) - E1 (E3-3)	W-G - BR	S1 solenoid signal	3rd or O/D gear	Below 1 V
S2 (E4-8) - E1 (E3-3)	W-R - BR	S2 solenoid signal	Ignition switch ON	Below 1 V
S2 (E4-8) - E1 (E3-3)	W-R - BR	S2 solenoid signal	1st or O/D gear	10 to 14 V
S2 (E4-8) - E1 (E3-3)	W-R - BR	S2 solenoid signal	2nd or 3rd gear	Below 1 V
ST (E4-19) - E1 (E3-3)	B-R - BR	ST solenoid signal	Ignition switch ON	Below 1 V
ST (E4-19) - E1 (E3-3)	B-R - BR	ST solenoid signal	Ignition switch ON and R gear	10 to 14 V
SL (E4-11) - E1 (E3-3)	G - BR	SL solenoid signal	Ignition switch ON	Below 1 V
SL (E4-11) - E1 (E3-3)	G - BR	SL solenoid signal	Vehicle driving under lock-up range	10 to 14 V

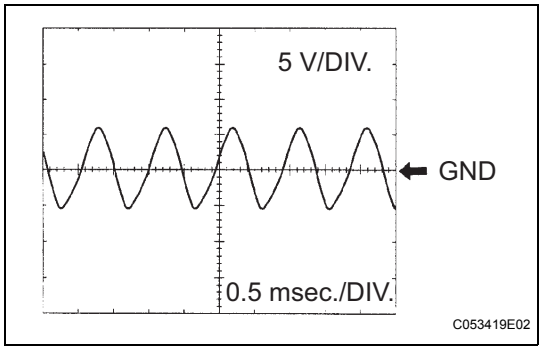
AX

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SLT+ (E4-12) - SLT- (E4-13)	W-L - W	SLT solenoid signal	Ignition switch ON	10 to 14 V (see waveform 1)
STP (E5-4) - E1 (E3-3)	G-W - BR	Stop light switch signal	Brake pedal is depressed	7.5 to 14 V
STP (E5-4) - E1 (E3-3)	G-W - BR	Stop light switch signal	Brake pedal is released	Below 1.5 V
SPD (E5-8) - E1 (E3-3)	V-W - BR	Speed signal	Ignition switch ON and rotate driving wheel slowly	Pulse generation
NT+ (E4-35) - NT- (E4-27)	R - B	Speed sensor (NT) signal	Engine is running	Below 1 V and 4 to 5 V (see waveform 2)
THO1 (E4-24) - E2 (E3-28)	Y-G - BR	ATF temperature sensor signal	ATF temperature: 115°C (329°F) or more	Below 1.5 V
ODLP (E5-14) - E1 (E3-3)	G-O - BR	O/D OFF indicator light circuit	Ignition switch ON and O/D OFF indicator light illuminates	Below 3 V
ODLP (E5-14) - E1 (E3-3)	G-O - BR	O/D OFF indicator light circuit	Ignition switch ON and O/D OFF indicator light goes off	10 to 14 V
ODMS (E5-6) - E1 (E3-3)	G-B - BR	O/D main switch signal	Ignition switch ON	10 to 14 V
ODMS (E5-6) - E1 (E3-3)	G-B - BR	O/D main switch signal	Ignition switch ON and continuously press O/D main switch	Below 1 V



1. Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	SLT+ (E4-12) - SLT- (E4-13)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Engine idle speed



2. Waveform 2 (Reference)

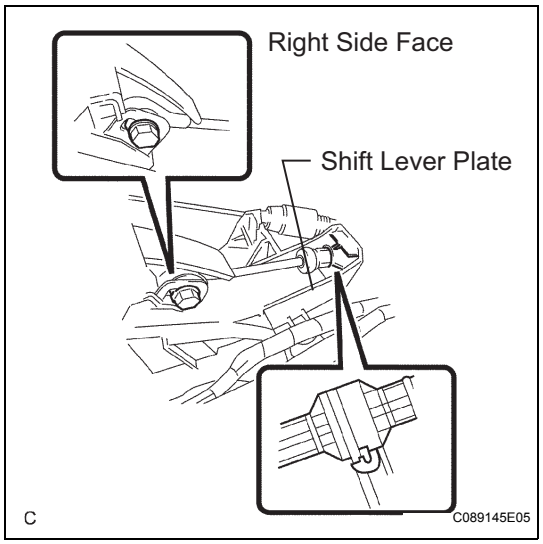
Item	Content
Symbols (Terminal No.)	NT+ (E4-35) - NT- (E4-27)
Tool Setting	5 V/DIV., 0.5 msec./DIV.
Condition	Vehicle speed 20 km/h (12 mph)

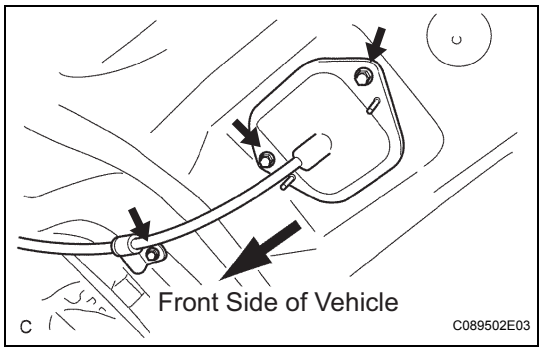
AX

TRANSMISSION CONTROL CABLE ASSEMBLY

REPLACEMENT

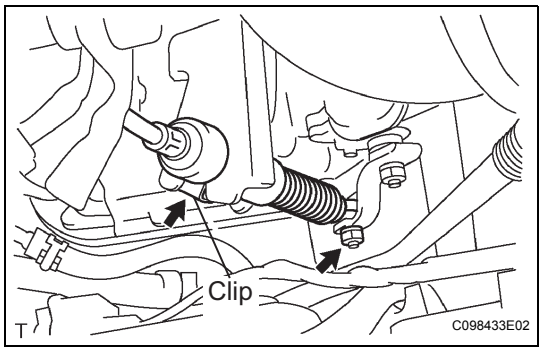
1. **REMOVE CONSOLE BOX REAR COVER**
   (a) Remove the console box rear cover (see page IP-26).
2. **REMOVE CONSOLE BOX CARPET**
3. **REMOVE REAR CONSOLE BOX ASSEMBLY**
   (a) Remove the rear console box (see page IP-26).
4. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
   (a) Remove the front exhaust pipe (see page EX-3).
5. **REMOVE FRONT NO. 1 FLOOR HEAT INSULATOR**
6. **REMOVE AIR CLEANER ASSEMBLY**
   (a) Remove the air cleaner assembly (see page ES-346).
7. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the nut, and disconnect the transmission control cable from the floor shift assembly.
   (b) Using a screwdriver, disconnect the transmission control cable assembly from the shift lever plate.



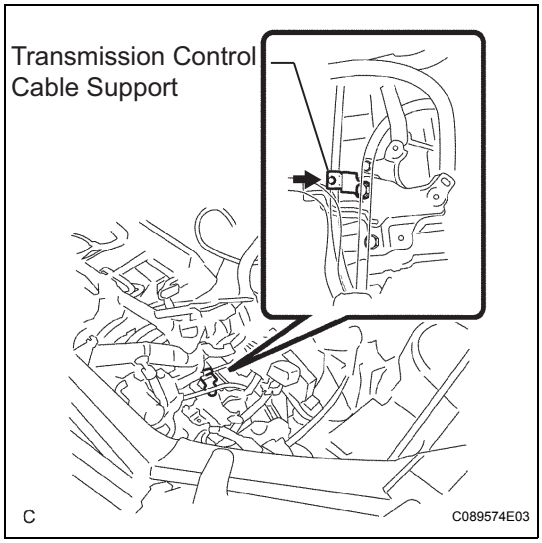


   (c) Remove the 3 bolts.
   (d) Pull out the transmission control cable from the body.

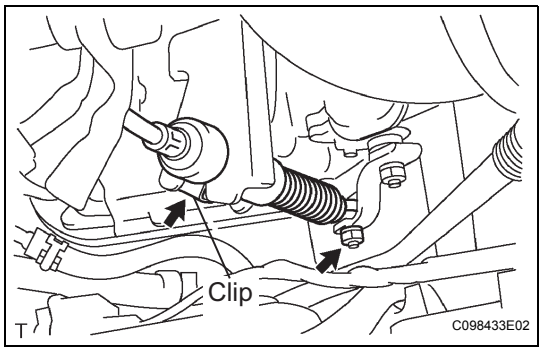
AX



(e) Remove the nut and disconnect the transmission control cable from the control shaft lever.
(f) Remove the clip and disconnect the transmission control cable from the control cable bracket.

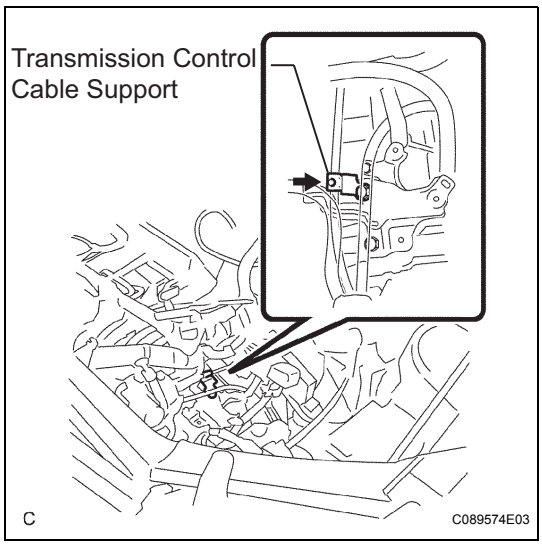


(g) Disconnect the transmission control cable from the transmission control cable support.



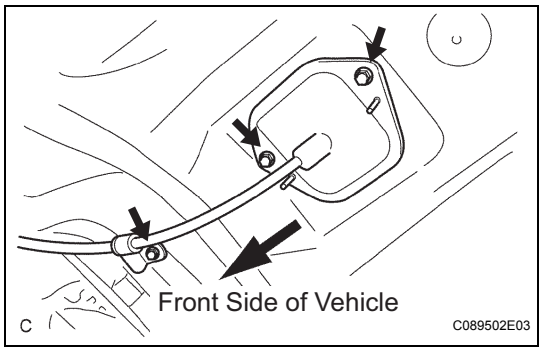
8. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Temporarily install the transmission control cable on the control shaft lever with the nut.
(b) Connect the transmission control cable on the bracket with a new clip.

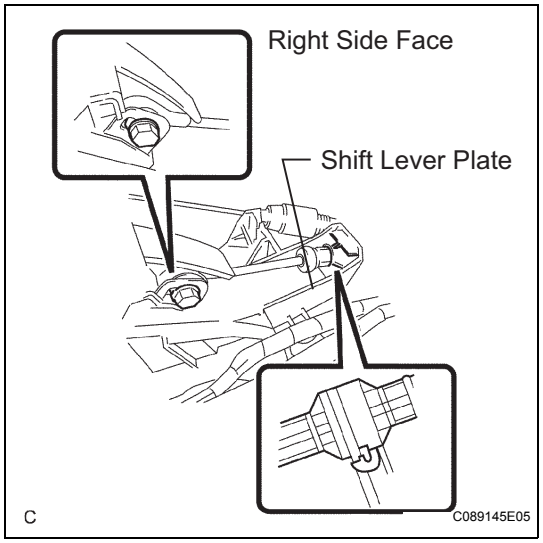


(c) Connect the transmission control cable to the transmission control cable support.

AX



(d) Install the transmission control cable on the body with the 3 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



(e) Connect the transmission control cable on the shift lever plate.
(f) Temporarily install the transmission control cable on the floor shift.
Torque: 2 N*m (122 kgf*cm, 9 ft.*lbf)

9. INSTALL AIR CLEANER ASSEMBLY
(a) Install the air cleaner (see page ES-348).

10. INSTALL FRONT NO. 1 FLOOR HEAT INSULATOR

11. INSTALL FRONT EXHAUST PIPE ASSEMBLY
(a) Install the front exhaust pipe (see page EX-5).

12. ADJUST SHIFT LEVER POSITION
(a) Adjust the shift lever position (see page AX-121).

13. INSPECT SHIFT LEVER POSITION
(a) Inspect the shift lever position (see page AX-121).

14. INSTALL REAR CONSOLE BOX ASSEMBLY
(a) Install the rear console box (see page IP-27).

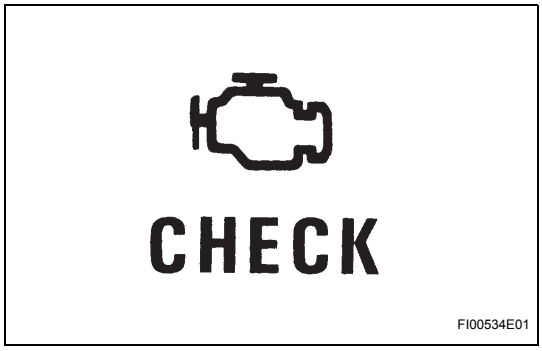
15. INSTALL CONSOLE BOX CARPET

16. INSTALL CONSOLE BOX REAR COVER
(a) Install the console box rear cover (see page IP-27).

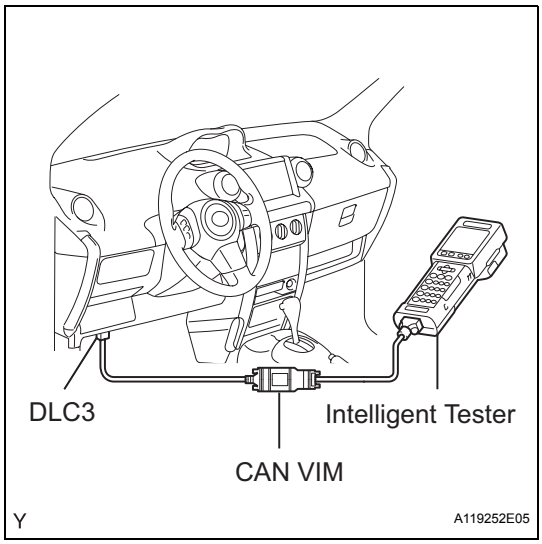
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle's ECM can then be read.



(b) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:
(1) The emission control system/components
(2) The power train control components (which affect vehicle emissions)
(3) The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory.
If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.



(c) To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester displays DTCs, the freeze frame data and a variety of the engine data.
The DTCs and freeze frame data can be erased with the intelligent tester (see page AX-30).

(d) The DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (see page AX-36).

2. NORMAL MODE AND CHECK MODE

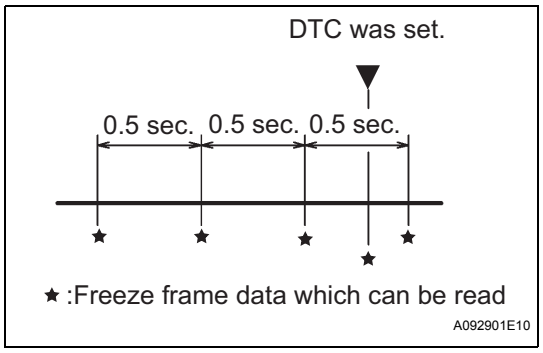
(a) The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1 trip detection logic" is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions.

3. 2 TRIP DETECTION LOGIC

(a) When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next drive cycle, the MIL is illuminated (2nd trip).

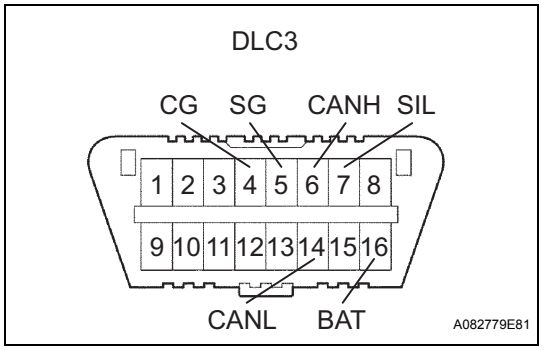
4. FREEZE FRAME DATA

(a) Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.



(b) The intelligent tester records freeze frame data in five different instances: 1) 3 times before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. These data can be used to simulate the vehicle's condition around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.

5. DATA LINK CONNECTOR 3 (DLC3)



(a) The vehicle's ECM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.
HINT:
Connect the cable of the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the intelligent tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.
If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

AX

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF	54 to 69 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF	1 MΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF	1 kΩ or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF	1 MΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF	1 kΩ or higher

FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

REPLACEMENT

NOTICE:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **REMOVE STEERING PAD ASSEMBLY**
   (a) Remove the steering pad (see page RS-287).
4. **REMOVE STEERING WHEEL ASSEMBLY**
   (a) Remove the steering wheel (see page SR-7).
5. **REMOVE STEERING COLUMN COVER**
   (a) Remove the steering column cover (see page SR-7).
6. **REMOVE INSTRUMENT CLUSTER FINISH PANEL**
   (a) Remove the instrument cluster finish panel (see page IP-5).
7. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
   (a) Remove the No. 2 instrument cluster finish panel garnish (see page IP-5).
8. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
9. **REMOVE INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER**
   (a) Remove the instrument cluster finish panel center (see page IP-18).
10. **REMOVE FRONT ASH RECEPTACLE ASSEMBLY**
    (a) Remove the front ash receptacle (see page IP-18).
11. **REMOVE INSTRUMENT COVER LOWER CENTER**
    (a) Remove the instrument cover lower center (see page IP-19).
12. **REMOVE INSTRUMENT PANEL FINISH PANEL LOWER CENTER**
    (a) Remove the instrument panel finish panel lower center (see page IP-19).
13. **REMOVE CONSOLE BOX REAR COVER**
14. **REMOVE CONSOLE BOX CARPET**

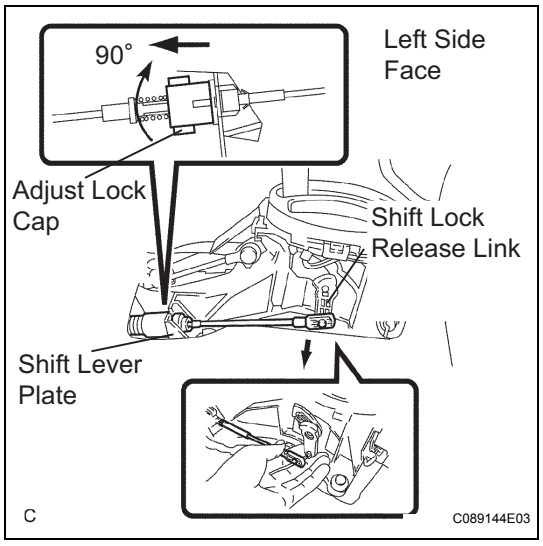
15. REMOVE REAR CONSOLE BOX ASSEMBLY

(a) Remove the rear console box (see page IP-26).

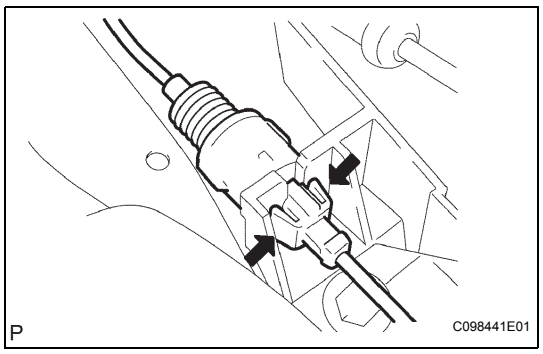
16. DISCONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

(a) Rotate the adjust lock cap clockwise 90°so that it faces the front of the vehicle, and release it.

(b) Push the claw and disconnect the floor shift parking lock cable from the shift lock release link.



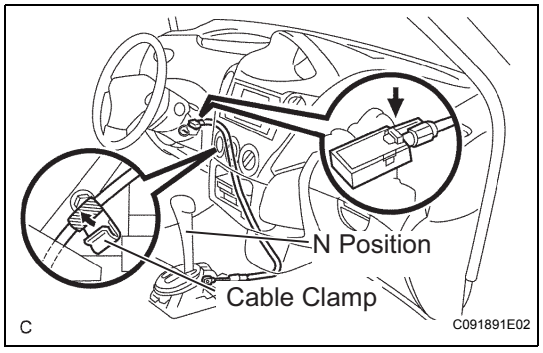
(c) Using a screwdriver, disconnect the floor shift parking lock cable from the shift lever plate.



(d) Disconnect the cable clamp.

(e) Adjust the shift lever to the N position.

(f) Disconnect the floor shift parking lock cable from the upper bracket.



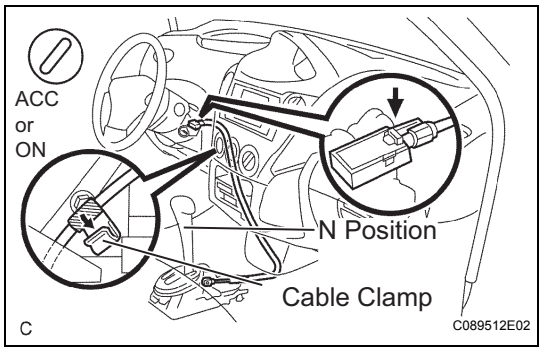
17. CONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

(a) Turn the ignition switch to the ACC or ON position.

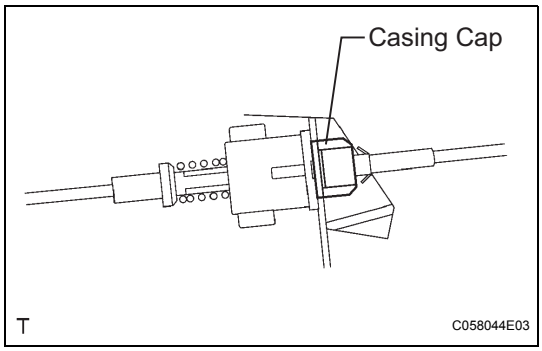
(b) Connect the cable to the upper bracket.
HINT:
After installation, make sure that the lever pin is pulled by the cable and is stopped with the stopper.

(c) Connect the cable clamp.

(d) Move the shift lever to the N position.

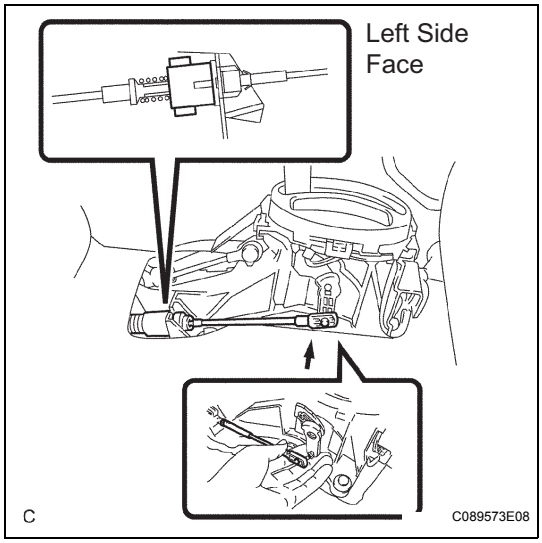


AX

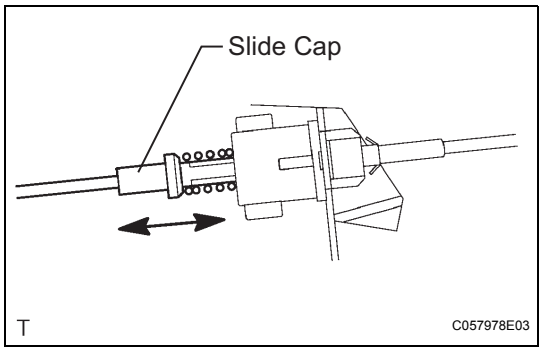


(e) Insert the floor shift parking lock cable end rod in the slit of the shift lever plate.

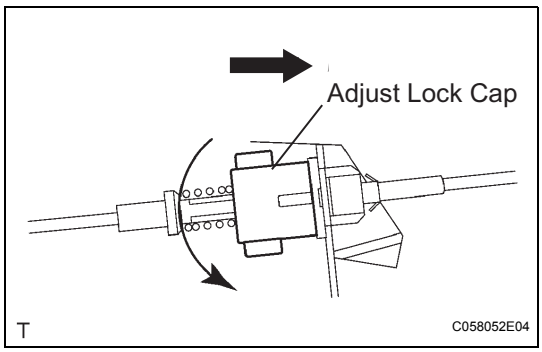
(f) Insert the casing cap of the cable into the shift lever plate through-hole.
HINT:
Check that it is inserted securely.



(g) Insert the lever pin into the hole in the floor shift parking lock cable end.
HINT:
- At this time, ensure that the shift lever is in the N position.
- After installation, make sure that the lever pin is pulled by the floor shift parking lock cable and is stopped with the stopper.



(h) Hold the slide cap and move it back and forth. Check that the spring for automatic adjustment works properly.



(i) Rotate the adjust lock cap counterclockwise by 90° so that it faces the front of the vehicle, and attach it.
HINT:
- Install the floor shift parking lock cable on the shift lever side with the ignition switch in the ACC position.
- Make sure the slide amount of the spring for automatic adjustment is 8 mm (0.31 in.).

18. INSTALL REAR CONSOLE BOX ASSEMBLY

(a) Install the rear console box (see page IP-27).

19. INSTALL CONSOLE BOX CARPET

20. INSTALL CONSOLE BOX REAR COVER

AX

21. **INSTALL INSTRUMENT PANEL FINISH PANEL LOWER CENTER**
    (a) Install the instrument panel finish panel lower center (see page IP-23).
22. **INSTALL INSTRUMENT COVER LOWER CENTER**
    (a) Install the instrument cover lower center (see page IP-23).
23. **INSTALL FRONT ASH RECEPTACLE ASSEMBLY**
    (a) Install the front ash receptacle (see page IP-23).
24. **INSTALL INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER**
    (a) Install the instrument cluster finish panel center (see page IP-23).
25. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
26. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
27. **INSTALL INSTRUMENT CLUSTER FINISH PANEL**
    (a) Install the instrument cluster finish panel (see page IP-12).
28. **INSTALL STEERING COLUMN COVER**
    (a) Install the steering column cover (see page SR-13).
29. **INSTALL STEERING WHEEL ASSEMBLY**
    (a) Install the steering wheel (see page SR-13).
30. **INSTALL STEERING PAD ASSEMBLY**
    (a) Install the steering pad (see page RS-291).
31. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
32. **INSPECT STEERING PAD ASSEMBLY**
    (a) Inspect the steering pad (see page RS-287).
33. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (see page RS-28).
34. **CHECK KEY INTERLOCK OPERATION**
    (a) Check the key interlock operation (see page AX-104).
35. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

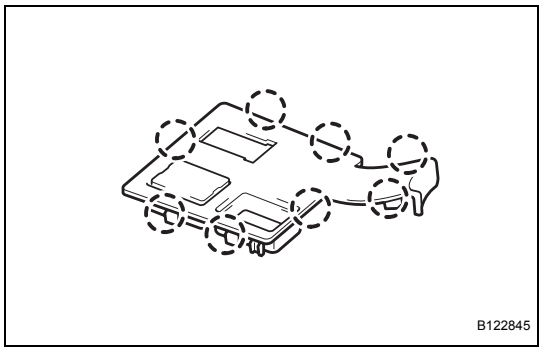
REMOVAL

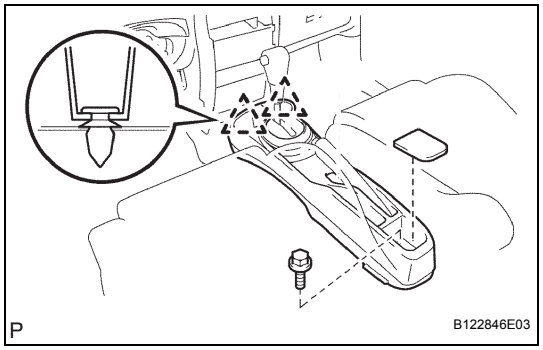
1. REMOVE CONSOLE BOX REAR COVER

2. REMOVE CONSOLE BOX CARPET

3. REMOVE REAR CONSOLE BOX ASSEMBLY

(a) Using a screwdriver, detach the 8 claws and remove the rear console box cover.
NOTICE:
Tape the screwdriver tip before use.

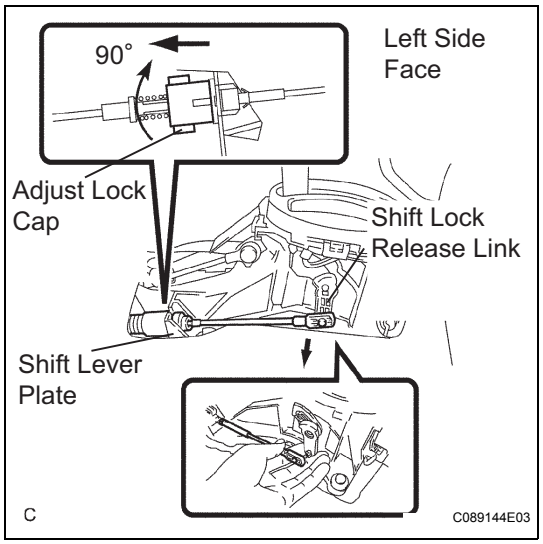




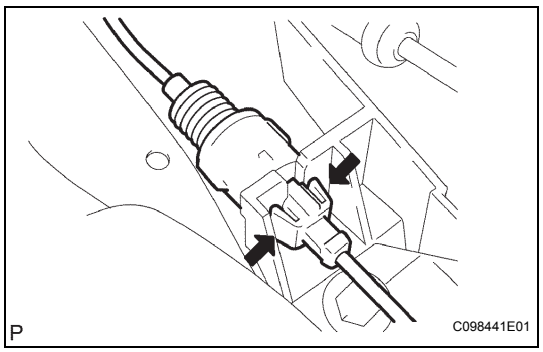
(b) Remove the console box carpet.
(c) Remove the screw.
(d) Disconnect the connector.
(e) Using a screwdriver, detach the 2 clips and remove the console box.

4. DISCONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

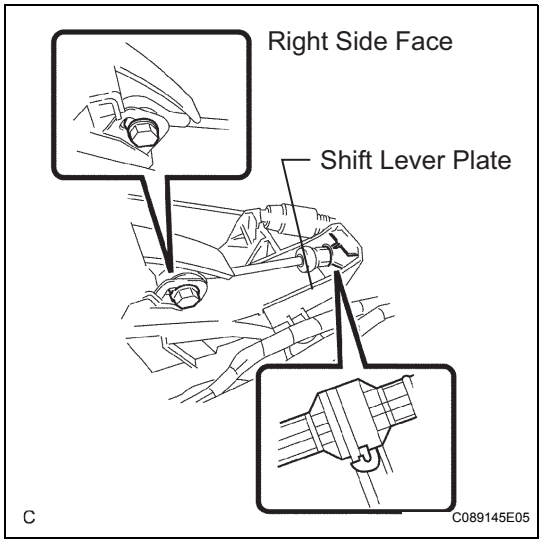
(a) Rotate the adjust lock cap clockwise 90° so that it faces the front of the vehicle, and release it.
(b) Push the claw and disconnect the floor shift parking lock cable from the shift lock release link.



(c) Using a screwdriver, disconnect the floor shift parking lock cable from the shift lever plate.

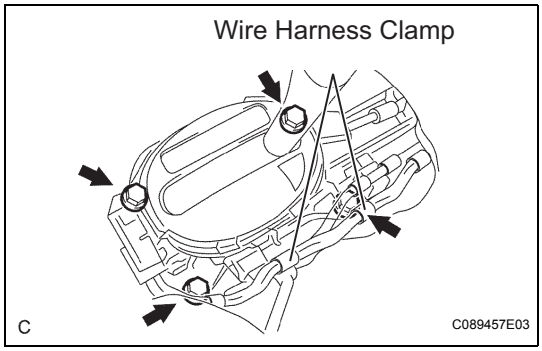


AX



5. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

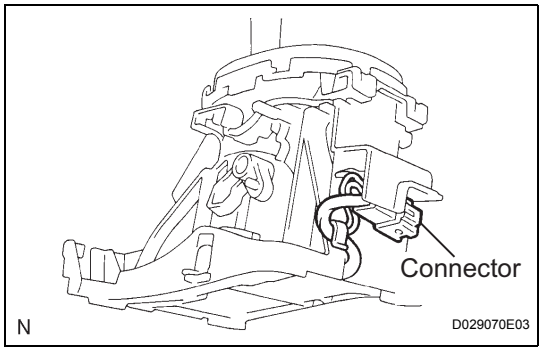
(a) Remove the nut, and disconnect the transmission control cable from the floor shift.
(b) Using a screwdriver, disconnect the transmission control cable from the shift lever plate.



6. REMOVE FLOOR SHIFT ASSEMBLY

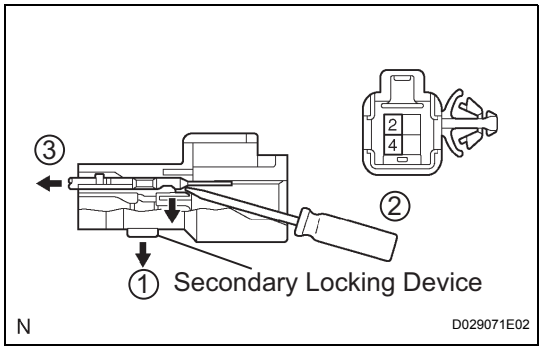
(a) Disconnect the 2 connectors.
(b) Remove the 2 wire harness clamps from the floor shift.
(c) Remove the 4 bolts and floor shift.

DISASSEMBLY



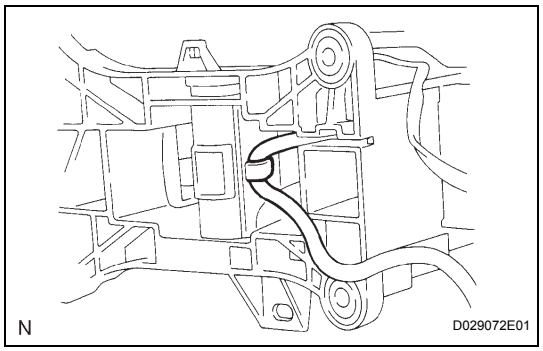
1. REMOVE TRANSMISSION CONTROL SWITCH

(a) Disconnect the connector from the shift lever plate.



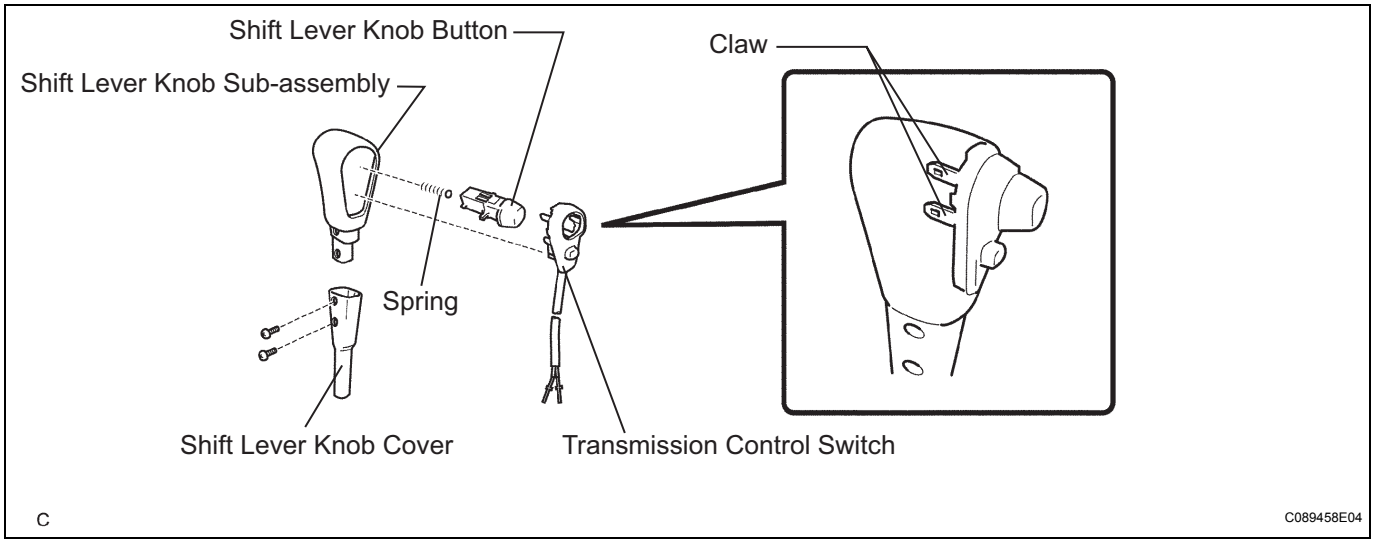
(b) Remove the transmission control switch connector from the shift lever plate.
(c) Disengage the secondary locking device.
(d) Release the locking lug of terminals 2 and 4, and then pull out the terminals from the rear.

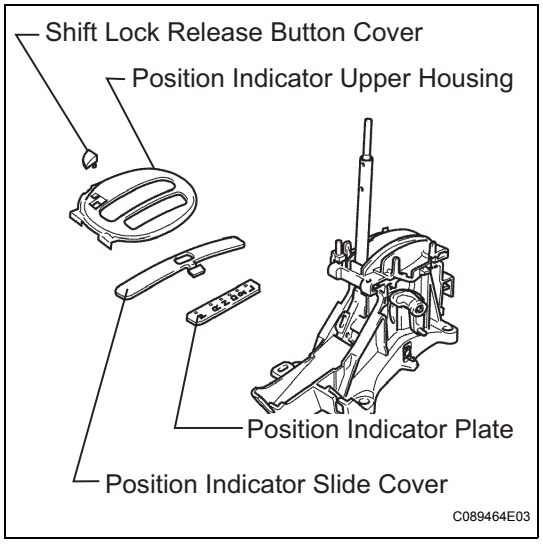
AX



2. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY

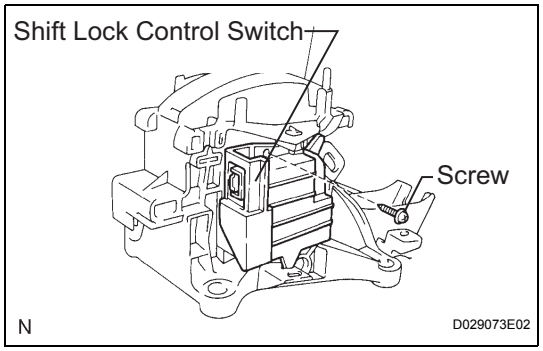
(a) Separate the wire harness of the transmission control switch from the shift lever plate.
(b) Remove the 2 screws and shift lever knob.
NOTICE:
Be careful not to apply excessive force to the transmission control switch wire harness.
(c) Remove the shift lever knob cover.
(d) Remove the shift lever knob button and spring.
(e) Detach the 2 claws and remove the transmission control switch.





3. REMOVE POSITION INDICATOR UPPER HOUSING

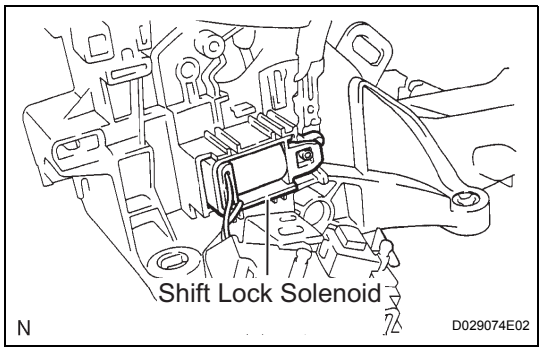
(a) Remove the shift lock release button cover from the position indicator upper housing.
(b) Remove the position indicator upper housing from the shift lever.
(c) Remove the position indicator slide cover from the shift lever plate.
(d) Remove the position indicator plate from the position indicator upper housing.



4. REMOVE SHIFT LOCK CONTROL SWITCH

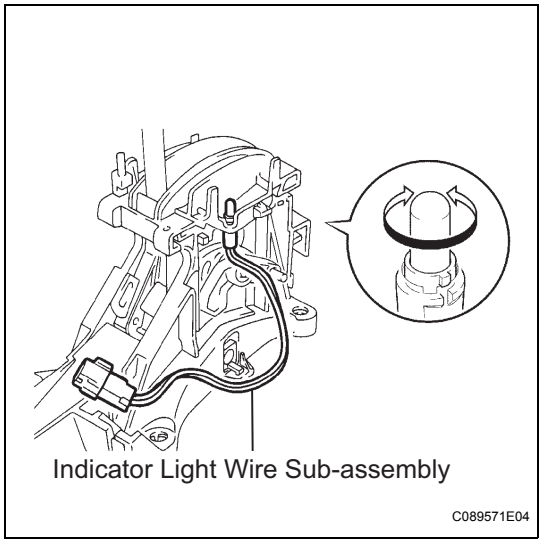
(a) Remove the screw and shift lock control switch.

AX



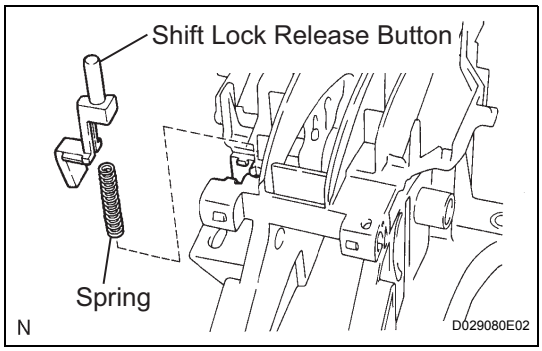
5. REMOVE SHIFT LOCK SOLENOID

(a) Remove the shift lock solenoid from the floor shift.



6. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Remove the indicator light wire from the floor shift.



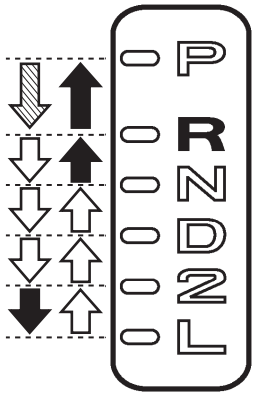
7. REMOVE SHIFT LOCK RELEASE BUTTON

(a) Remove the shift lock release button and spring from the floor shift.

AX

ADJUSTMENT

1. INSPECT SHIFT LEVER POSITION



HINT:
This illustration shows the positions that the shift lever can be moved to depending on other factors.

The ignition switch is ON, the brake pedal is depressed and the shift lever knob button is pressed. Or, the ignition switch is ON and the shift lever release button is pressed.

The shift lever knob button is pressed.

Nothing is pressed.

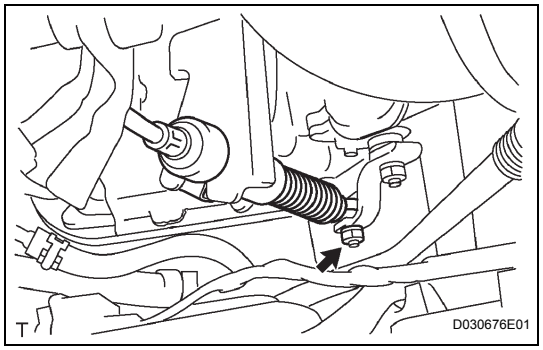
C119755E01

(a) When adjusting the shift lever to each position, make sure that it moves smoothly, can be properly operated and the position indicator displays correctly.
Positions which can be operated without pressing the shift lever knob button:
R → N → D → 2, L → 2 → D → N
Positions which can be operated only while pressing the shift lever knob button:
2 → L, N → R → P
Positions which can be operated only while pressing the shift lever knob button, the ignition switch is in the ON position and the brake pedal is depressed:
P → R

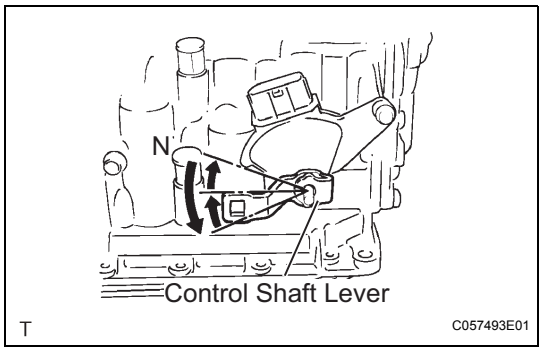
(b) When starting the engine, make sure that the vehicle moves forward when shifting from the N to D position, and moves rearward when shifting to the R position.

AX

2. ADJUST SHIFT LEVER POSITION



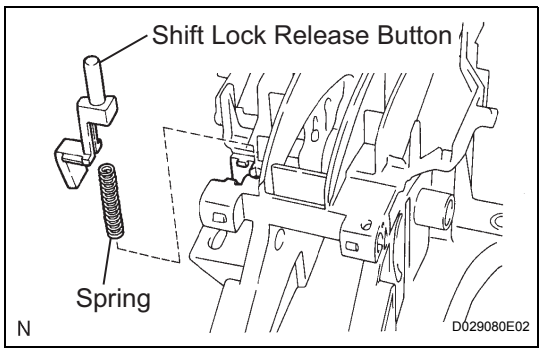
(a) Remove the nut and disconnect the control cable from the control shaft lever.



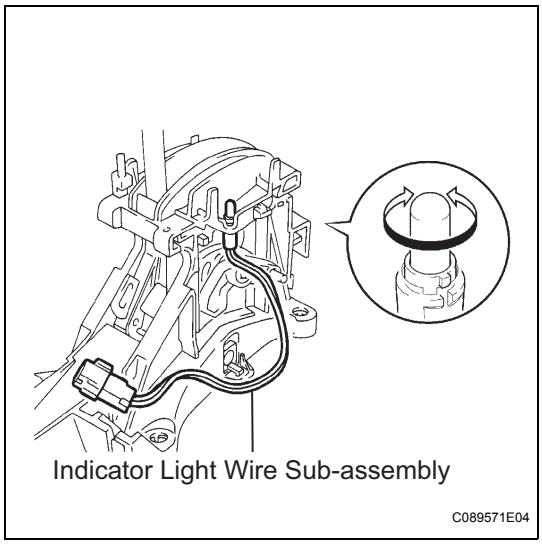
(b) Turn the control shaft lever counterclockwise until it stops.
(c) Turn it clockwise 2 notches to set it to the N position.
(d) Move the shift lever to the N position and install the control cable to the control shaft lever with the nut while pushing the end of the control cable up.
Torque: 12.7 N*m (130 kgf*cm, 9 ft.*lbf)
NOTICE:
- **The shift lever cannot be moved if the end of the control cable is excessively pushed up.**
- **Tighten the nut while the control cable is properly stretched.**

(e) After adjustment, check that the shift lever moves smoothly, and that the shift lever and gear operate correctly.

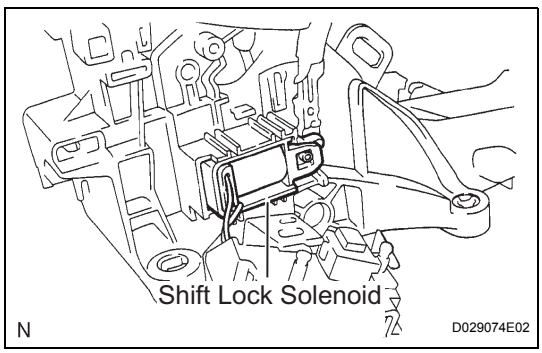
REASSEMBLY



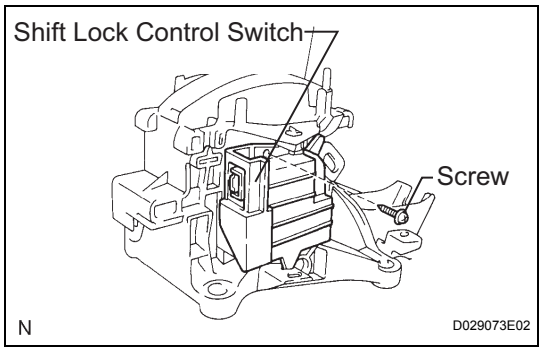
1. INSTALL SHIFT LOCK RELEASE BUTTON
(a) Apply MP grease on the shift lock release button and spring.
(b) Install the shift lock release button and spring to the floor shift.
HINT:
Ensure that the claws fit tightly.



2. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY
(a) Install the indicator light wire to the floor shift assembly.

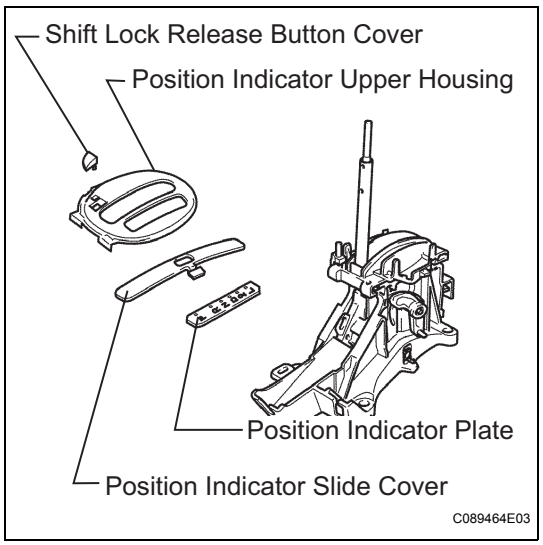


3. INSTALL SHIFT LOCK SOLENOID
(a) Install the shift lock solenoid to the floor shift.



4. INSTALL SHIFT LOCK CONTROL SWITCH

(a) Install the shift lock control switch to the floor shift with the screw.
Torque: 2.2 N*m (22 kgf*cm, 19 in.*lbf)



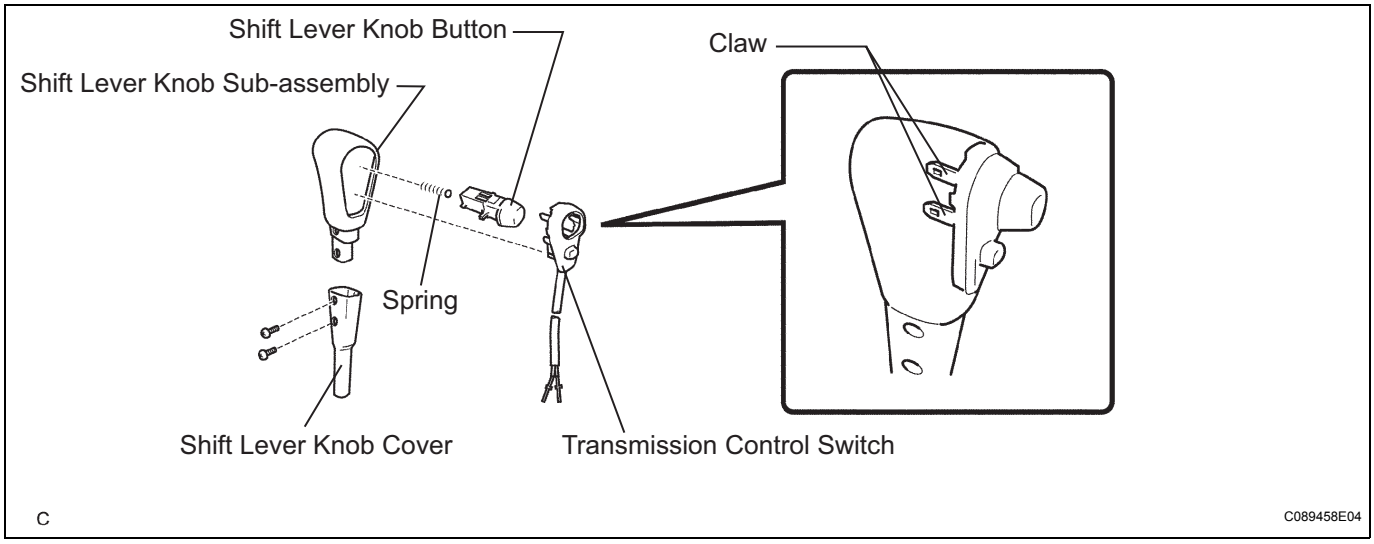
5. INSTALL POSITION INDICATOR UPPER HOUSING

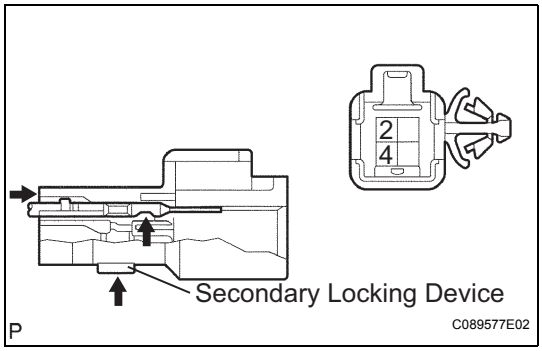
(a) Install the position indicator plate on the position indicator upper housing.
(b) Install the position indicator slide cover on the shift lever plate.
(c) Install the position indicator upper housing on the shift lever.
(d) Install the shift lock release button cover on the position indicator upper housing.

6. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY

(a) Apply MP grease to the shift lever knob button and spring.
(b) Install the shift lever knob button and spring to the shift lever knob.
(c) Install the transmission control switch to the shift lever knob.
NOTICE:
Ensure that the claws fit tightly.
(d) Install the shift lever knob cover to the shift lever knob with the 2 screws.
HINT:
Coat the threads of the screws with sealant.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
NOTICE:
Be careful that the transmission control switch wire harness is not caught between the shift lever knob cover and shift lever knob.

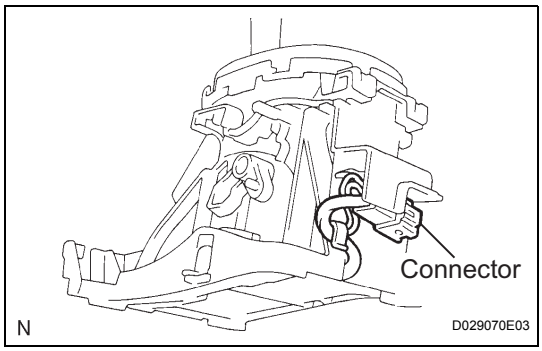
AX



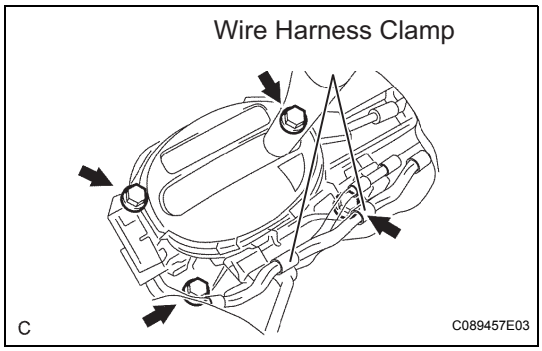


7. INSTALL TRANSMISSION CONTROL SWITCH

(a) Install the 2 terminals into the indicator light wire connector.



(b) Clamp the wire harness onto the shift lever plate. Then connect the connector to the shift lever plate.

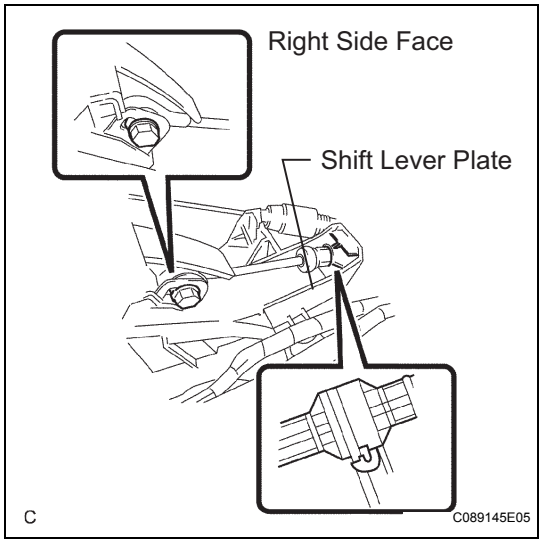


INSTALLATION

1. INSTALL FLOOR SHIFT ASSEMBLY

(a) Install the floor shift with the 4 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)
HINT:
Tighten them in the order A, B, C and D.

(b) Install the 2 wire harness clamps on the shift lever plate.

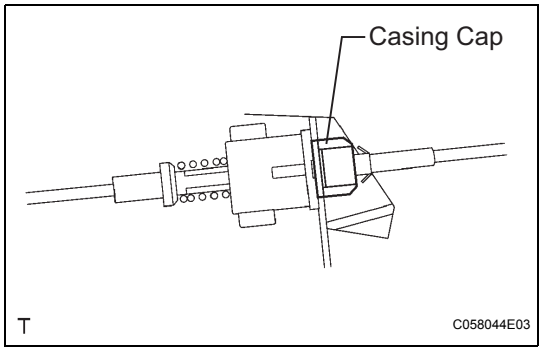


2. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Adjust the shift lever to the N position, push the lever to the R position side and hold it in place.

(b) While pulling the cable, connect the transmission control cable with the nut.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

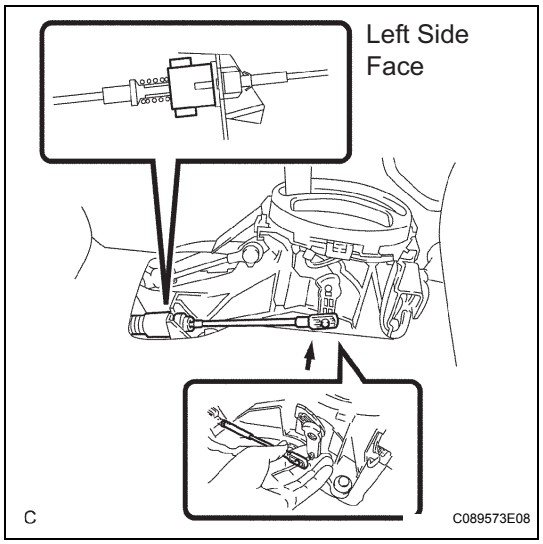
(c) Connect the 2 connectors.



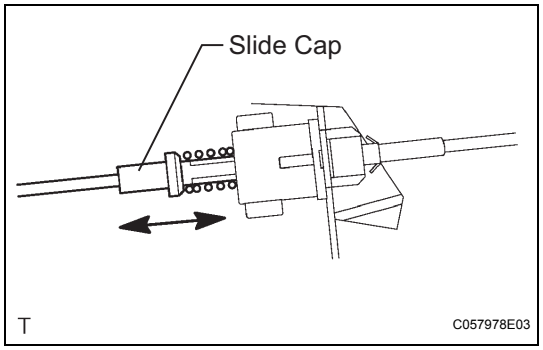
3. CONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY

(a) Insert the floor shift parking lock cable end rod in the slit of the shift lever plate.

(b) Insert the casing cap of the cable into the shift lever plate through-hole.
HINT:
Check that it is inserted securely.

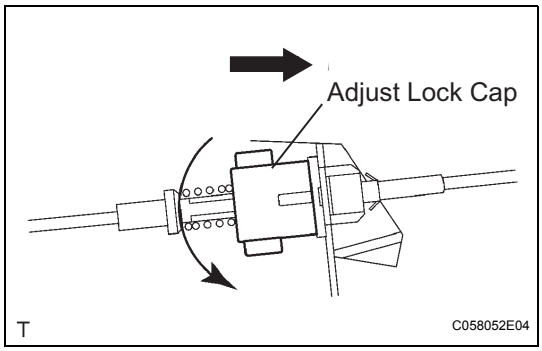


(c) Insert the lever pin into the hole in the floor shift parking lock cable end.
HINT:
- At this time, ensure that the shift lever is in the N position.
- After installation, make sure that the lever pin is pulled by the floor shift parking lock cable and is stopped with the stopper.



(d) Hold the slide cap and move it back and forth. Check that the spring for automatic adjustment works properly.

AX



(e) Rotate the adjust lock cap counterclockwise by 90°so that it faces the front of the vehicle, and attach it.
HINT:
- Install the floor shift parking lock cable on the shift lever side with the ignition switch in the ACC position.
- Make sure the slide amount of the spring for automatic adjustment is 8 mm (0.31 in.).

4. INSPECT AND ADJUST SHIFT LEVER POSITION

(a) Check that the starter operates when the shift lever is in the P or N position and does not operate in other position.
(b) Operate the shift lever and check that the reading on the indicator matches the actual position.
(c) Check that the ignition key can be pulled out with the shift lever in the P position.
(d) Check that the ignition switch cannot be turned to the LOCK position with the shift lever in any position other than P.
(e) Check that the shift lever can be shifted from the P position to other positions when the shift lock release button is pressed.

5. INSPECT SHIFT LEVER POSITION

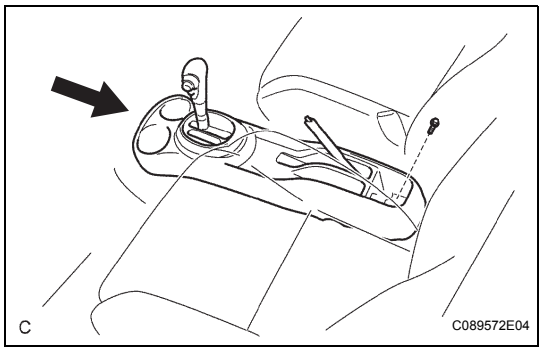
(a) Inspect the shift lever position (see page AX-121).

6. ADJUST SHIFT LEVER POSITION

(a) Adjust the shift lever position (see page AX-121).

7. INSTALL REAR CONSOLE BOX ASSEMBLY

(a) Install the console box to the vehicle with the screw.
NOTICE:
While installing the console box sub-assembly, pay attention not to damage the shift lever knob and the indicator housing.



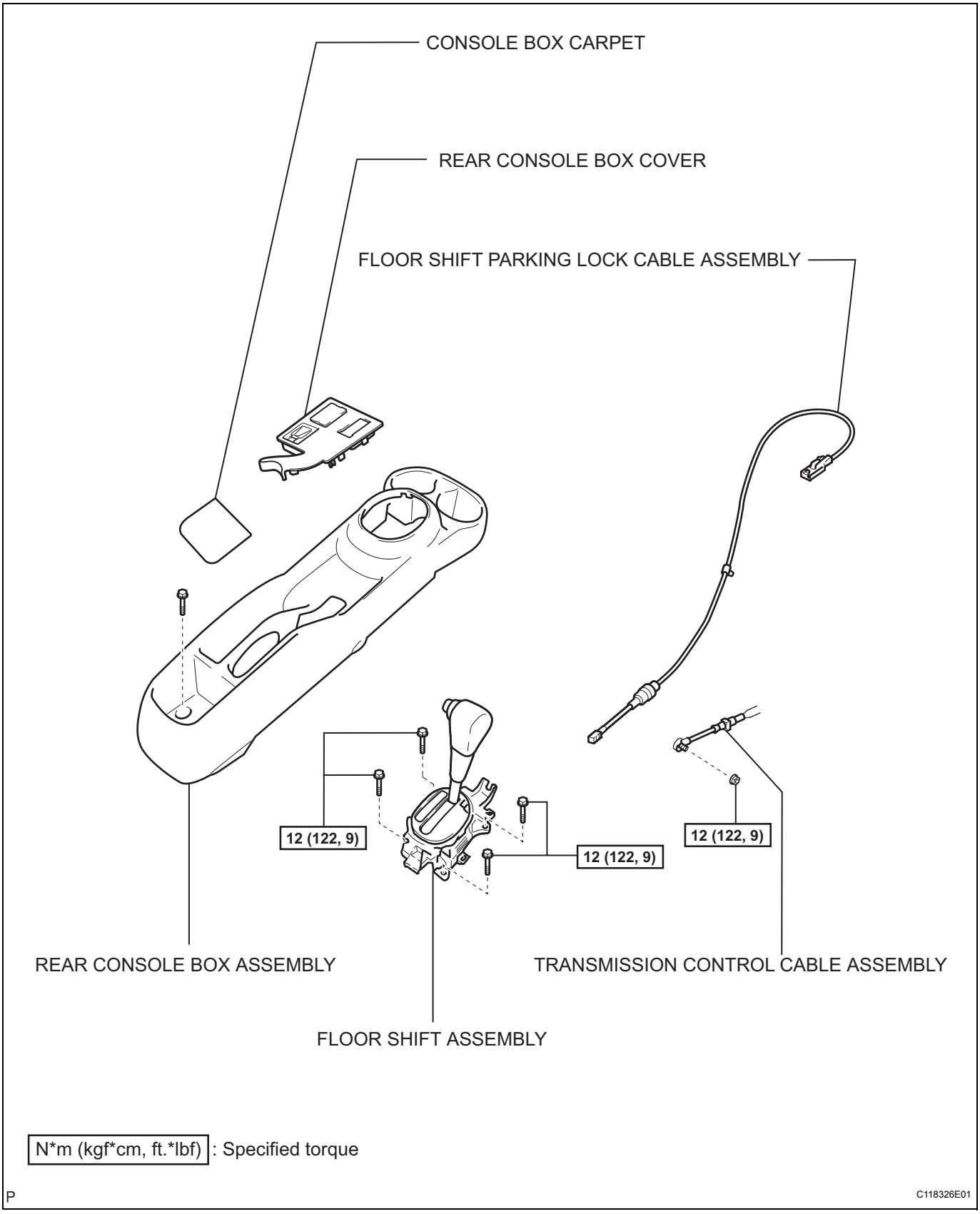
8. INSTALL CONSOLE BOX CARPET

9. INSTALL CONSOLE BOX REAR COVER

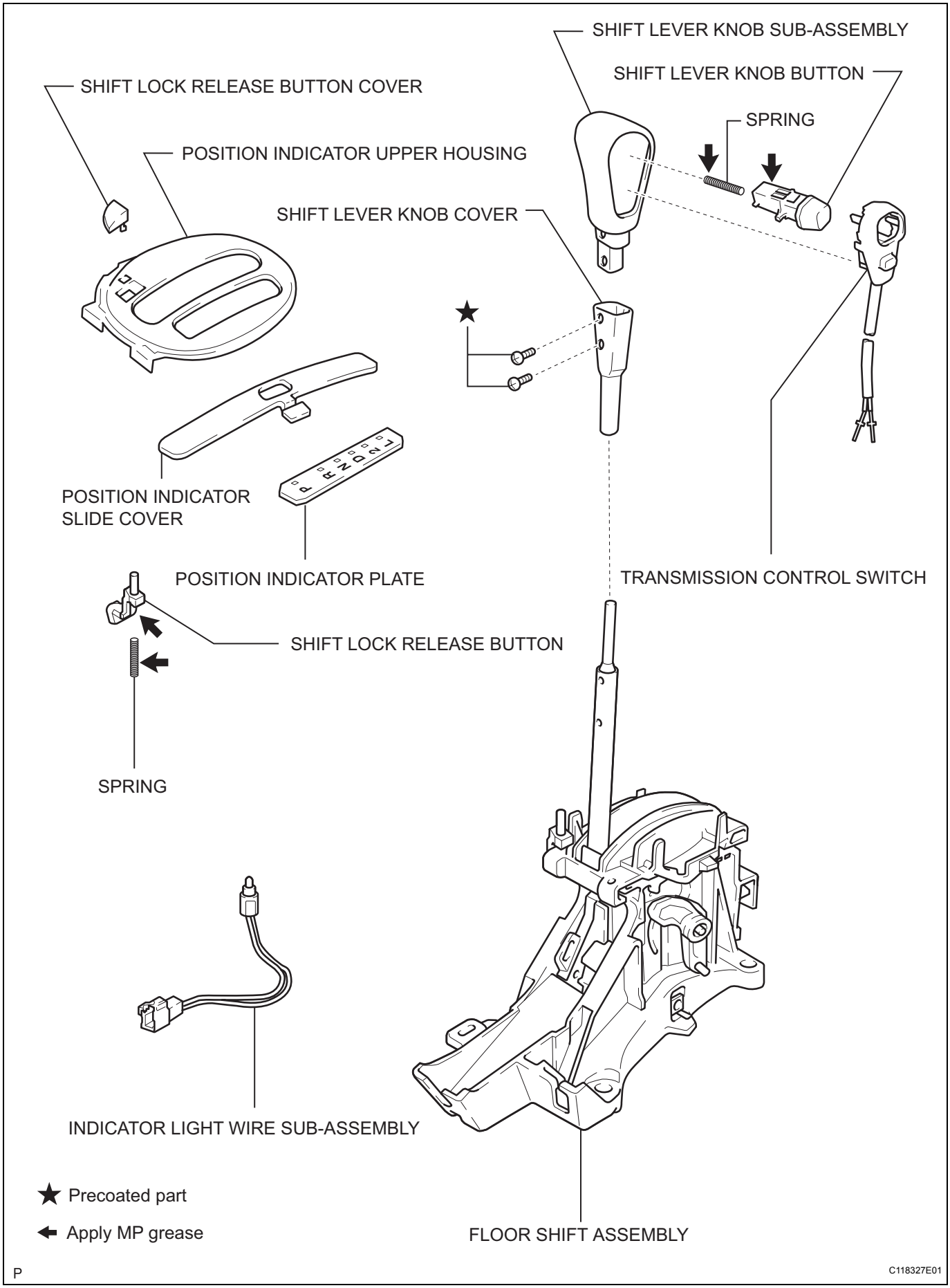
AX

FLOOR SHIFT ASSEMBLY

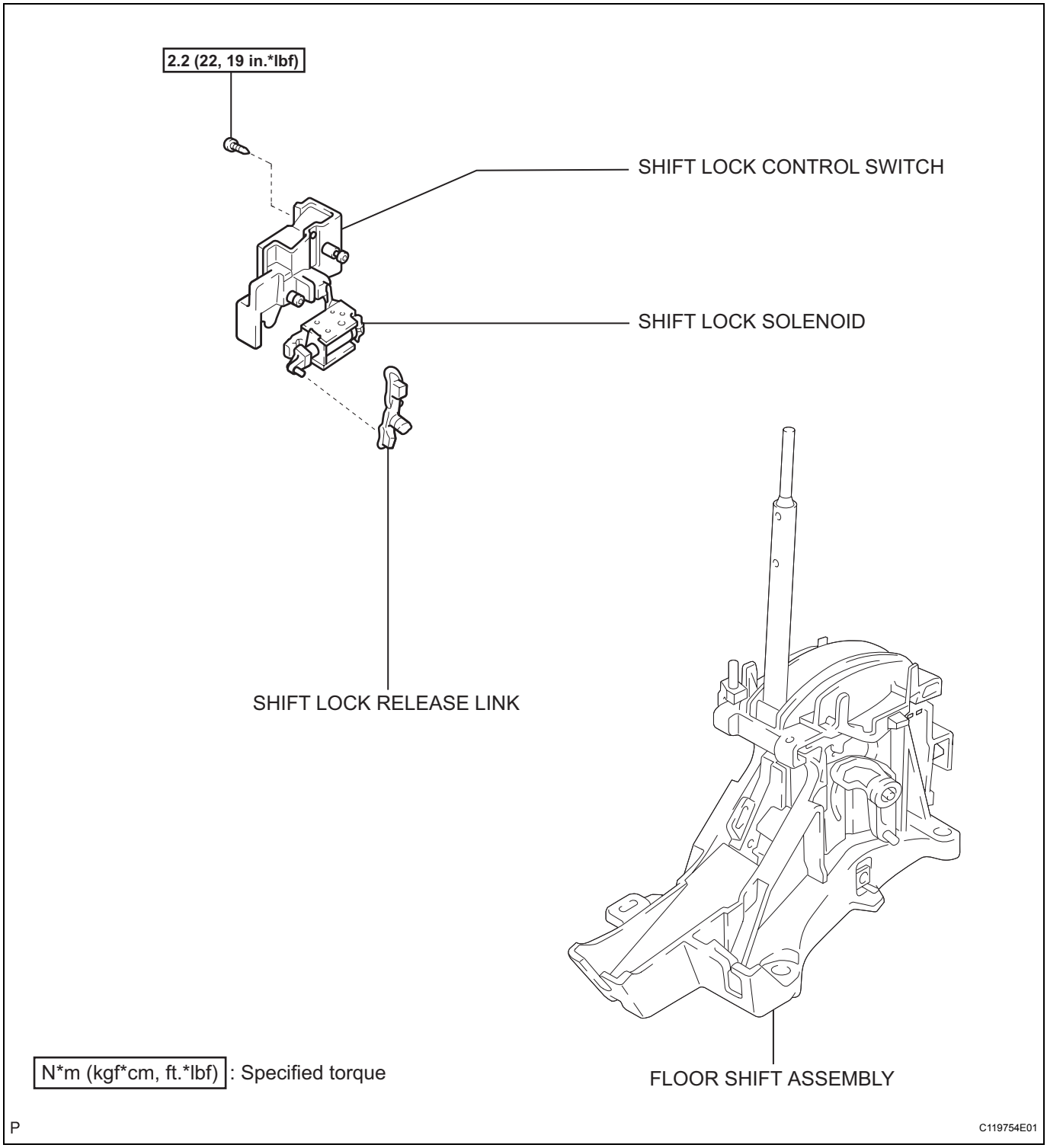
COMPONENTS



AX


SHIFT LEVER KNOB SUB-ASSEMBLY
SHIFT LEVER KNOB BUTTON
SHIFT LOCK RELEASE BUTTON COVER
SPRING
POSITION INDICATOR UPPER HOUSING
SHIFT LEVER KNOB COVER
★
POSITION INDICATOR SLIDE COVER
POSITION INDICATOR PLATE
TRANSMISSION CONTROL SWITCH
SHIFT LOCK RELEASE BUTTON
SPRING
INDICATOR LIGHT WIRE SUB-ASSEMBLY
FLOOR SHIFT ASSEMBLY
★ Precoated part
Apply MP grease
P
C118327E01

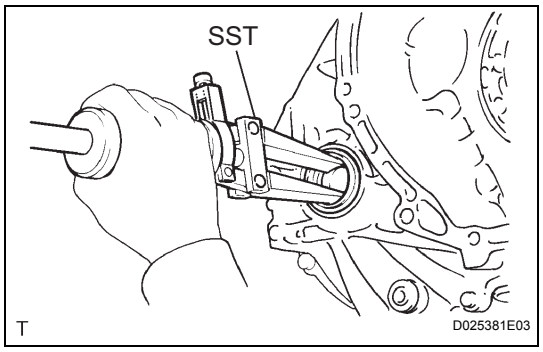
AX


2.2 (22, 19 in.*lbf)
SHIFT LOCK CONTROL SWITCH
SHIFT LOCK SOLENOID
SHIFT LOCK RELEASE LINK
FLOOR SHIFT ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
P
C119754E01

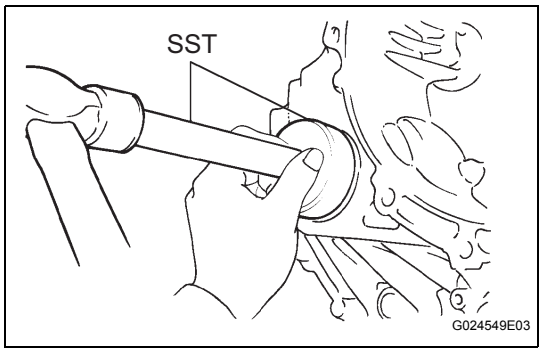
AX

REPLACEMENT

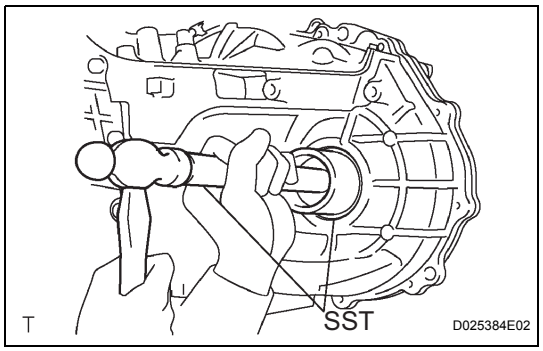
1. **REMOVE FRONT WHEEL**
2. **REMOVE ENGINE UNDER COVER RH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **DRAIN AUTOMATIC TRANSAXLE FLUID**
   (a) Remove the drain plug and gasket, and drain ATF.
   (b) Install a new gasket and the drain plug.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
5. **REMOVE FRONT DRIVE SHAFT ASSEMBLY**
   (a) Remove the front drive shaft (see page DS-4).
6. **REMOVE FRONT TRANSAXLE CASE OIL SEAL**
   (a) Using SST, pull out the oil seal.
   SST 09308-00010



7. **INSTALL FRONT TRANSAXLE CASE OIL SEAL (for RH Side)**
   (a) Using SST and a hammer, tap in a new oil seal.
   SST 09554-14010, 09950-70010 (09951-07200)
   Standard oil seal drive in depth:
   1.5 to 2.5 mm (0.059 to 0.098 in.)
   (b) Coat the lip of the oil seal with MP grease.



8. **INSTALL FRONT TRANSAXLE CASE OIL SEAL (for LH Side)**
   (a) Using SST and a hammer, drive in a new oil seal.
   SST 09726-27012 (09726-02041), 09950-70010 (09951-07200)
   Standard oil seal drive in depth:
   5.4 to 6.4 mm (0.213 to 0.252 in.)
   (b) Coat the lip of the oil seal with MP grease.



9. **INSTALL FRONT DRIVE SHAFT ASSEMBLY**
   (a) Install the front drive shaft (see page DS-13).
10. **INSTALL ENGINE UNDER COVER LH**
11. **INSTALL ENGINE UNDER COVER RH**
12. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
13. **ADD AUTOMATIC TRANSAXLE FLUID**
    Fluid type:
    Toyota Genuine ATF TYPE T-IV

AX

Standard capacity:
2.9 liters (3.1 US qts, 2.6 Imp. qts)

14. INSPECT AUTOMATIC TRANSAXLE FLUID

(a) Inspect the automatic transaxle fluid (see page AX-82).

15. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

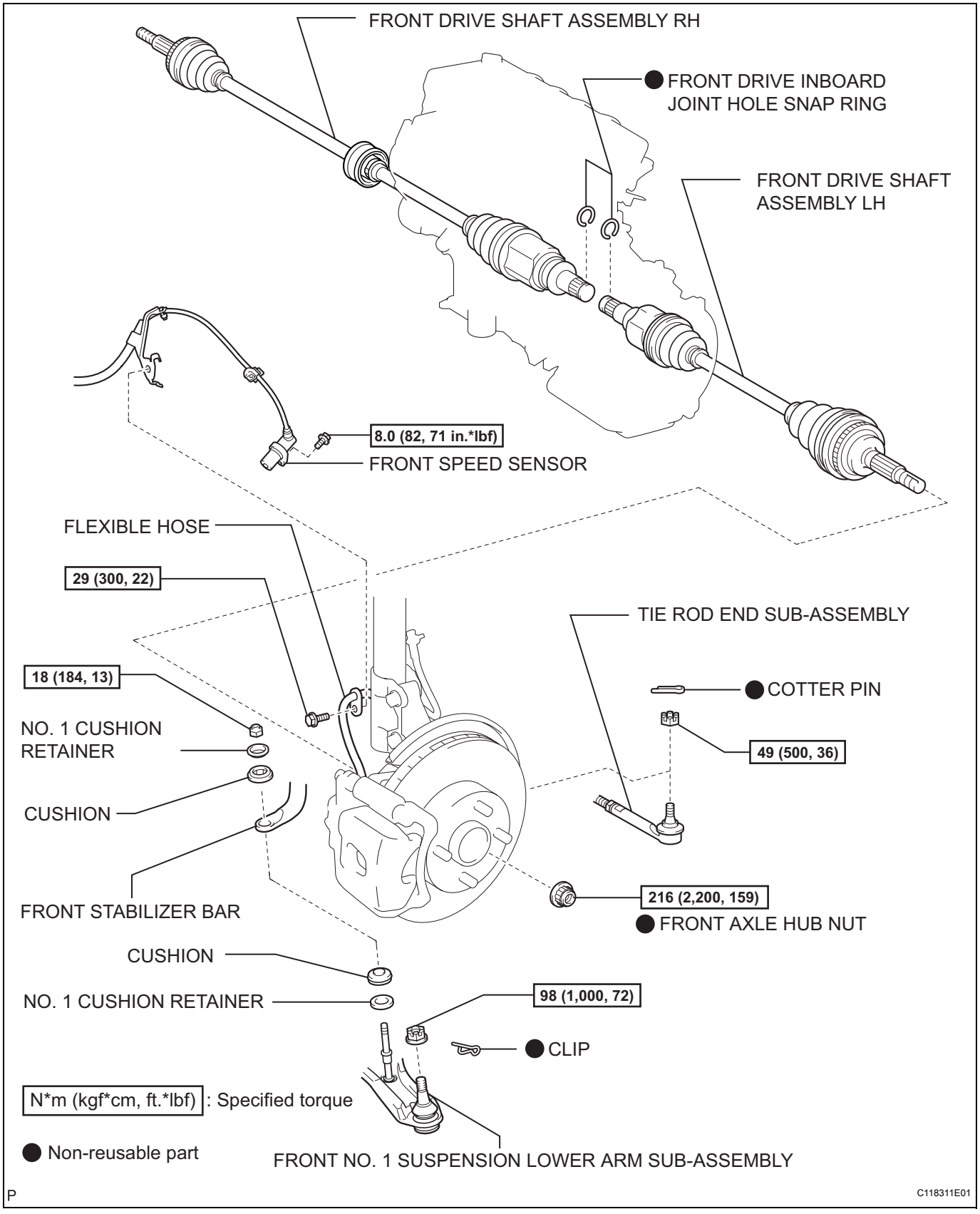
(a) Inspect and adjust the front wheel alignment (see page SP-2).

16. CHECK ABS SPEED SENSOR SIGNAL

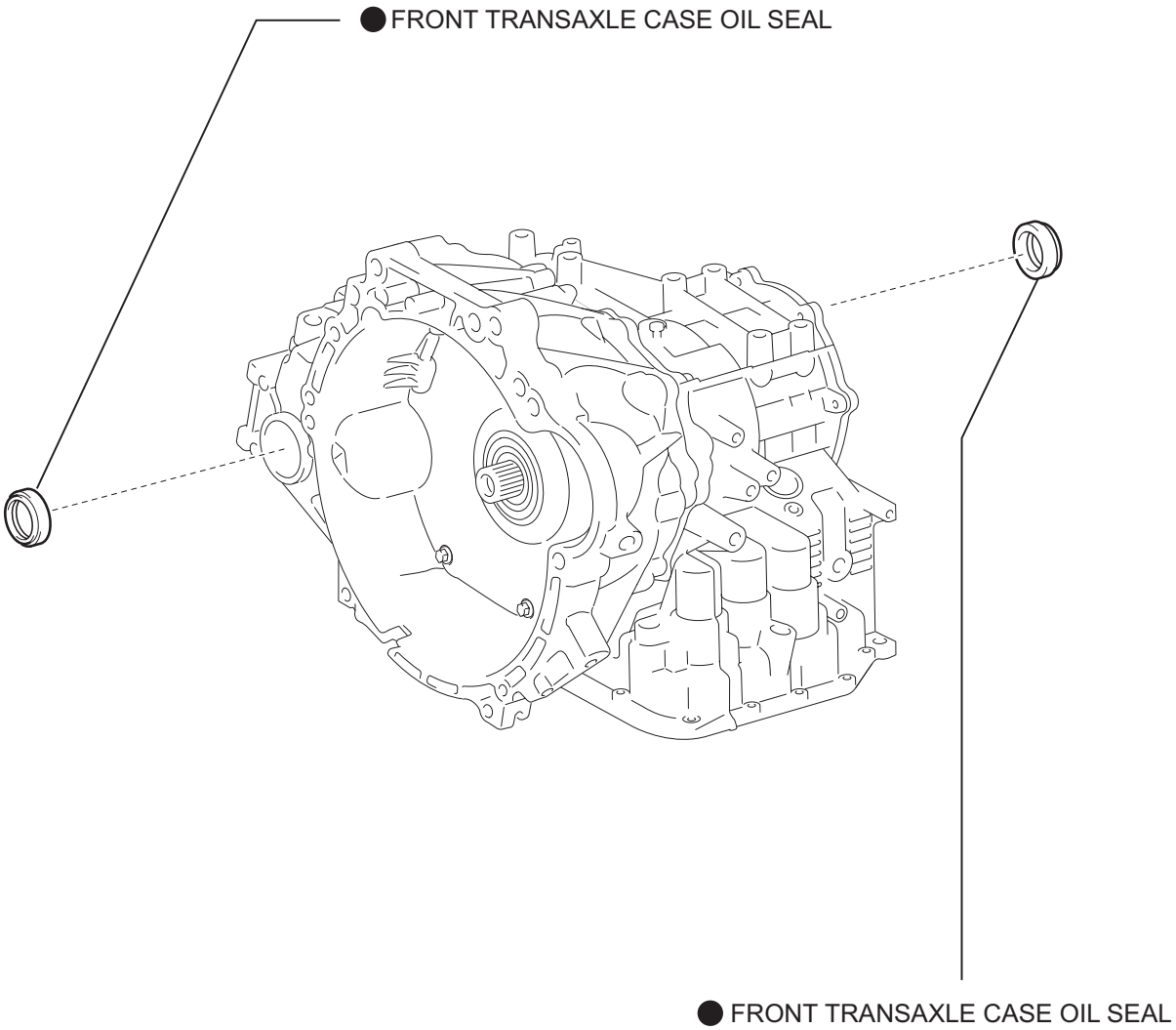
(a) Check the ABS speed sensor signal (see page BC-5).

DIFFERENTIAL OIL SEAL

COMPONENTS



AX



AX

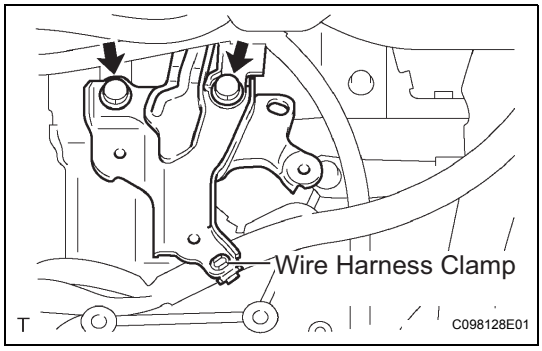
● Non-reusable part

P

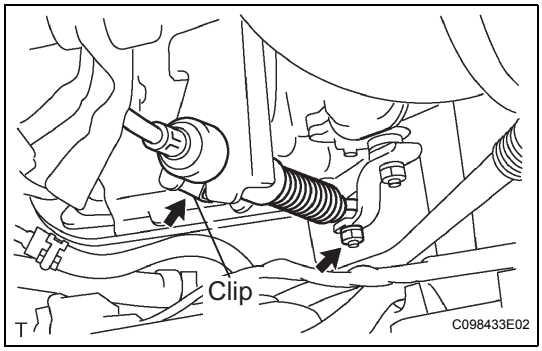
C118325E01

REMOVAL

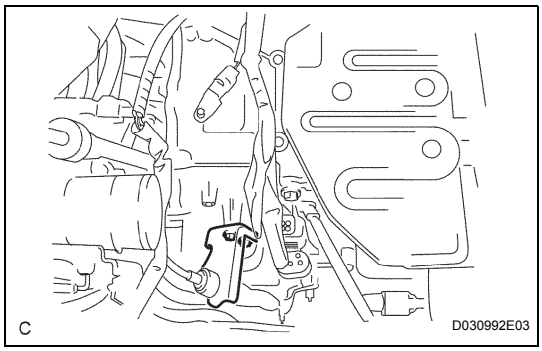
1. **REMOVE HOOD SUB-ASSEMBLY**
2. **REMOVE BATTERY**
   NOTICE:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
   (a) Remove the windshield wiper link (see page WW-7).
4. **REMOVE COWL TOP PANEL OUTER**
5. **REMOVE NO. 2 CYLINDER HEAD COVER**
6. **REMOVE AIR CLEANER ASSEMBLY**
   (a) Remove air cleaner (see page ES-346).
7. **REMOVE AIR CLEANER BRACKET**
   (a) Disconnect the wire harness clamp.
   (b) Remove the 2 bolts, air cleaner bracket and transmission control cable support.



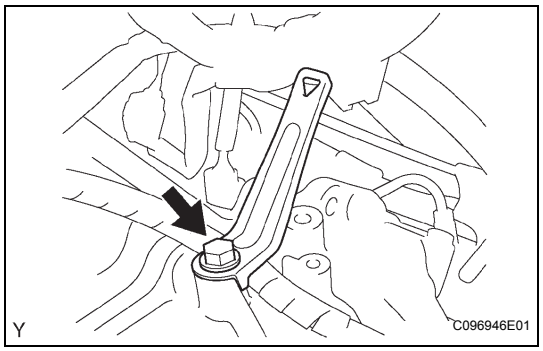
8. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the nut from the control shaft lever.
   (b) Disconnect the control cable from the control shaft lever.
   (c) Remove the clip and disconnect the control cable from the control cable bracket.



9. **REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET**
   (a) Remove the 2 bolts and bracket.

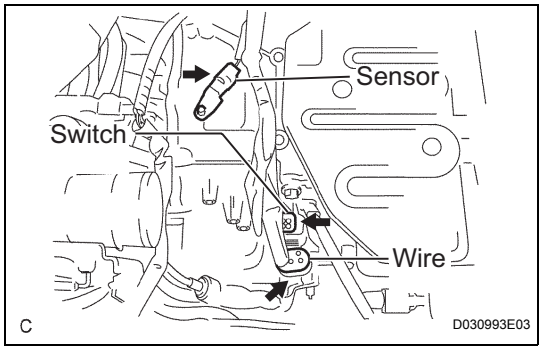


AX



10. DISCONNECT WIRE HARNESS

(a) Remove the bolt and disconnect the wire harness clamp bracket.



11. DISCONNECT CONNECTOR

(a) Disconnect the transmission wire connector.
(b) Disconnect the park/neutral position switch connector.
(c) Disconnect the transmission revolution sensor connector.

12. REMOVE FRONT WHEEL

13. REMOVE ENGINE UNDER COVER RH

14. REMOVE ENGINE UNDER COVER LH

15. REMOVE FRONT EXHAUST PIPE ASSEMBLY

(a) Remove the front exhaust pipe (see page EX-3).

16. DRAIN AUTOMATIC TRANSAXLE FLUID

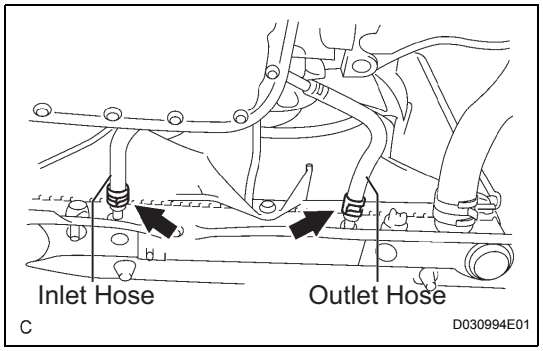
(a) Remove the drain plug and gasket, and drain ATF.
(b) Install a new gasket and the drain plug.

17. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

(a) Remove the front drive shaft (see page DS-4).

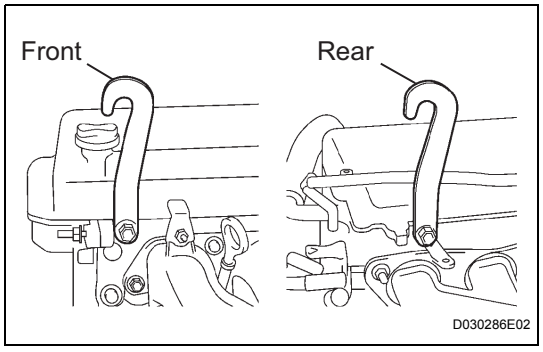
18. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

(a) Remove the front drive shaft (see page DS-4).



19. DISCONNECT OIL COOLER HOSE

(a) Using pliers, grip the claws of the 2 clips and disconnect the oil cooler hoses (inlet and outlet).
HINT:
Use a container to catch the fluid.

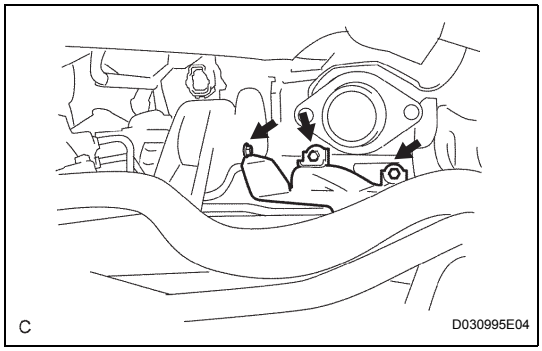


20. SUSPEND ENGINE ASSEMBLY

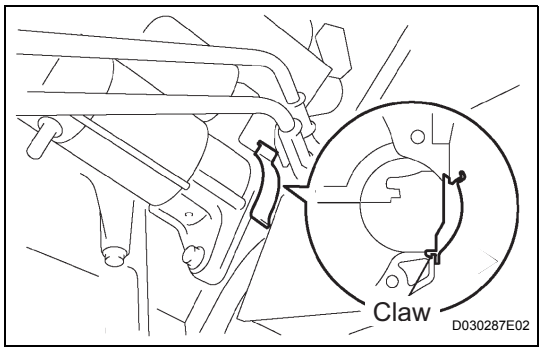
(a) Install the engine hangers with the bolts in the correct direction.
Engine hanger:
Part No. 12281-21010
Bolt:
Part No. 91642-81025
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

AX

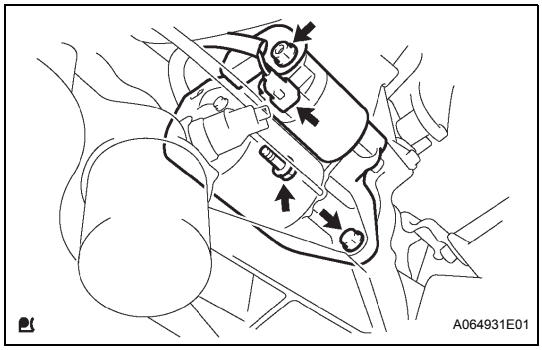
(b) Attach the engine chain hoist to the engine hangers.
NOTICE:
Do not attempt to hang the engine by hooking the chain to any other parts.



21. REMOVE DRIVE SHAFT HEAT INSULATOR SUB-ASSEMBLY
(a) Remove the 3 bolts and drive shaft heat insulator.

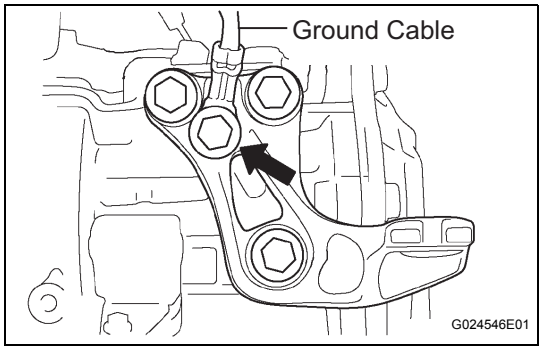


22. REMOVE STARTER ASSEMBLY
(a) Remove the flywheel housing side cover.



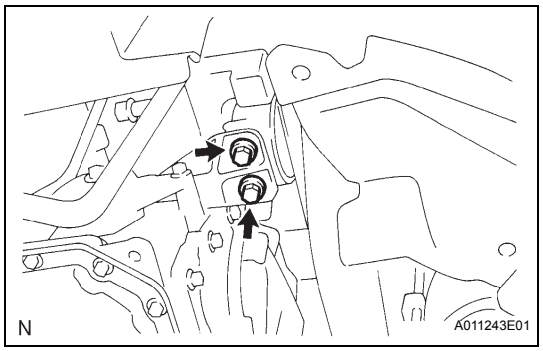
(b) Remove the nut and disconnect the starter wire.
(c) Disconnect the connector.
(d) Remove the 2 bolts and starter.

23. SUPPORT AUTOMATIC TRANSAXLE ASSEMBLY
(a) Support the automatic transaxle with a transmission jack.

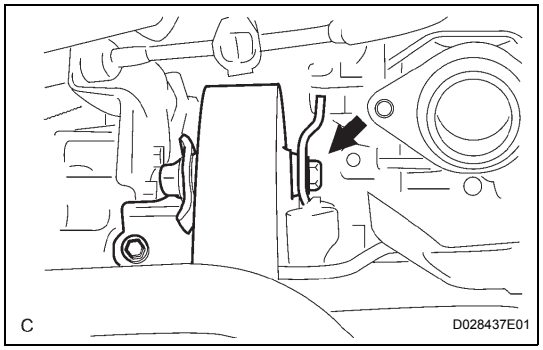


24. DISCONNECT ENGINE MOUNTING BRACKET LH
(a) Remove the bolt and ground cable from the engine mounting bracket.

AX



(b) Remove the 2 bolts and disconnect the engine mounting bracket from the engine mounting insulator.

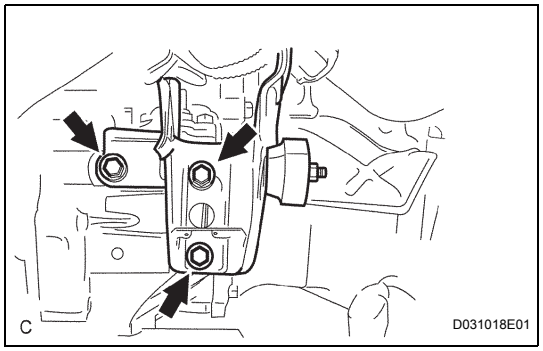


25. DISCONNECT ENGINE MOUNTING INSULATOR REAR

(a) Remove the bolt and nut, and disconnect the engine mounting insulator rear from the engine mounting bracket.

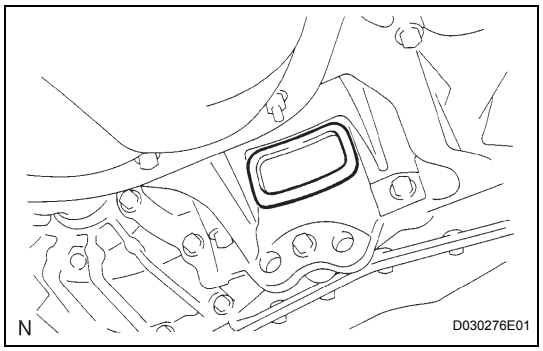
26. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Remove the front suspension crossmember (see page EM-75).



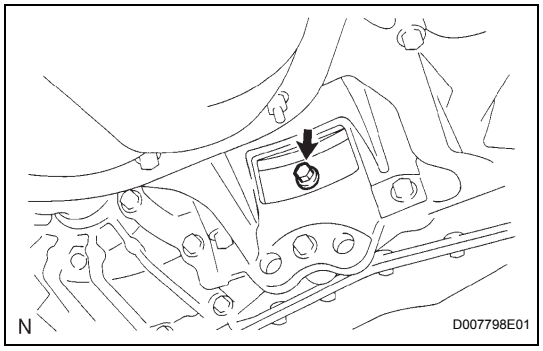
27. REMOVE ENGINE MOUNTING BRACKET REAR

(a) Remove the 3 bolts and engine mounting bracket from the automatic transaxle.



28. REMOVE FLYWHEEL HOUSING UNDER COVER

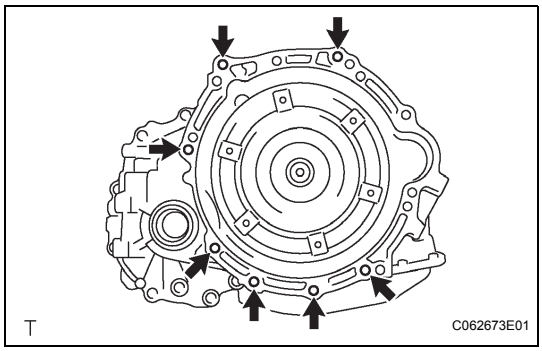
(a) Remove the flywheel housing under cover.



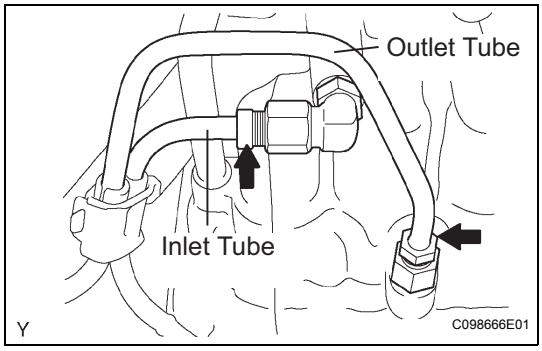
29. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

(a) Turn the crankshaft to gain access and remove the 6 torque converter mounting bolts while holding the crankshaft pulley bolt with a wrench.
HINT:
There will be one white colored bolt.

AX



(b) Remove the 7 bolts.
(c) Remove the automatic transaxle from the engine.

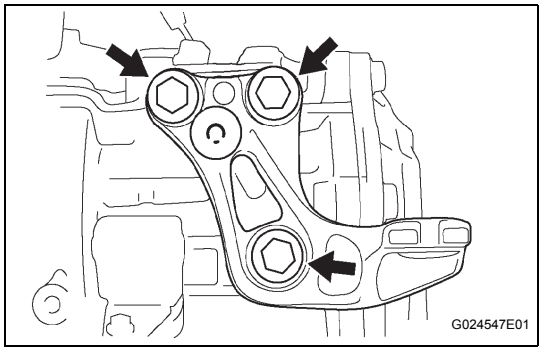


30. DISCONNECT NO. 1 OIL COOLER INLET TUBE

(a) Using SST, disconnect the oil cooler inlet tube.
SST 09023-12701

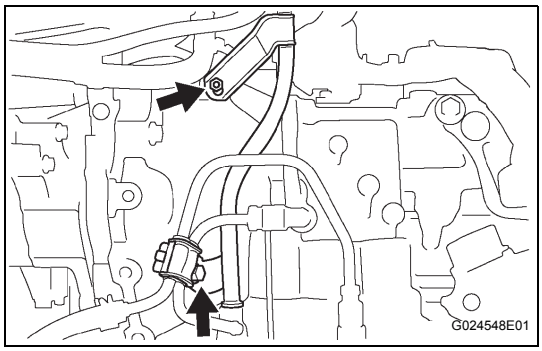
31. DISCONNECT NO. 1 OIL COOLER OUTLET TUBE

(a) Using SST, disconnect the oil cooler outlet tube.
SST 09023-12701



32. REMOVE ENGINE MOUNTING BRACKET LH

(a) Remove the 3 bolts and engine mounting bracket from the automatic transaxle.



33. REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

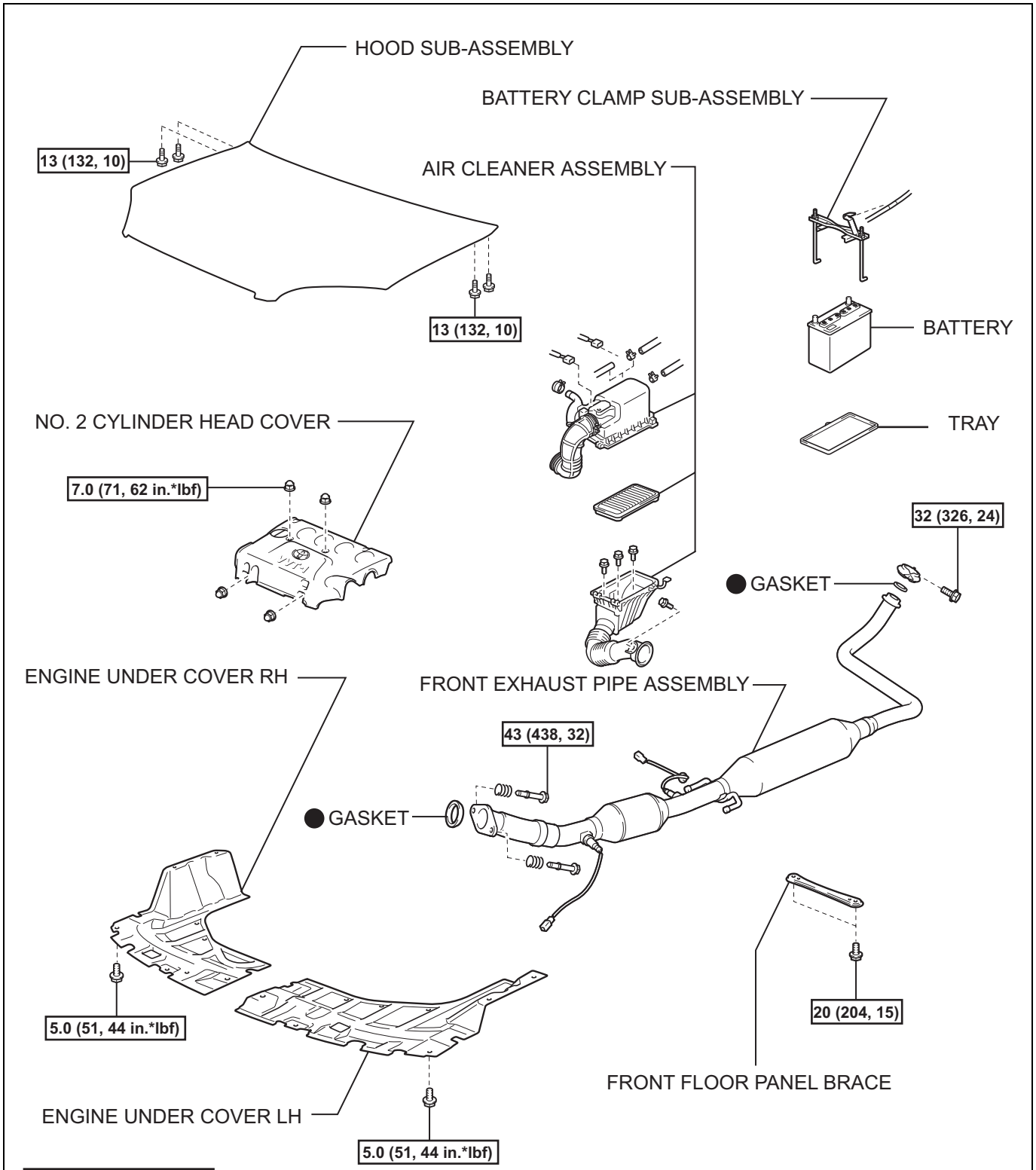
34. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Remove the torque converter clutch from the automatic transaxle.

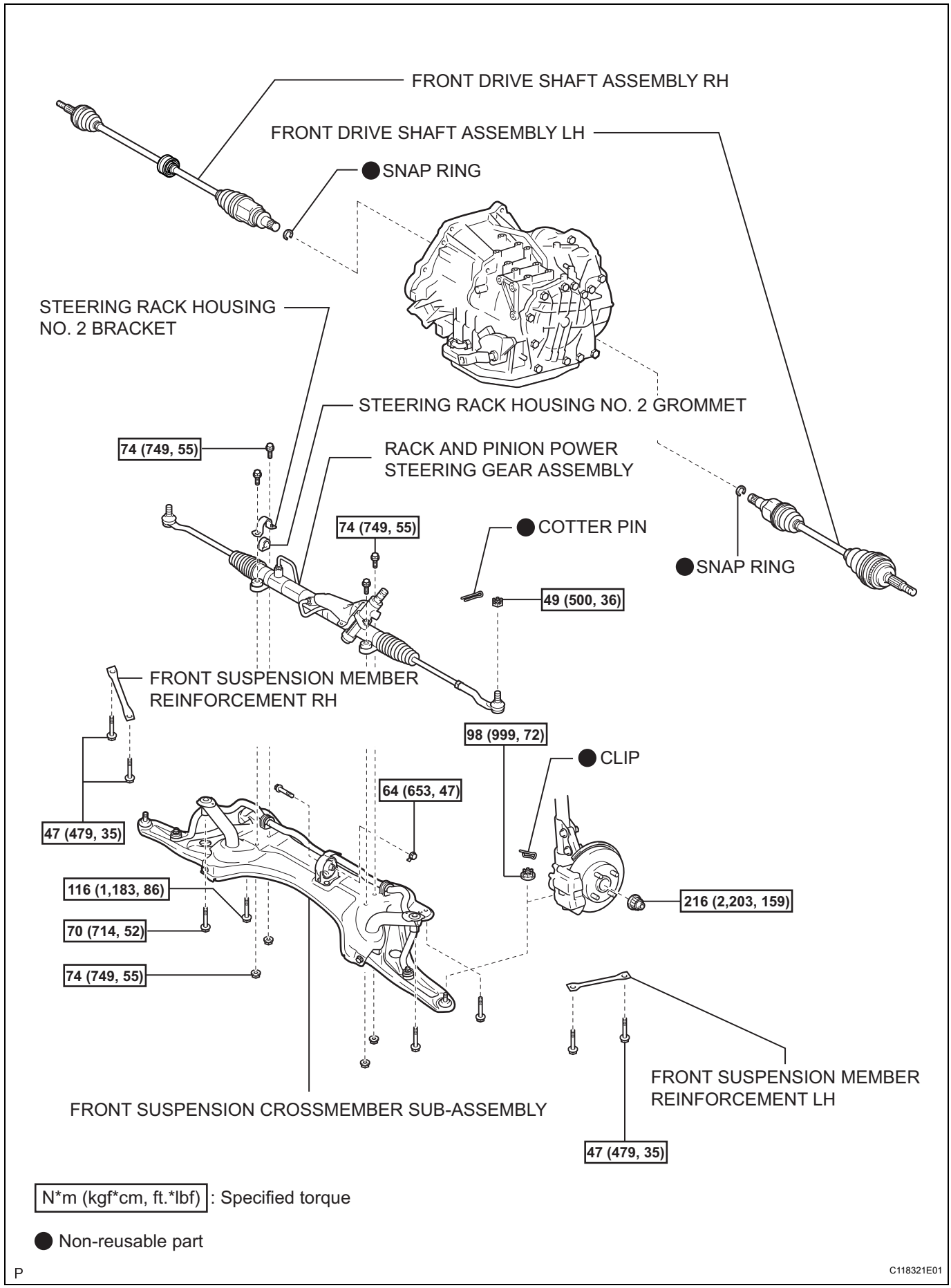
AX

AUTOMATIC TRANSAXLE ASSEMBLY

COMPONENTS



AX



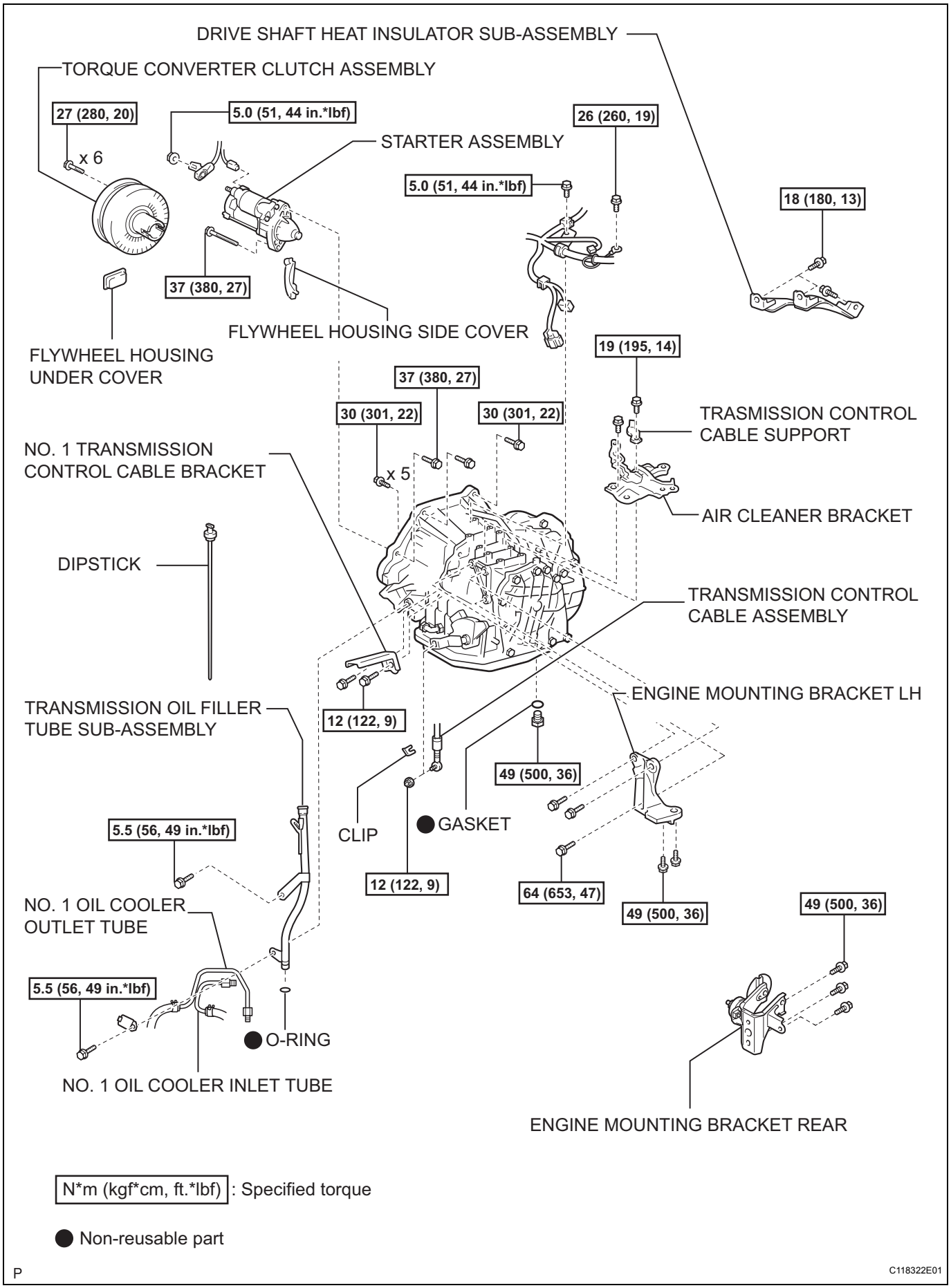
AX

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

C118321E01


DRIVE SHAFT HEAT INSULATOR SUB-ASSEMBLY
TORQUE CONVERTER CLUTCH ASSEMBLY
27 (280, 20)
x 6
5.0 (51, 44 in.*lbf)
STARTER ASSEMBLY
26 (260, 19)
5.0 (51, 44 in.*lbf)
18 (180, 13)
37 (380, 27)
FLYWHEEL HOUSING SIDE COVER
FLYWHEEL HOUSING UNDER COVER
19 (195, 14)
37 (380, 27)
30 (301, 22)
30 (301, 22)
TRASMISSION CONTROL CABLE SUPPORT
NO. 1 TRANSMISSION CONTROL CABLE BRACKET
x 5
AIR CLEANER BRACKET
DIPSTICK
TRANSMISSION CONTROL CABLE ASSEMBLY
ENGINE MOUNTING BRACKET LH
TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY
12 (122, 9)
49 (500, 36)
CLIP
GASKET
5.5 (56, 49 in.*lbf)
12 (122, 9)
64 (653, 47)
49 (500, 36)
NO. 1 OIL COOLER OUTLET TUBE
49 (500, 36)
5.5 (56, 49 in.*lbf)
O-RING
NO. 1 OIL COOLER INLET TUBE
ENGINE MOUNTING BRACKET REAR
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P
C118322E01

AX

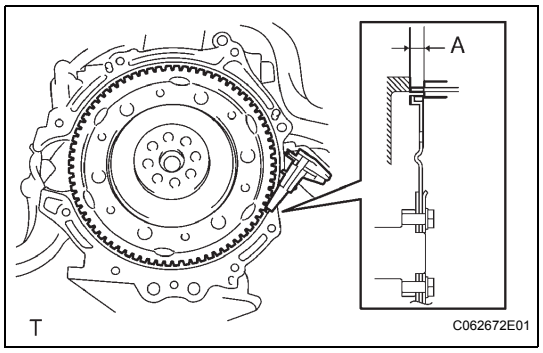
INSTALLATION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

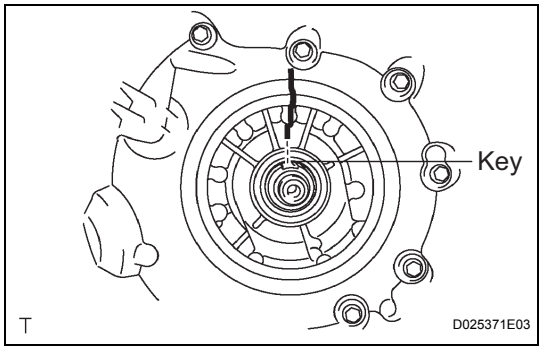
(a) Inspect the torque converter clutch (see page AX-146).

2. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

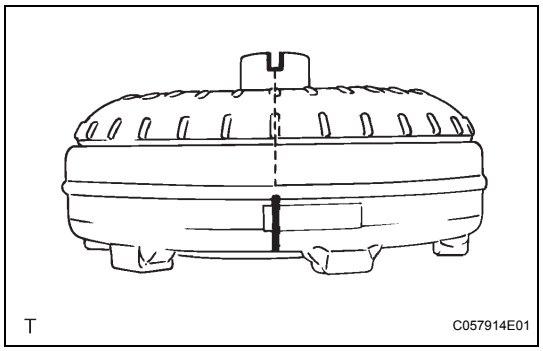
(a) Using a vernier caliper, measure the dimension "A" between the transaxle fitting part of the engine and the converter clutch fitting part of the drive plate.



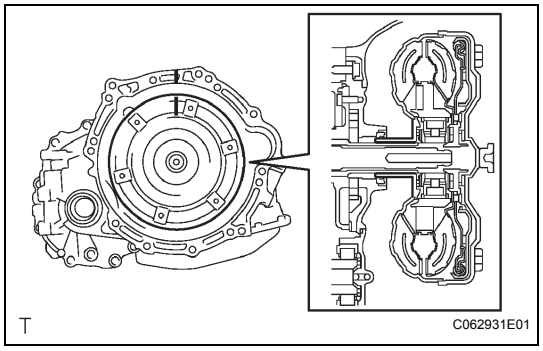
(b) Set the key at the top of the front oil pump drive gear and put a mark on the housing.



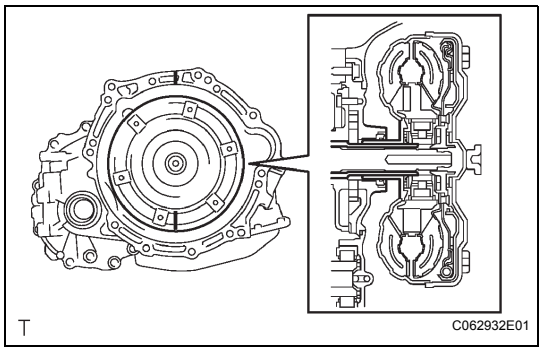
(c) Put a mark on the torque converter clutch so that its groove is clearly indicated.



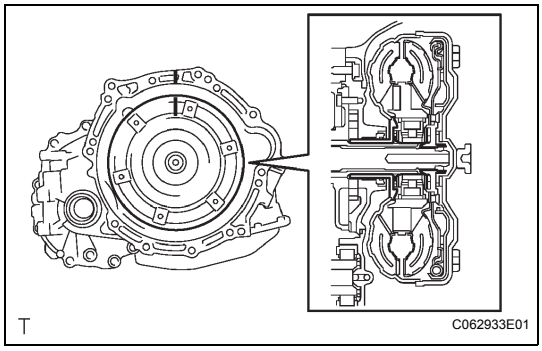
(d) Align the marks on the case and converter clutch, and fit the splined part of the input shaft to the spline part of the turbine runner.



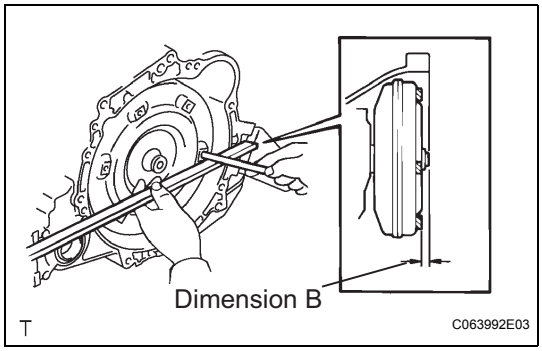
AX



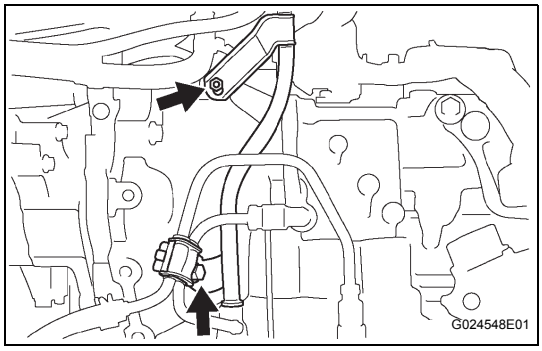
(e) Rotating the converter clutch, fit the spline part of the stator shaft with that of the stator.
HINT:
Rotate it approximately 180°.



(f) Rotating the converter clutch, align the marks on the case and converter clutch again, and fit the key of the oil pump drive gear into the keyway of the converter.
NOTICE:
When rotating the converter, do not push it with excessive force.



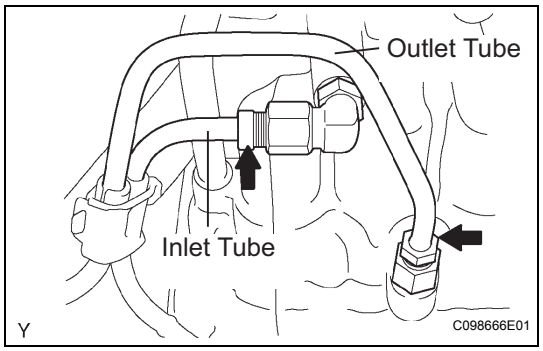
(g) Using a vernier caliper and straightedge, measure the dimension "B" shown in the illustration and check that "B" is greater than "A".
HINT:
Dimension "A" is the measurement between the transaxle fitting part of the engine and the converter clutch fitting part of the drive plate.
Standard dimension:
A + 1 mm (0.04 in.) or more
NOTICE:
Remember to subtract the thickness of the straightedge.



3. INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

(a) Temporarily install the oil cooler outlet tube.
(b) Temporarily install the oil cooler inlet tube.
(c) Coat a new O-ring with ATF, and install it on the oil filler tube.
(d) Install the oil filler tube on the automatic transaxle.
(e) Install the breather hose on the oil filler tube.
(f) Install the oil cooler tube clamp with the 2 bolts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
(g) Install the ATF level gauge.

AX

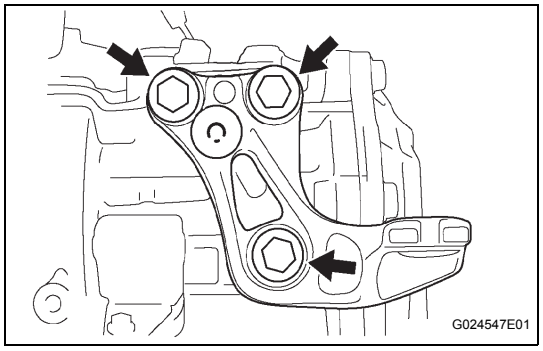


4. INSTALL NO. 1 OIL COOLER OUTLET TUBE

(a) Using SST, tighten the oil cooler outlet tube.
SST 09023-12701
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)

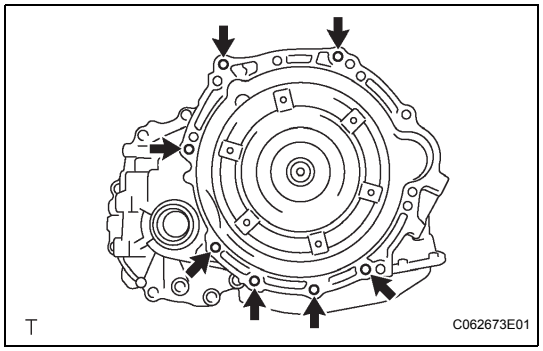
5. INSTALL NO. 1 OIL COOLER INLET TUBE

(a) Using SST, tighten the oil cooler inlet tube.
SST 09023-12701
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)



6. INSTALL ENGINE MOUNTING BRACKET LH

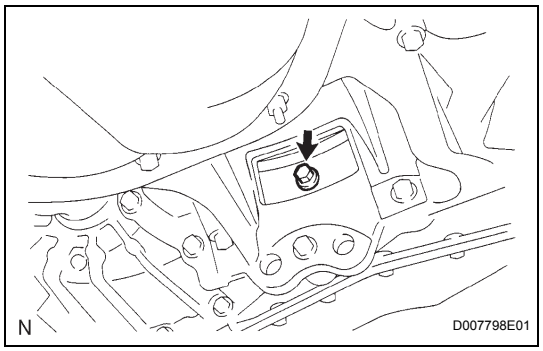
(a) Install the engine mounting bracket LH on the automatic transaxle with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



7. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

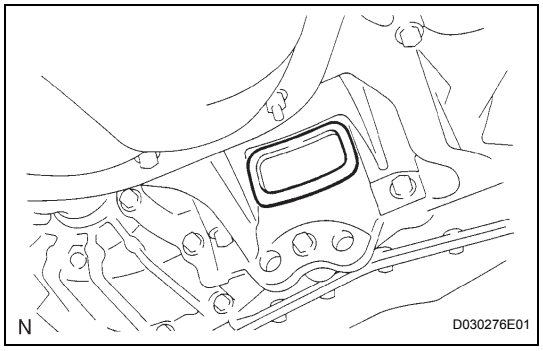
(a) Install the automatic transaxle on the engine with the 7 bolts.
Torque: 30 N*m (301 kgf*cm, 22 ft.*lbf)

(b) Install the 6 torque converter mounting bolts.
Torque: 27 N*m (280 kgf*cm, 20 ft.*lbf)
HINT:
First install the white colored bolt, and then the remaining 5 bolts.

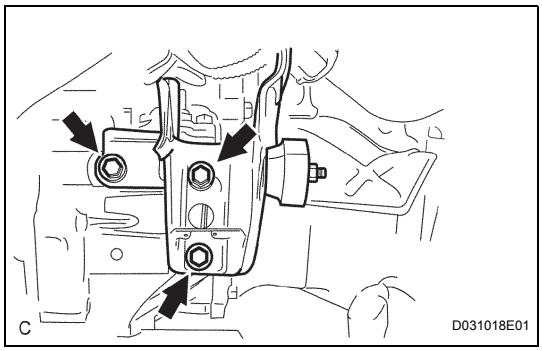


8. INSTALL FLYWHEEL HOUSING UNDER COVER

(a) Install the flywheel housing under cover.



AX

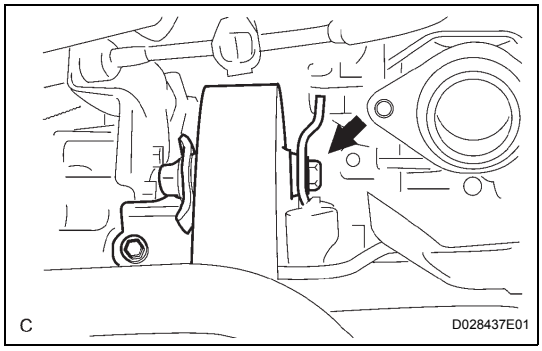


9. INSTALL ENGINE MOUNTING BRACKET REAR

(a) Install the engine mounting bracket on the automatic transaxle with the 3 bolts.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

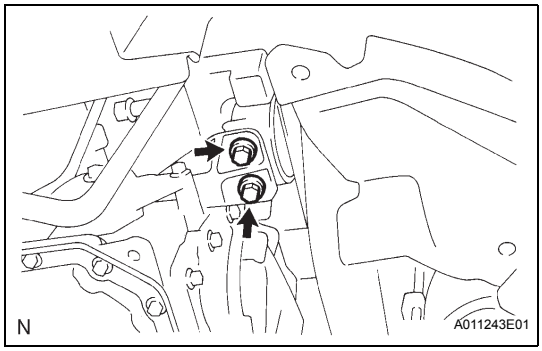
10. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Install the front suspension crossmember (see page EM-80).



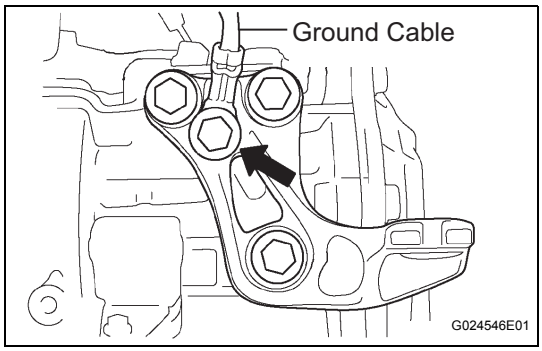
11. INSTALL ENGINE MOUNTING INSULATOR REAR

(a) Install the engine mounting insulator rear on the engine mounting bracket with the bolt and nut.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

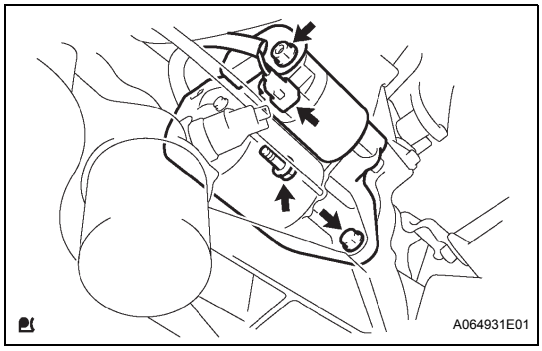


12. CONNECT ENGINE MOUNTING BRACKET LH

(a) Connect the engine mounting bracket to the engine mounting insulator with the 2 bolts.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



(b) Connect the ground cable to the engine mounting bracket with the bolt.
Torque: 26 N*m (260 kgf*cm, 19 ft.*lbf)



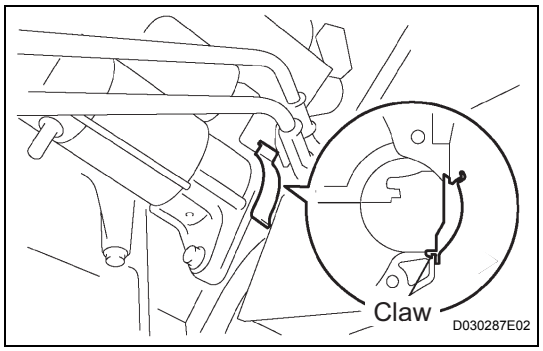
13. INSTALL STARTER ASSEMBLY

(a) Install the starter with the 2 bolts.
Torque: 37 N*m (380 kgf*cm, 27 ft.*lbf)

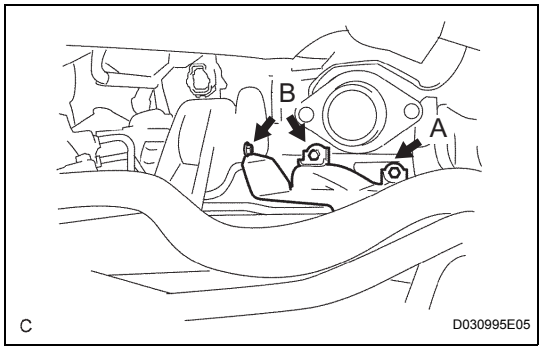
(b) Connect the connecter.

(c) Install the starter wire with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

AX



(d) Install the flywheel housing side cover.



14. INSTALL DRIVE SHAFT HEAT INSULATOR SUB-ASSEMBLY

(a) Temporarily tighten the bolt labeled A.

(b) Fully tighten the 2 bolts labeled B.
Torque: 18 N*m (180 kgf*cm, 13 ft.*lbf)

(c) Fully tighten the bolt labeled A.
Torque: 18 N*m (180 kgf*cm, 13 ft.*lbf)

15. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

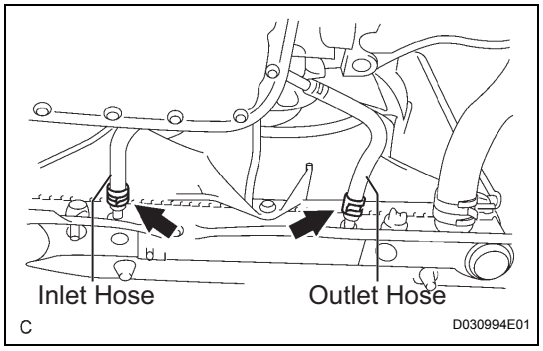
(a) Install the front drive shaft (see page DS-13).

16. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

(a) Install the front drive shaft (see page DS-13).

17. INSTALL FRONT EXHAUST PIPE ASSEMBLY

(a) Install the front exhaust pipe (see page EX-5).

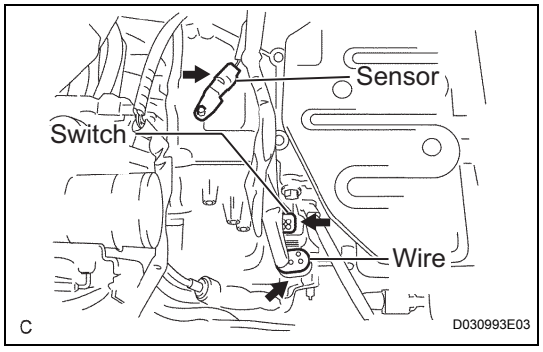


18. CONNECT OIL COOLER HOSE

19. INSTALL ENGINE UNDER COVER LH

20. INSTALL ENGINE UNDER COVER RH

21. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



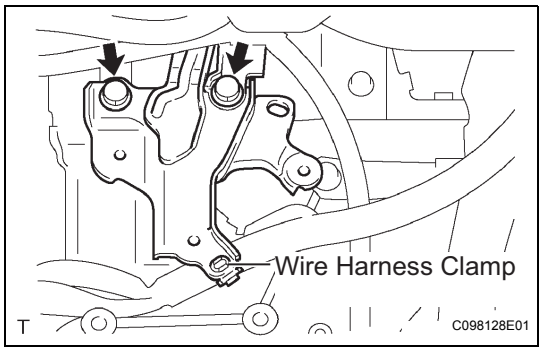
22. CONNECT CONNECTOR

(a) Connect the transmission wire connector.

(b) Connect the park/neutral position switch connector.

(c) Connect the transmission revolution sensor connector.

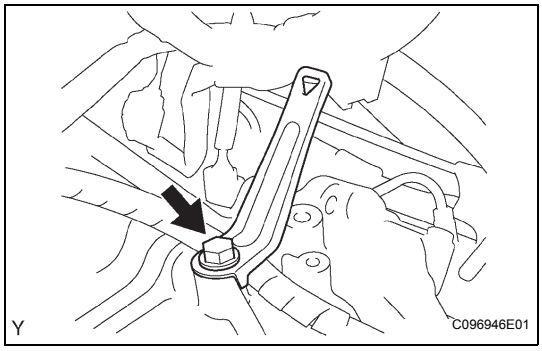
AX



23. INSTALL AIR CLEANER BRACKET

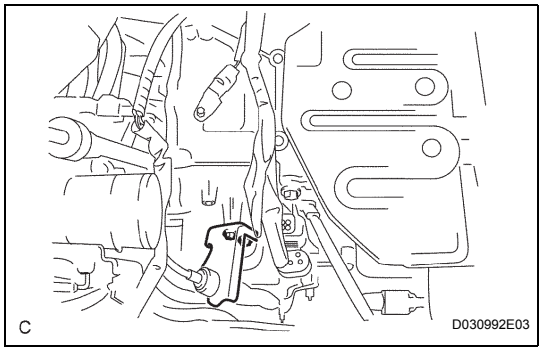
(a) Install the air cleaner bracket and transmission control cable support with the 2 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)

(b) Connect the wire harness clamp to the air cleaner bracket.



24. INSTALL WIRE HARNESS

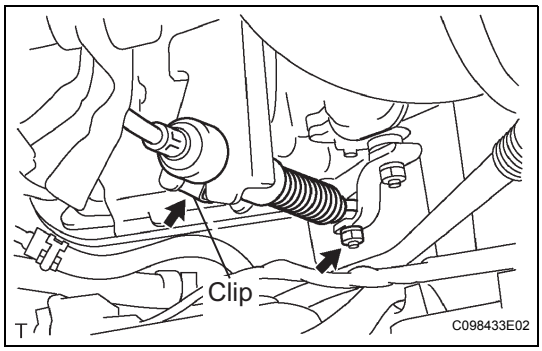
(a) Install the wire harness clamp bracket with the bolt.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



25. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

(a) Install the control cable bracket with the 2 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

AX



26. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Temporarily install the control cable on the control shaft lever with the nut.

(b) Install the control cable and a new clip on the bracket.

27. INSTALL AIR CLEANER ASSEMBLY

(a) Install the air cleaner (see page ES-348).

28. INSTALL NO. 2 CYLINDER HEAD COVER

29. INSTALL COWL TOP PANEL OUTER

(a) Install the cowl top panel outer (see page SP-14).

30. INSTALL WINDSHIELD WIPER LINK ASSEMBLY

(a) Install the windshield wiper link (see page WW-10).

31. INSTALL BATTERY

32. INSTALL HOOD SUB-ASSEMBLY
Torque: 13 N*m (132 kgf*cm, 10 ft.*lbf)

33. INSPECT AND ADJUST HOOD SUB-ASSEMBLY

(a) Inspect and adjust the hood (see page ED-1).

34. ADD AUTOMATIC TRANSAXLE FLUID

35. INSPECT AUTOMATIC TRANSAXLE FLUID

(a) Inspect the automatic transaxle fluid (see page AX-82).

36. ADJUST SHIFT LEVER POSITION

(a) Adjust the shift lever position (see page AX-121).

37. INSPECT SHIFT LEVER POSITION

(a) Inspect the shift lever position (see page AX-121).

38. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(a) Inspect and adjust the front wheel alignment (see page SP-2).

39. CHECK ABS SPEED SENSOR SIGNAL

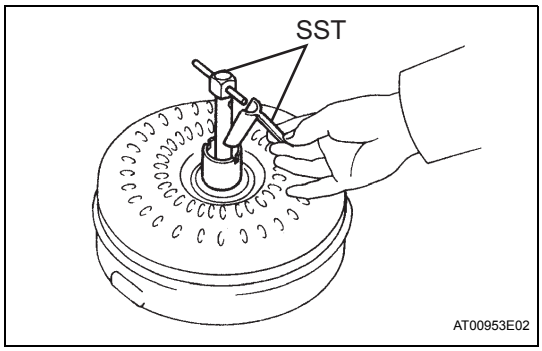
(a) Check the ABS speed sensor signal (see page BC-5).

40. PERFORM INITIALIZATION

(a) Perform initialization (see page AX-19).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.



TORQUE CONVERTER CLUTCH AND DRIVE PLATE

INSPECTION

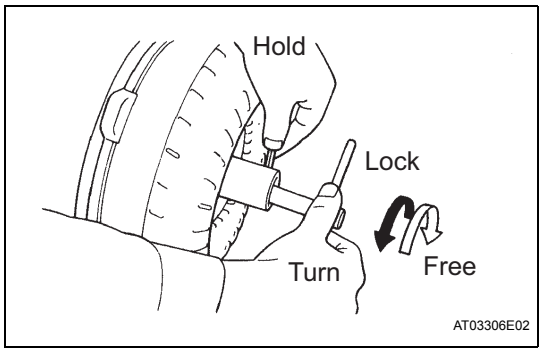
1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Inspect the one-way clutch.

(1) Install SST in the inner race of the one-way clutch.
SST 09350-32014 (09351-32010)

(2) Set SST so that it fits in the notch of the converter hub and in the outer race of the one-way clutch.
SST 09350-32014 (09351-32020)

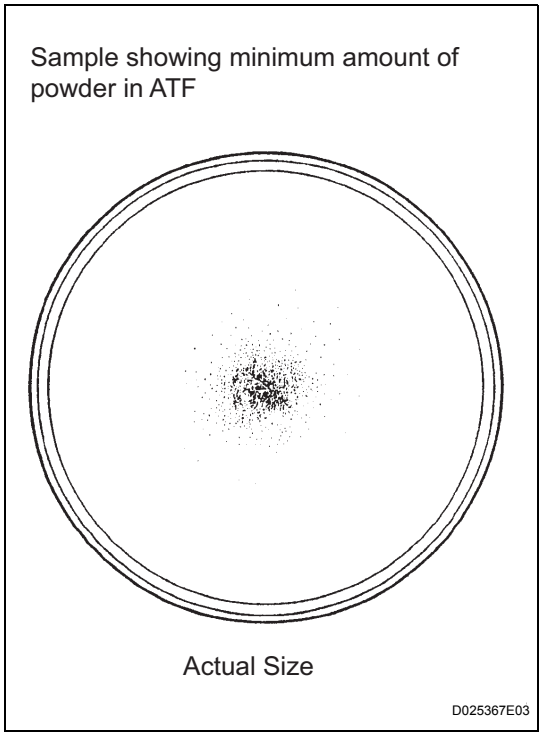
(3) With the torque converter standing on its side, check that the clutch locks when SST is turned counterclockwise and rotates freely and smoothly when turned clockwise. If the results are not as specified, clean the converter and recheck the one-way clutch. If the results still are not as specified, replace the converter.



(b) Determine the condition of the torque converter clutch.

(1) Check that the following conditions are met:
- During the stall test or when the shift lever is on N, metallic sounds are not emitted from the torque converter clutch.
- The one-way clutch turns in one direction and locks in the other direction.
- The amount of powder in the ATF is not greater than the sample shown in the illustration.
  If the results are not as specified, replace the torque converter clutch assembly.

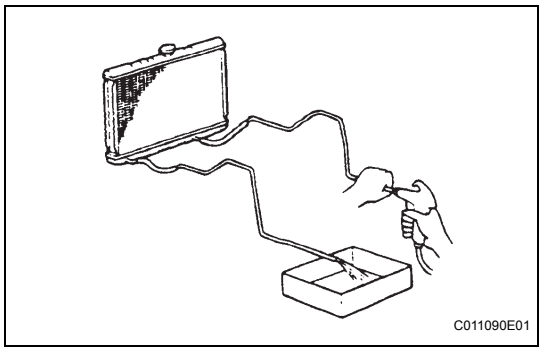
HINT:
The sample illustration shows approximately 0.25 liters (0.26 US qts, 0.22 Imp. qts) of the ATF taken from a removed torque converter clutch.



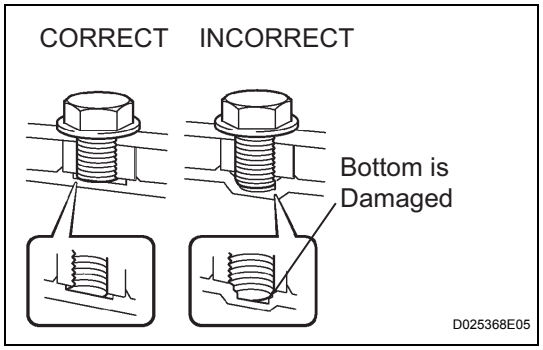
(c) Replace the ATF in the torque converter clutch.

(1) If the ATF is discolored and/or has a foul odor, stir the ATF in the torque converter clutch thoroughly and drain the ATF with the torque converter facing upward.

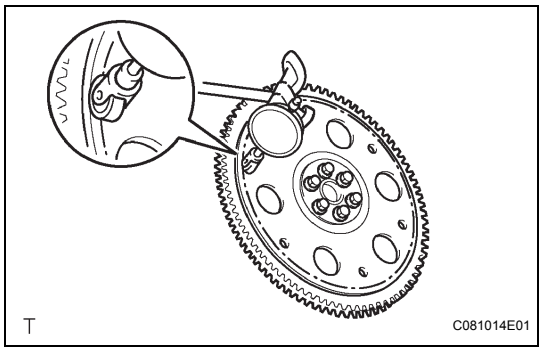
AX



(d) Clean and check the oil cooler and oil pipe line.
  (1) If the torque converter clutch is inspected or the ATF is replaced, clean the oil cooler and oil pipe line.
    • Apply compressed air of 196 kPa (2 kgf/cm^2, 28 psi) into the inlet hose.
    • If a large amount of powder is found in the ATF, add new ATF using a bucket pump and clean the oil cooler and oil pipe line again.
  (2) If the ATF is cloudy, inspect the oil cooler (radiator).



(e) Prevent deformation of the torque converter clutch and damage to the oil pump gear.
  (1) When any marks due to interference are found on the end of the bolt for the torque converter clutch and on the bottom of the bolt hole, replace the bolt and torque converter clutch.
  (2) All of the bolts should be the same length.
  (3) Make sure no spring washers are missing.



2. INSPECT DRIVE PLATE AND RING GEAR SUB-ASSEMBLY

(a) Set up a dial indicator and measure the drive plate runout.

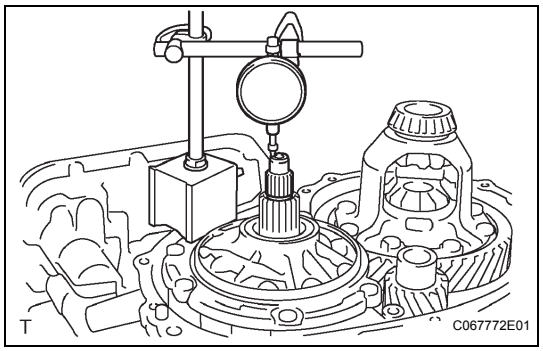
Maximum runout:
0.20 mm (0.0079 in.)

If the runout is greater than the maximum or if the ring gear is damaged, replace the drive plate. If installing a new drive plate, note the orientation of the spacers and tighten the bolts.

Torque: 88 N*m (900 kgf*cm, 65 ft.*lbf)

(b) Check the ring gear for any damage.
If the ring gear is damaged, replace the drive plate.

AX



INSPECTION

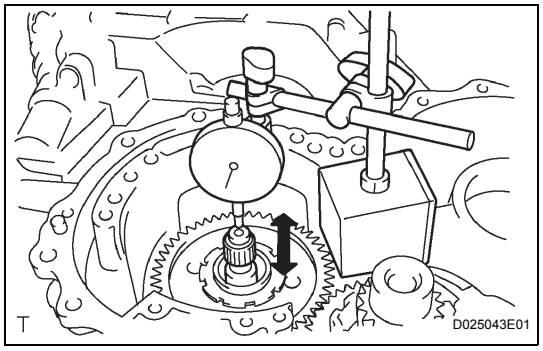
1. INSPECT INPUT SHAFT END PLAY

(a) Using a dial indicator, measure the end play in the axial direction.

Standard end play:

0.374 to 1.292 mm (0.0147 to 0.0509 in.)

If the end play is not as specified, select and replace the thrust needle roller bearing.

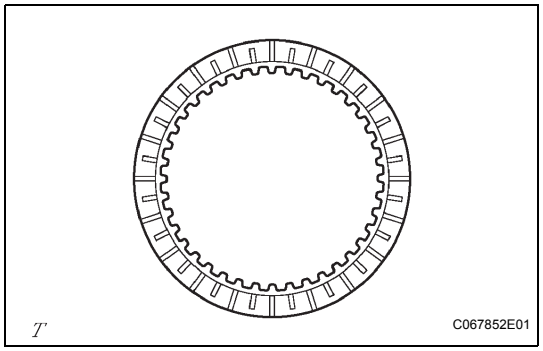


2. INSPECT INTERMEDIATE SHAFT ASSEMBLY

(a) Using a dial indicator, measure the end play of the intermediate shaft.

Standard end play:

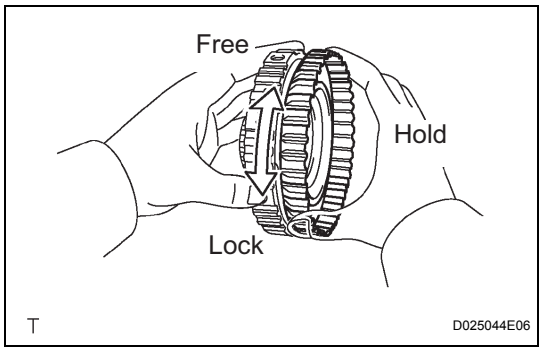
0.204 to 0.966 mm (0.008 to 0.038 in.)



3. INSPECT 2ND COAST AND OVERDRIVE BRAKE DISC

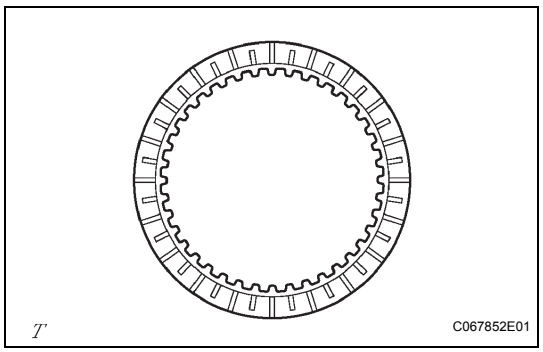
(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc is peeling off or discolored, or even if a part of the printed number is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

AX



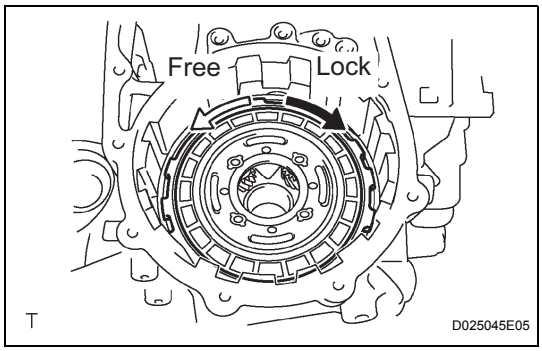
4. INSPECT 1-WAY CLUTCH ASSEMBLY

(a) Hold the rear planetary sun gear and turn the 1-way clutch. The 1-way clutch should turn freely clockwise and should lock counterclockwise.



5. INSPECT 2ND BRAKE BRAKE DISC

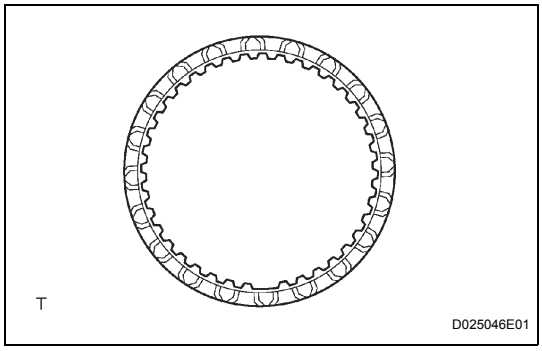
(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



6. INSPECT NO. 2 1-WAY CLUTCH

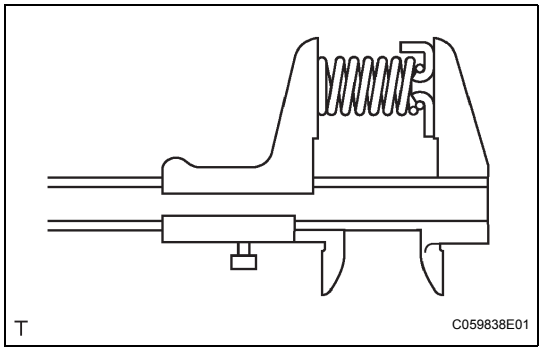
(a) Install the 1-way clutch and thrust washer to the rear planetary sun gear.

(b) Hold the rear planetary sun gear and turn the 1-way clutch. The 1-way clutch should turn freely counterclockwise and should lock clockwise.



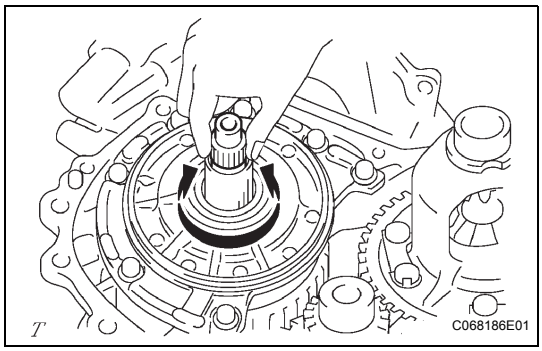
7. INSPECT 1ST AND REVERSE BRAKE DISC

(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



8. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
Standard free length:
13.96 mm (0.5496 in.)



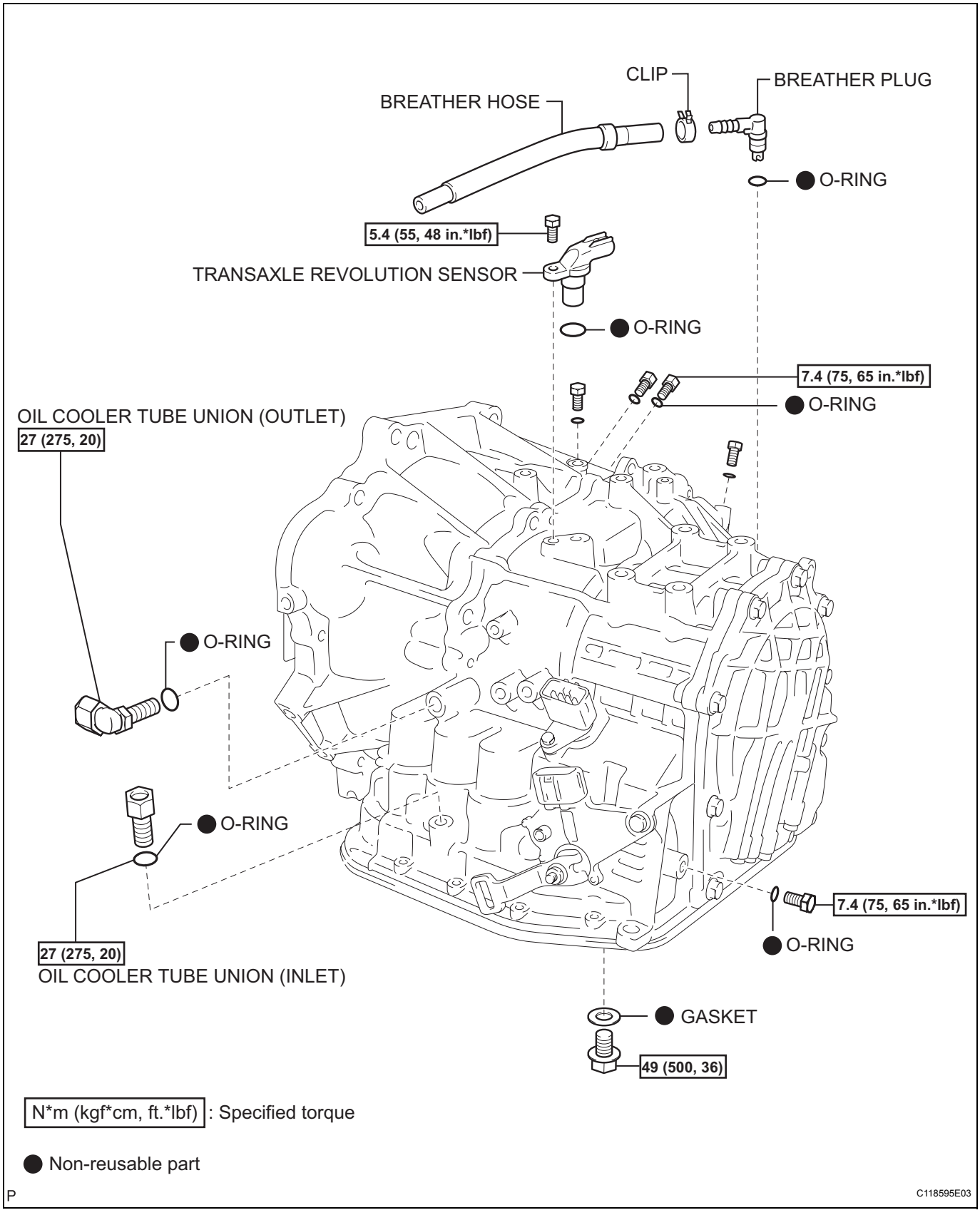
9. INSPECT INPUT SHAFT ASSEMBLY

(a) Make sure that the input shaft turns smoothly.

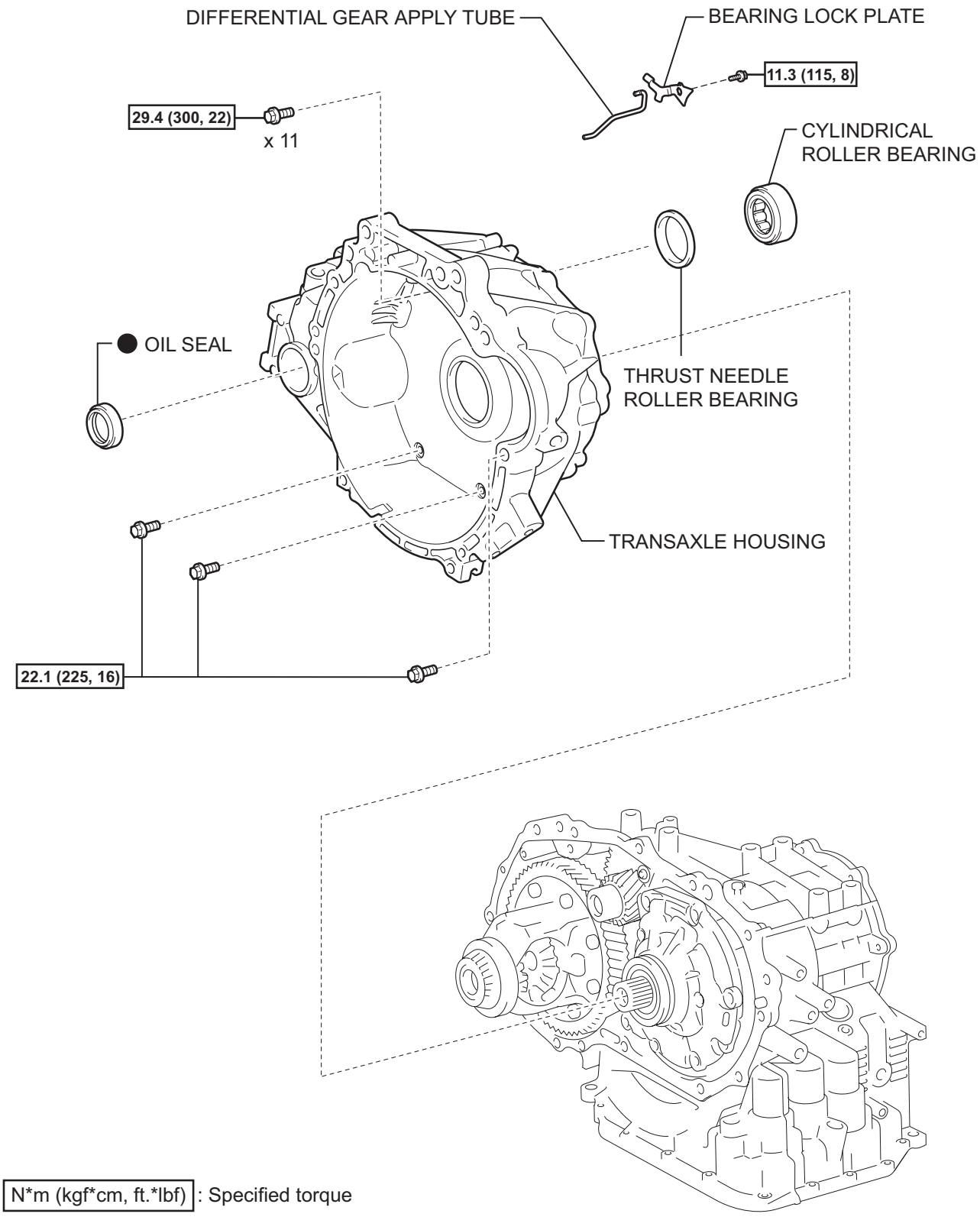
AX

AUTOMATIC TRANSAXLE UNIT

COMPONENTS



AX



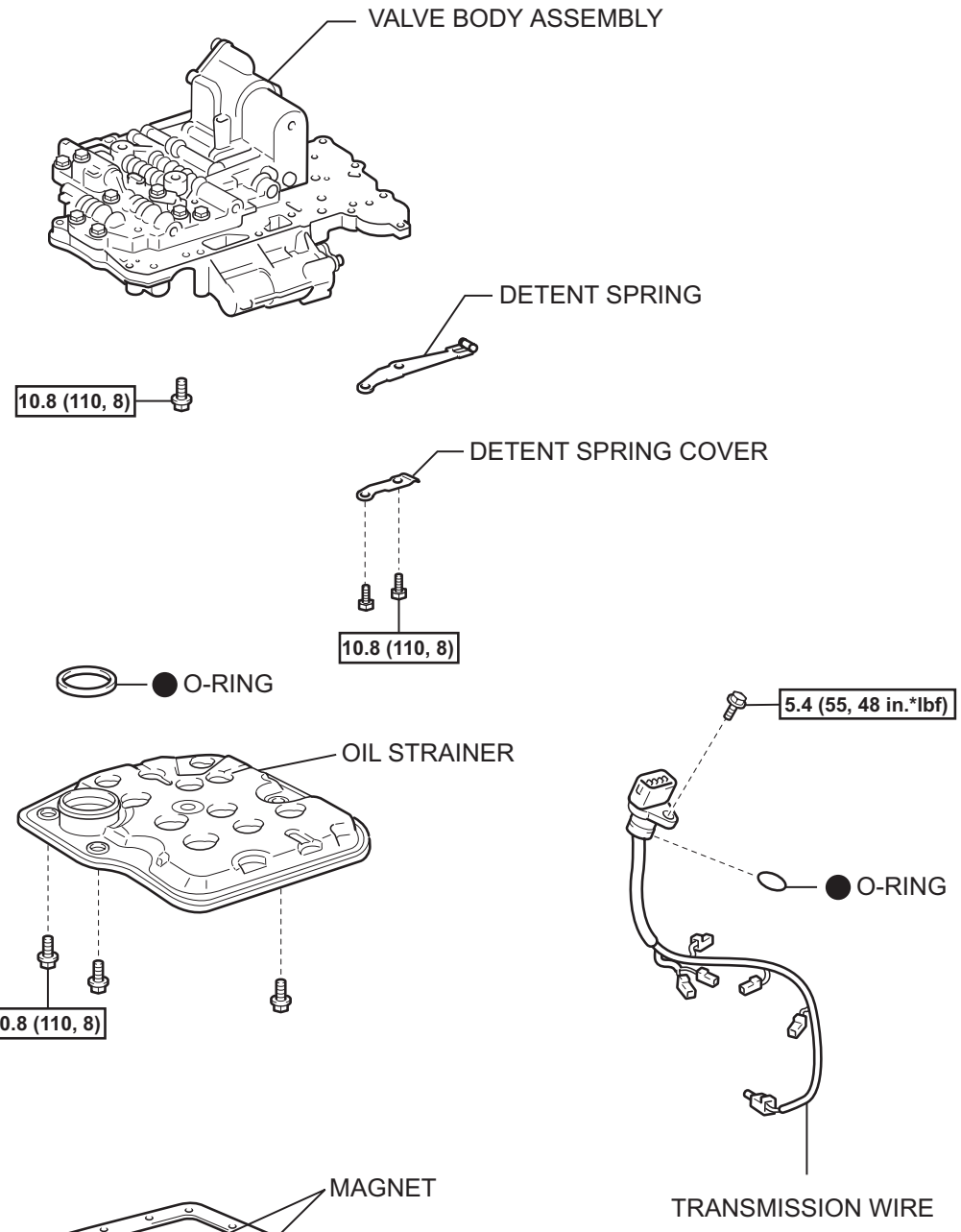
AX

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

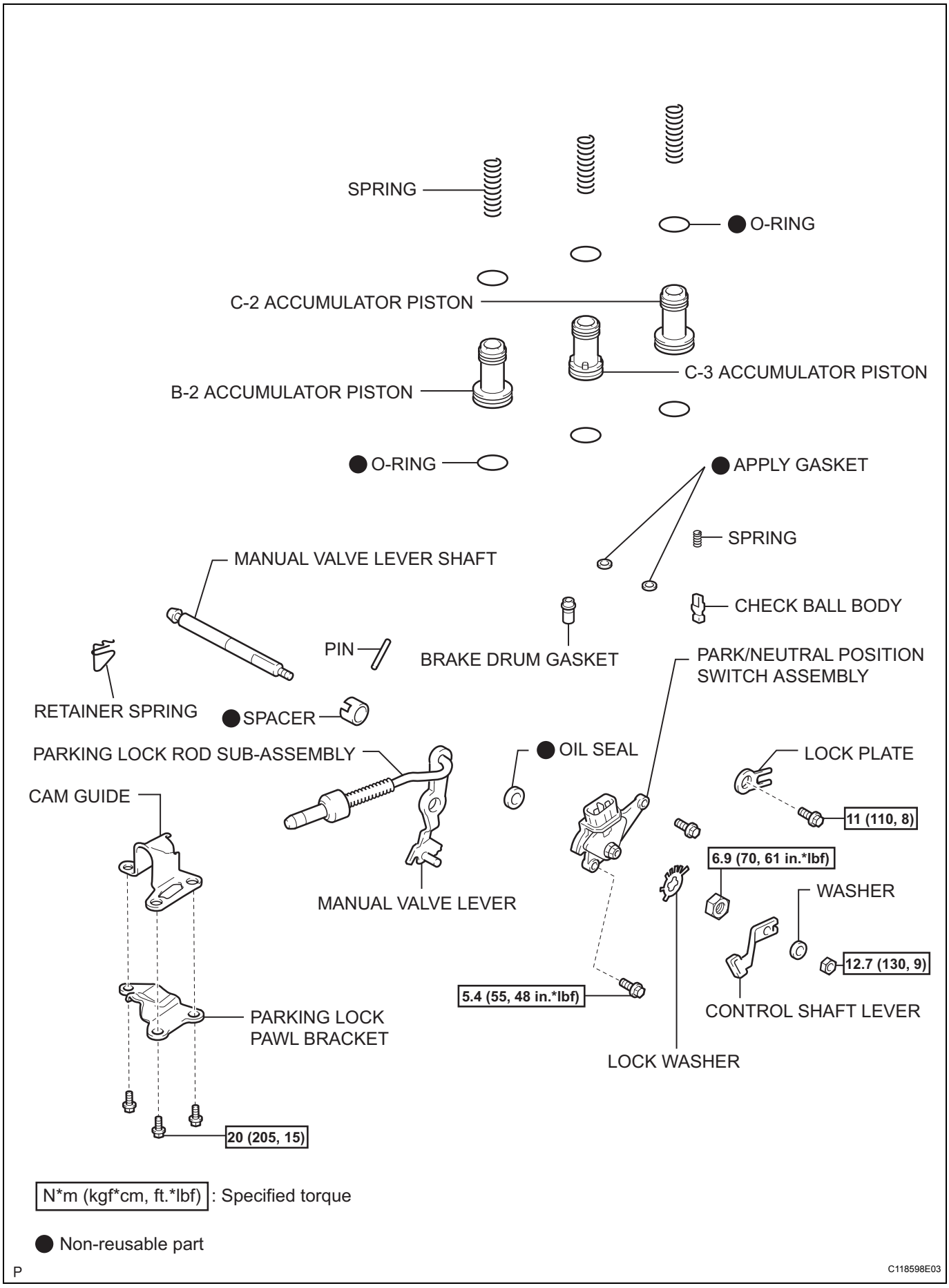
C118596E03



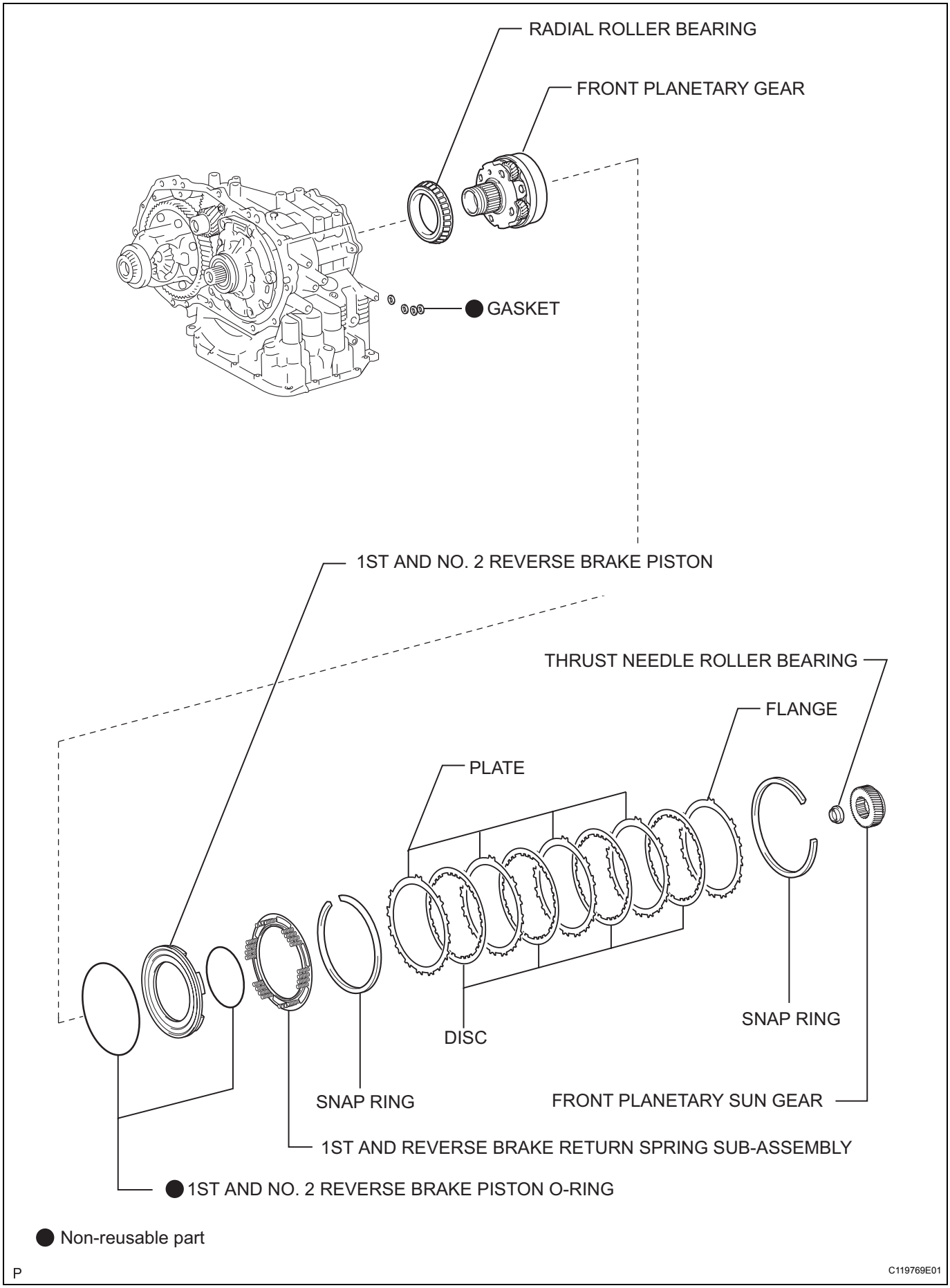
AX

P

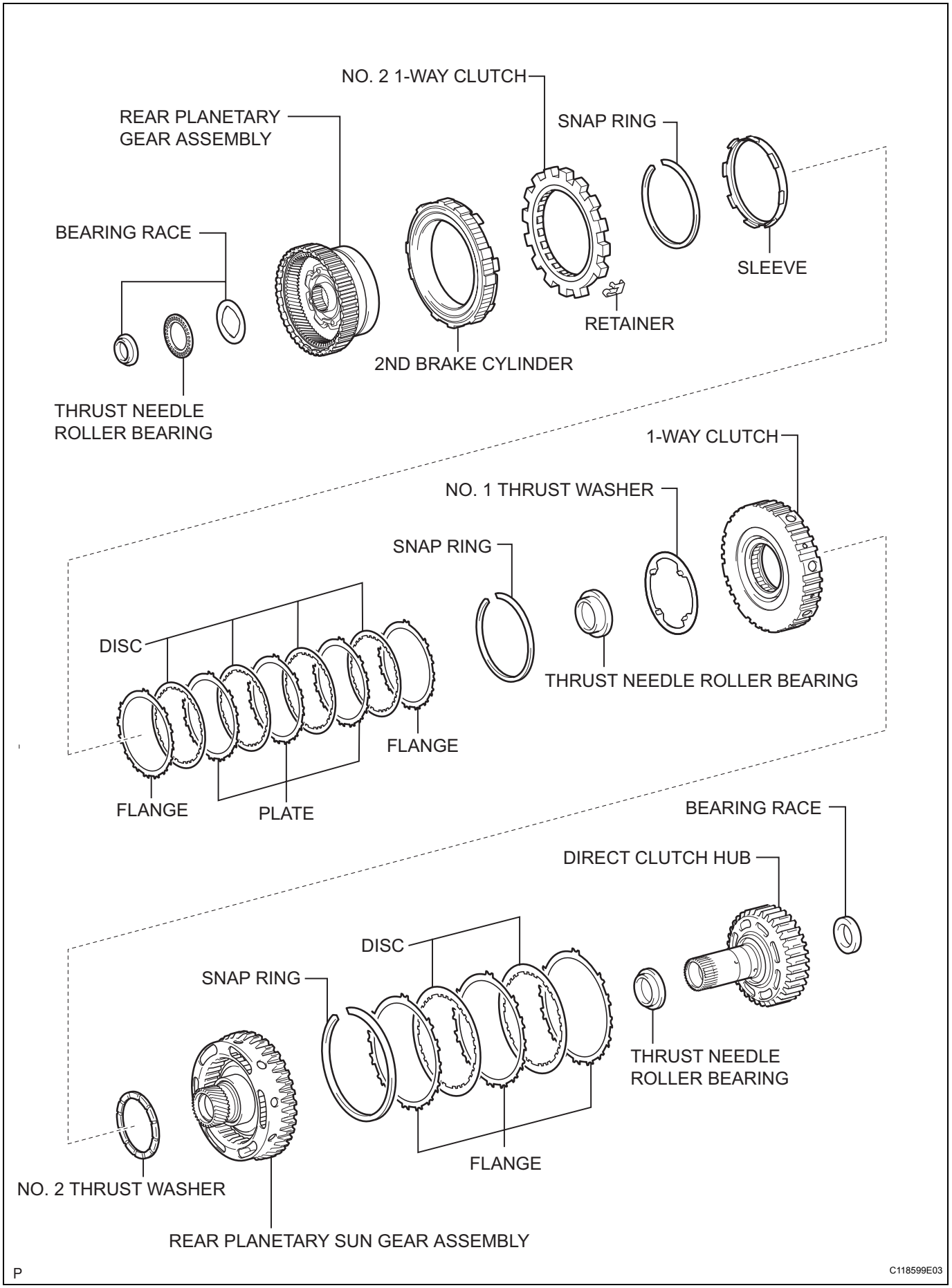
C118597E03


SPRING
O-RING
C-2 ACCUMULATOR PISTON
C-3 ACCUMULATOR PISTON
B-2 ACCUMULATOR PISTON
O-RING
APPLY GASKET
SPRING
MANUAL VALVE LEVER SHAFT
CHECK BALL BODY
PIN
BRAKE DRUM GASKET
PARK/NEUTRAL POSITION SWITCH ASSEMBLY
RETAINER SPRING
SPACER
PARKING LOCK ROD SUB-ASSEMBLY
OIL SEAL
LOCK PLATE
CAM GUIDE
11 (110, 8)
6.9 (70, 61 in.*lbf)
WASHER
MANUAL VALVE LEVER
12.7 (130, 9)
5.4 (55, 48 in.*lbf)
CONTROL SHAFT LEVER
PARKING LOCK PAWL BRACKET
LOCK WASHER
20 (205, 15)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P
C118598E03

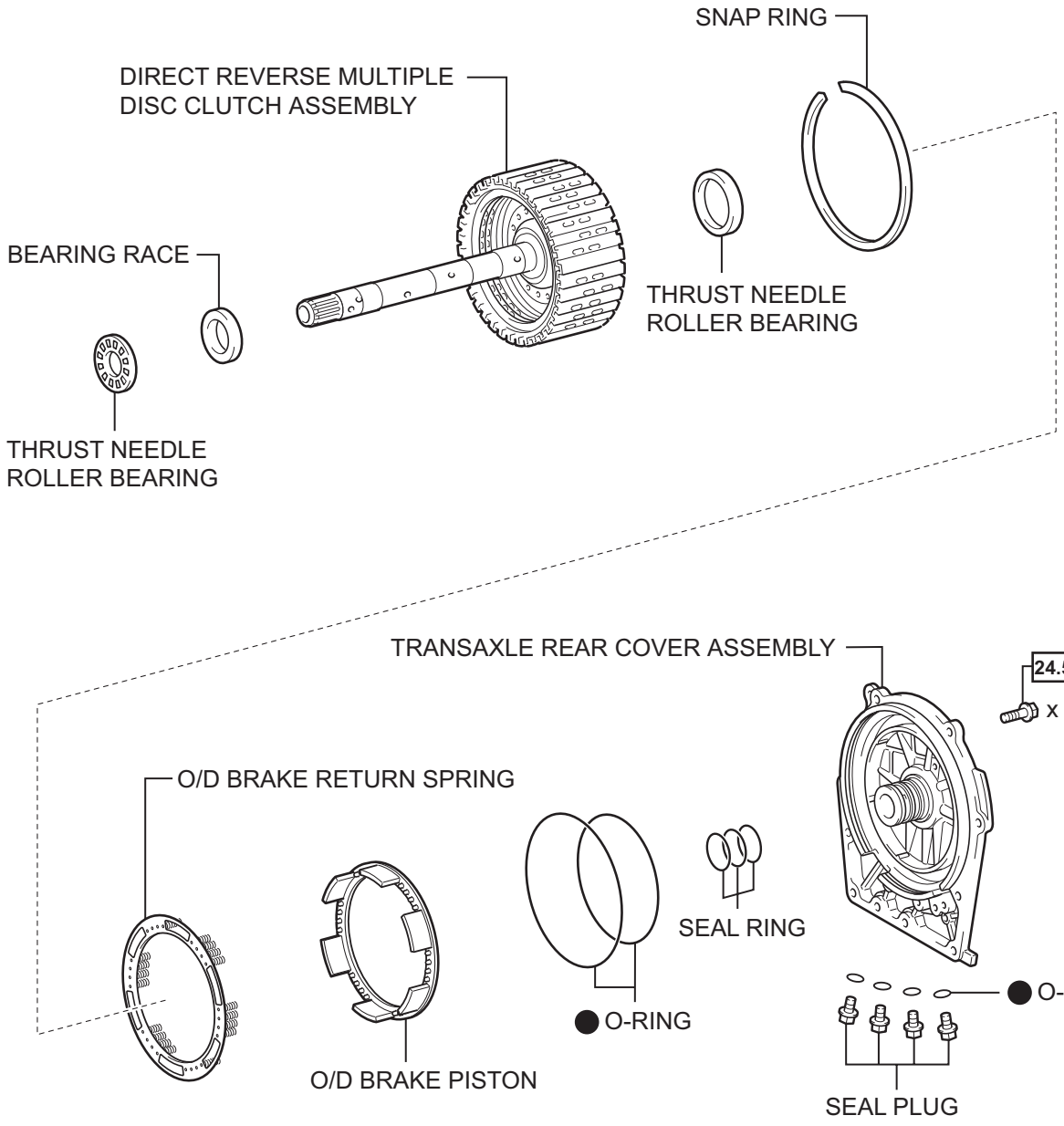
AX


RADIAL ROLLER BEARING
FRONT PLANETARY GEAR
GASKET
1ST AND NO. 2 REVERSE BRAKE PISTON
THRUST NEEDLE ROLLER BEARING
FLANGE
PLATE
DISC
SNAP RING
SNAP RING
FRONT PLANETARY SUN GEAR
1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY
1ST AND NO. 2 REVERSE BRAKE PISTON O-RING
Non-reusable part
P
C119769E01

AX


NO. 2 1-WAY CLUTCH
REAR PLANETARY GEAR ASSEMBLY
SNAP RING
BEARING RACE
SLEEVE
RETAINER
2ND BRAKE CYLINDER
THRUST NEEDLE ROLLER BEARING
1-WAY CLUTCH
NO. 1 THRUST WASHER
SNAP RING
DISC
THRUST NEEDLE ROLLER BEARING
FLANGE
FLANGE
PLATE
BEARING RACE
DIRECT CLUTCH HUB
DISC
SNAP RING
THRUST NEEDLE ROLLER BEARING
FLANGE
NO. 2 THRUST WASHER
REAR PLANETARY SUN GEAR ASSEMBLY
P
C118599E03

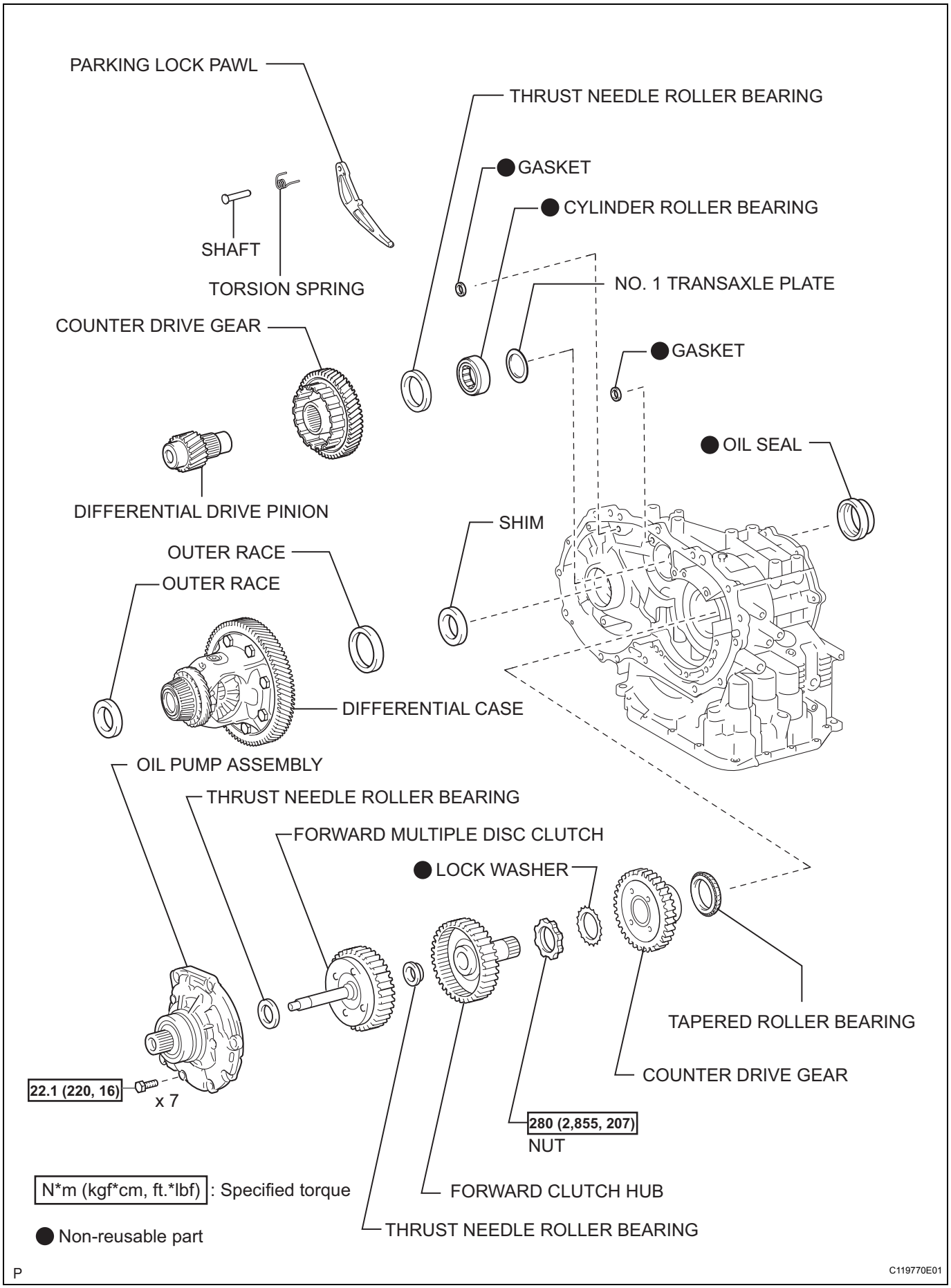
AX



N*m (kgf*cm, ft.*lbf) : Specified torque

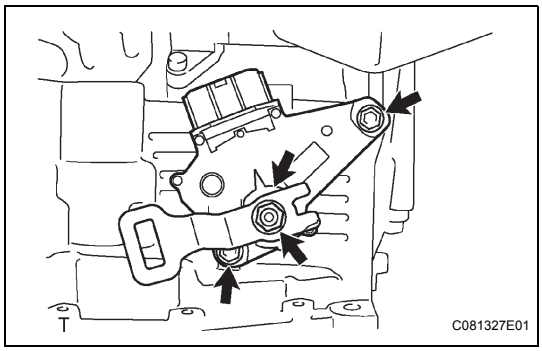
● Non-reusable part

C118600E03


PARKING LOCK PAWL
THRUST NEEDLE ROLLER BEARING
GASKET
CYLINDER ROLLER BEARING
SHAFT
TORSION SPRING
NO. 1 TRANSAXLE PLATE
COUNTER DRIVE GEAR
GASKET
OIL SEAL
DIFFERENTIAL DRIVE PINION
SHIM
OUTER RACE
OUTER RACE
DIFFERENTIAL CASE
OIL PUMP ASSEMBLY
THRUST NEEDLE ROLLER BEARING
FORWARD MULTIPLE DISC CLUTCH
LOCK WASHER
TAPERED ROLLER BEARING
COUNTER DRIVE GEAR
22.1 (220, 16)
x 7
280 (2,855, 207)
NUT
N*m (kgf*cm, ft.*lbf) : Specified torque
FORWARD CLUTCH HUB
Non-reusable part
THRUST NEEDLE ROLLER BEARING
P
C119770E01

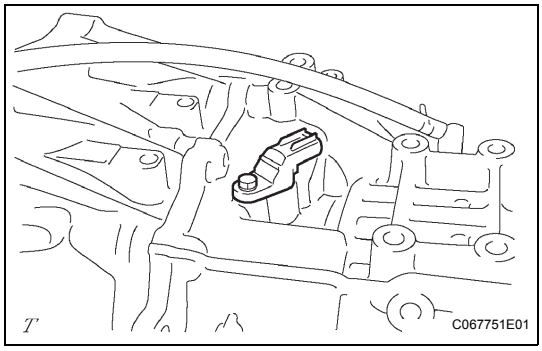
AX

DISASSEMBLY



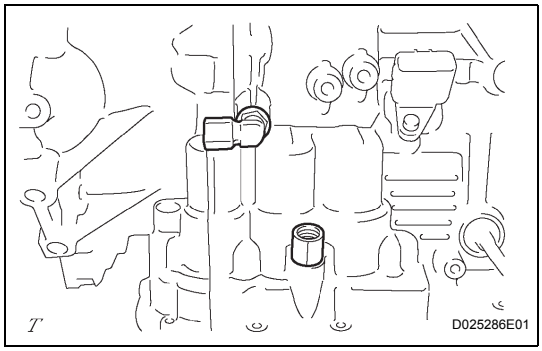
1. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Remove the nut, washer and control shaft lever.
(b) Using a screwdriver, unstake the lock nut and remove the lock washer and lock nut.
(c) Remove the 2 bolts and pull out the position switch.



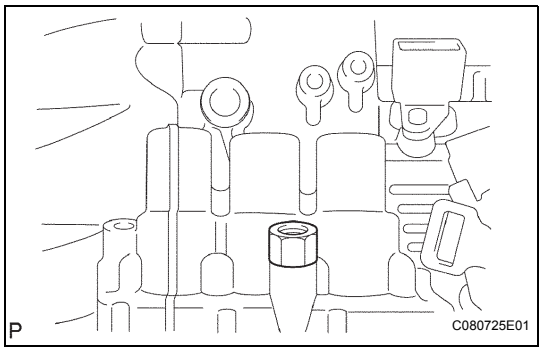
2. REMOVE TRANSMISSION REVOLUTION SENSOR

(a) Remove the bolt and transmission revolution sensor.



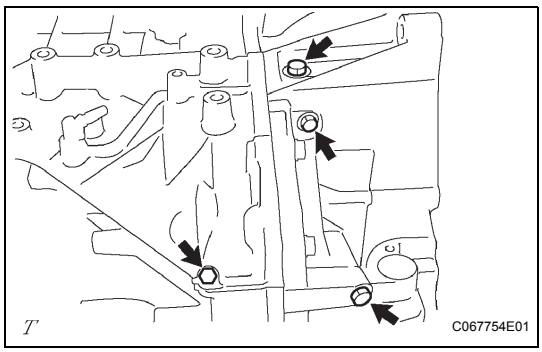
3. REMOVE OIL COOLER TUBE UNION (OUTLET)

(a) Remove the oil cooler tube union.
(b) Remove the O-ring from the oil cooler tube union.



4. REMOVE OIL COOLER TUBE UNION (INLET)

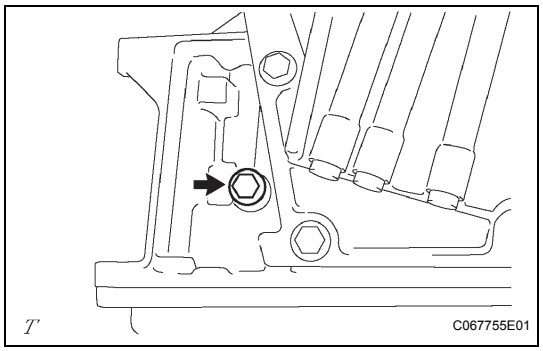
(a) Remove the oil cooler tube union.
(b) Remove the O-ring from the oil cooler tube union.



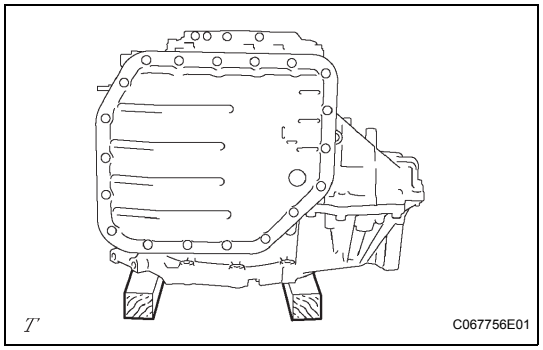
5. REMOVE NO. 1 TRANSAXLE CASE PLUG

(a) Remove the 4 case plugs from the transaxle housing and transaxle case.

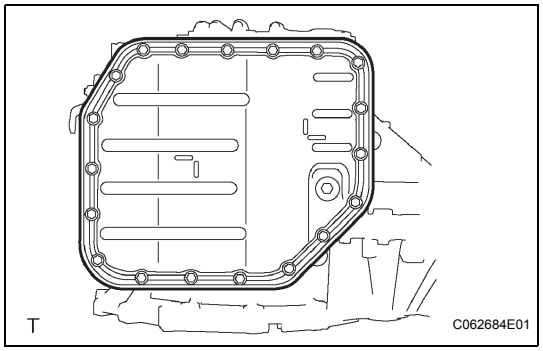
AX



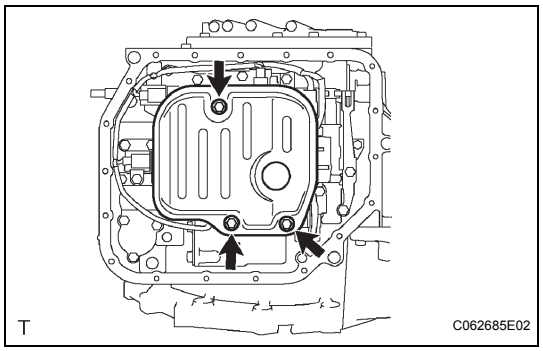
(b) Remove the case plug from the transaxle case.
(c) Remove the 5 O-rings from the case plugs.



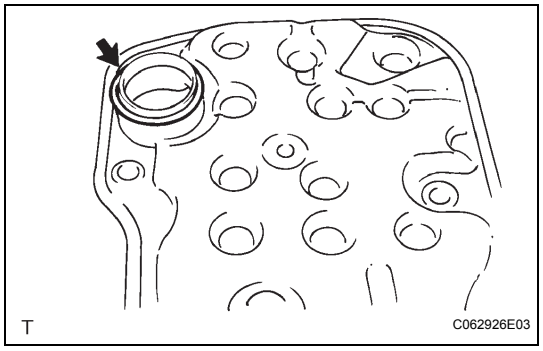
6. PLACE AUTOMATIC TRANSAXLE ASSEMBLY
NOTICE:
Be careful not to damage the oil seal.



7. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY
(a) Remove the drain plug and gasket from the oil pan.
(b) Remove the 19 bolts.
(c) Remove the oil pan and gasket.

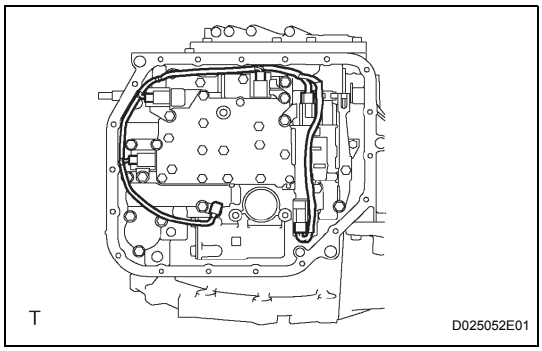


8. REMOVE VALVE BODY OIL STRAINER ASSEMBLY
(a) Remove the 3 bolts and oil strainer.



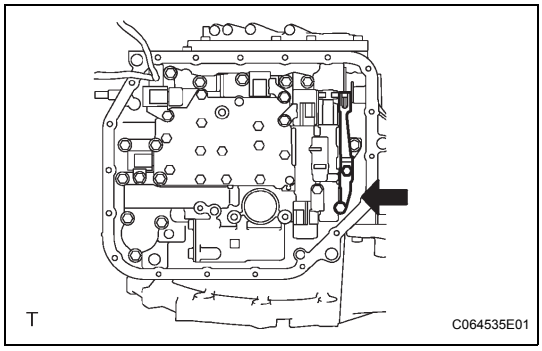
(b) Remove the O-ring from the oil strainer.

AX

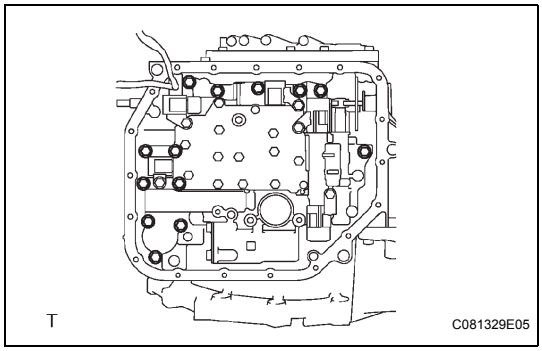


9. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

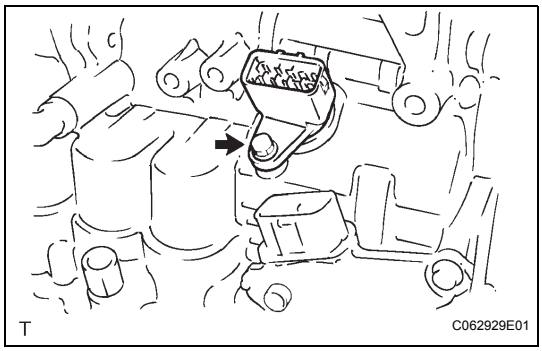
(a) Disconnect the 5 solenoid connectors.
(b) Remove the bolt, lock plate and ATF temperature sensor.
(c) Remove the O-ring from the ATF temperature sensor.



(d) Remove the 2 bolts, detent spring cover and detent spring.

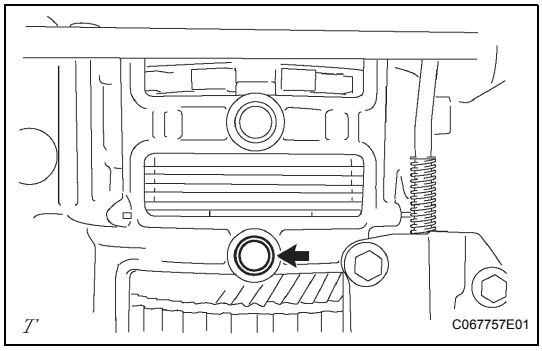


(e) Remove 13 bolts and valve body.



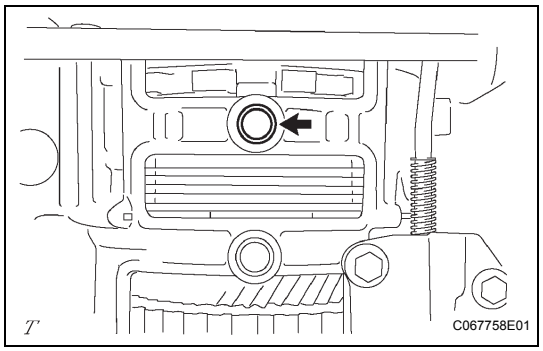
10. REMOVE TRANSMISSION WIRE

(a) Remove the bolt.
(b) Remove the transmission wire from the transaxle case.
(c) Remove the O-ring from the transmission wire.

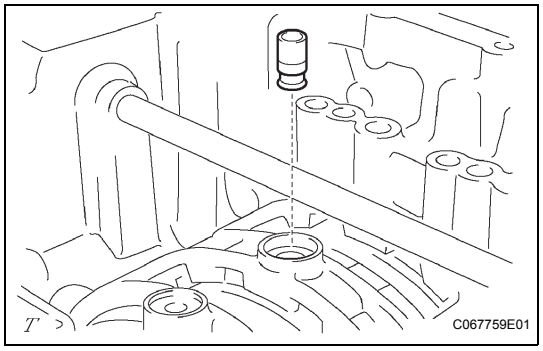


11. REMOVE TRANSAXLE CASE 2ND BRAKE GASKET

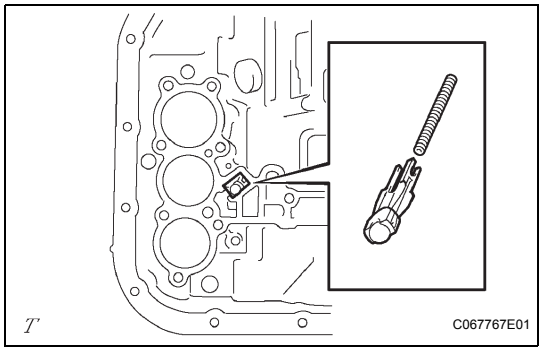
AX



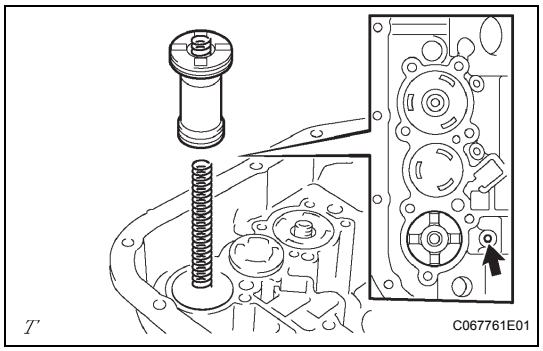
12. REMOVE TRANSAXLE CASE GASKET



13. REMOVE BRAKE DRUM GASKET

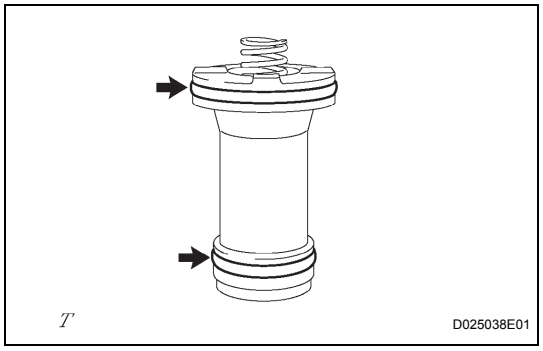


14. REMOVE CHECK BALL BODY



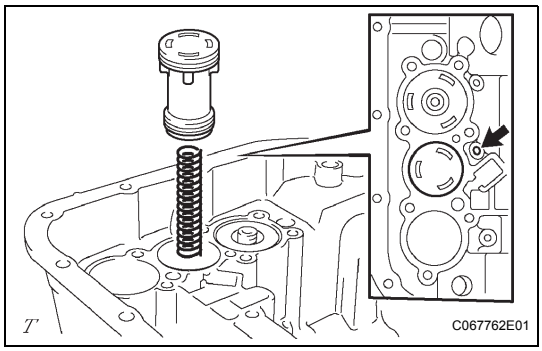
15. REMOVE B-2 ACCUMULATOR PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the B-2 accumulator piston and spring.
Remove the spring.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



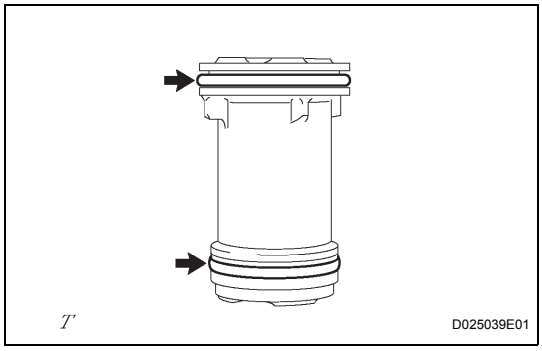
(b) Remove the 2 O-rings from the B-2 accumulator piston.

AX

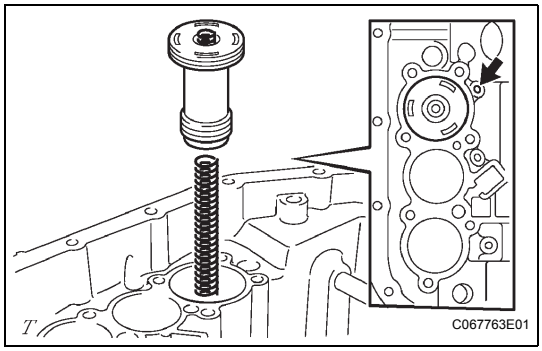


16. REMOVE C-3 ACCUMULATOR PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C-3 accumulator piston and spring.
Remove the spring.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**

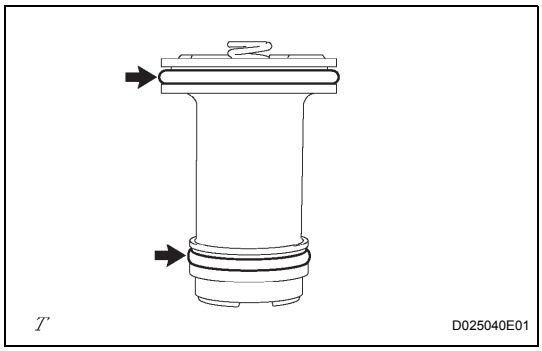


(b) Remove the 2 O-rings from the C-3 accumulator piston.

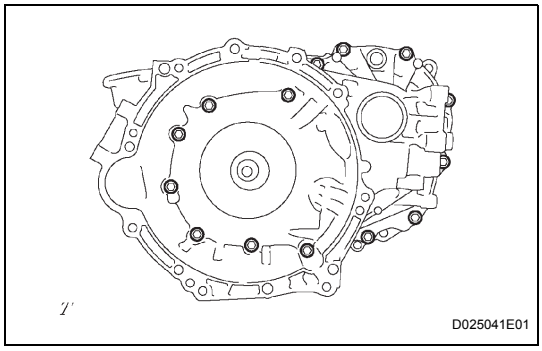


17. REMOVE C-2 ACCUMULATOR PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C-2 accumulator piston and spring.
Remove the spring.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



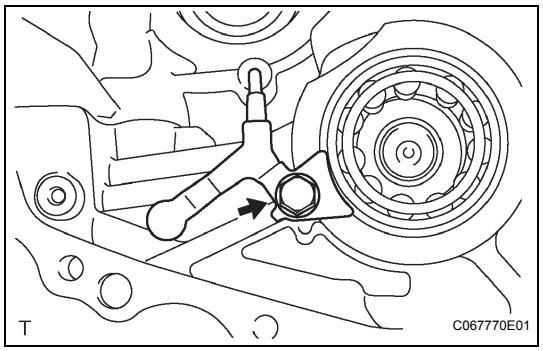
(b) Remove the 2 O-rings from the C-2 accumulator piston.



18. REMOVE TRANSAXLE HOUSING

(a) Remove the 14 bolts.
(b) Tap on the circumference of the transaxle housing with a plastic-faced hammer to remove the transaxle housing from the transaxle case.
NOTICE:
When removing the transaxle housing, do not accidentally remove the differential gear assembly.

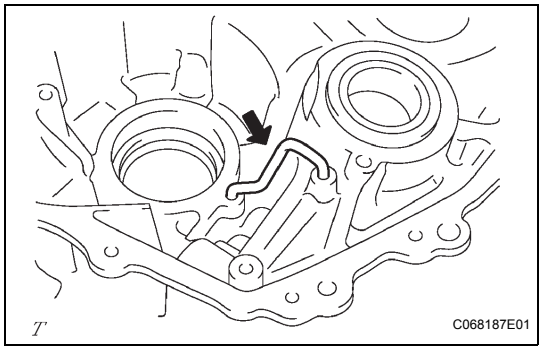
AX



19. REMOVE BEARING LOCK PLATE

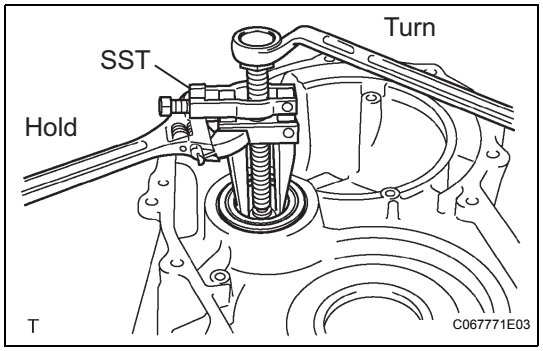
(a) Remove the bolt.

(b) Remove the bearing lock plate.



20. REMOVE DIFFERENTIAL GEAR LUBE APPLY TUBE

(a) Remove the bolt and differential gear lube apply tube from the transaxle housing.

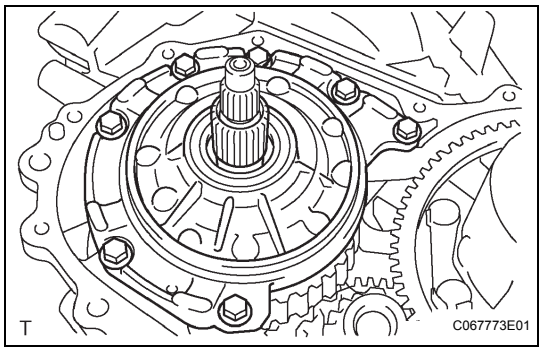


21. REMOVE FRONT DRIVE PINION FRONT TAPERED ROLLER BEARING (RH Side)

(a) Using SST, remove the RH cylindrical roller bearing from the transaxle housing.

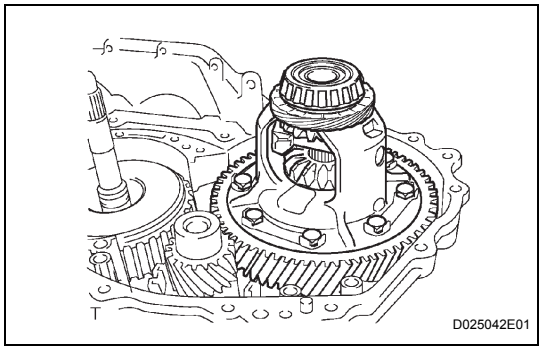
SST 09308-10010

22. INSPECT INPUT SHAFT END PLAY (See page AX-173)



23. REMOVE OIL PUMP ASSEMBLY

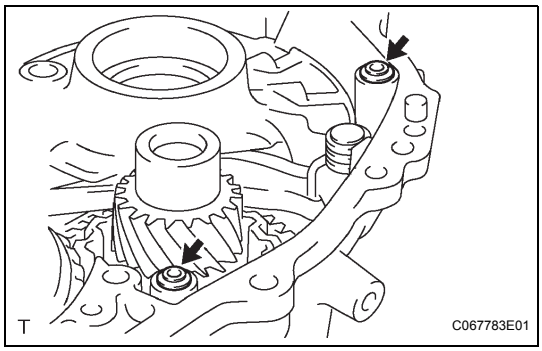
(a) Remove the 7 bolts and oil pump.



24. REMOVE DIFFERENTIAL GEAR ASSEMBLY

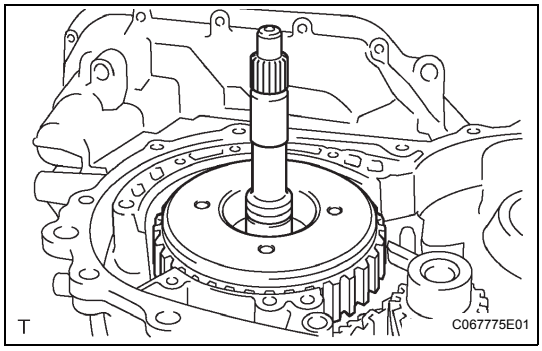
(a) Remove the differential gear.

AX



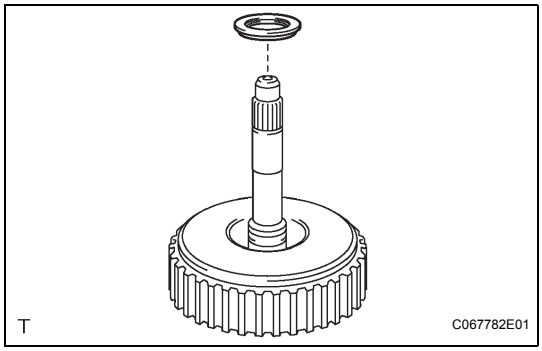
25. REMOVE OVERDRIVE BRAKE GASKET

(a) Using a screwdriver, remove the 2 overdrive brake gaskets from the transaxle case.



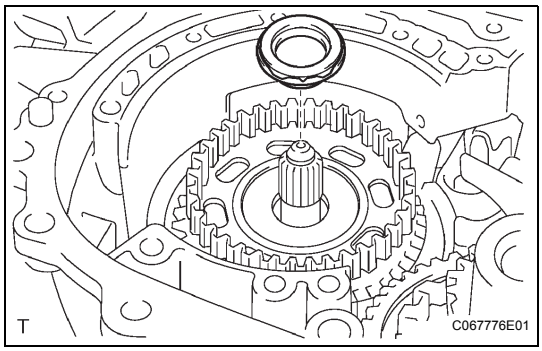
26. REMOVE INPUT SHAFT ASSEMBLY

(a) Remove the input shaft from the transaxle case.



27. REMOVE STATOR SHAFT THRUST NEEDLE ROLLER BEARING

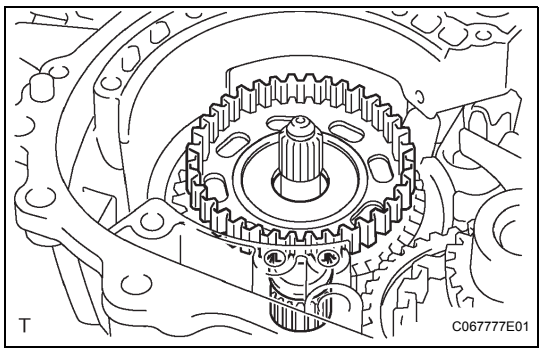
(a) Remove the thrust needle roller bearing from the input shaft.



28. REMOVE FORWARD CLUTCH HUB THRUST NEEDLE ROLLER BEARING

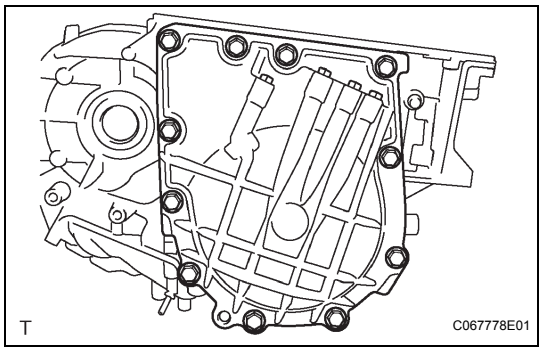
(a) Remove the thrust needle roller bearing from the forward clutch hub.

29. INSPECT INTERMEDIATE SHAFT ASSEMBLY (See page AX-173)



30. REMOVE FORWARD CLUTCH HUB SUB-ASSEMBLY

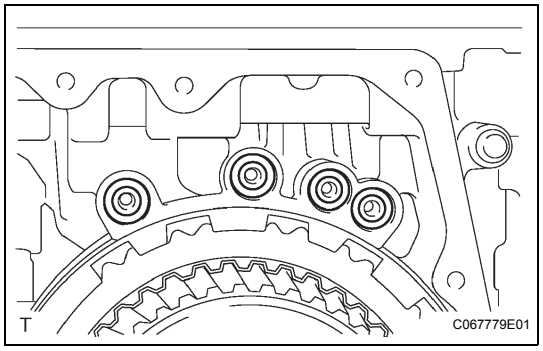
(a) Remove the forward clutch hub from the transaxle case.



31. REMOVE TRANSAXLE REAR COVER ASSEMBLY

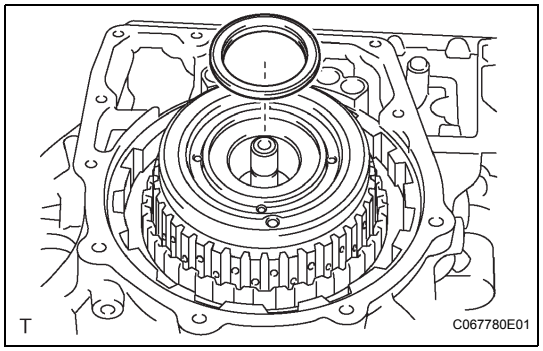
(a) Remove the 11 bolts.

(b) Tap on the circumference of the transaxle rear cover with a plastic-faced hammer to remove the transaxle rear cover from the transaxle case.



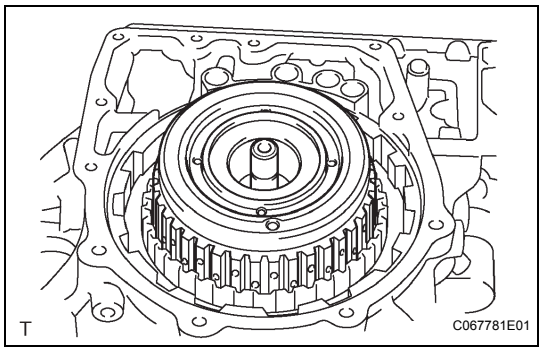
32. REMOVE TRANSAXLE CASE GASKET

(a) Remove the 4 transaxle case gaskets.



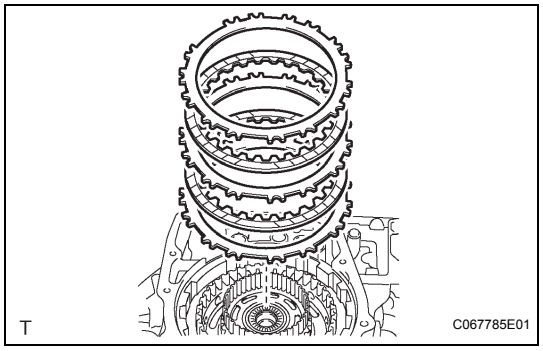
33. REMOVE REAR CLUTCH DRUM THRUST NEEDLE ROLLER BEARING

(a) Using a magnetic finger, remove the thrust needle roller bearing.



34. REMOVE INTERMEDIATE SHAFT ASSEMBLY

(a) Remove the intermediate shaft from the transaxle case.

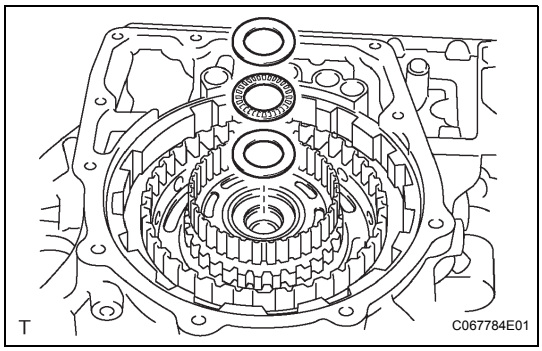


35. REMOVE 2ND COAST AND OVERDRIVE BRAKE DISC

(a) Remove the 2 flanges, 2 discs and 2 plates from the transaxle case.

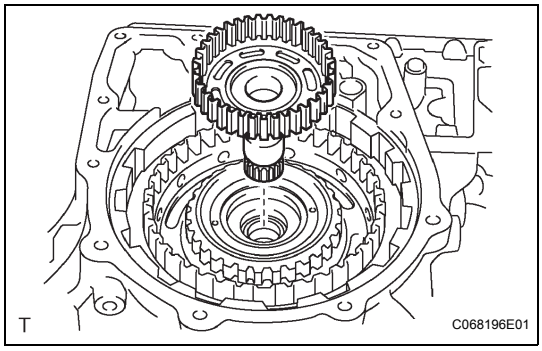
36. INSPECT 2ND COAST AND OVERDRIVE BRAKE DISC (See page AX-173)

AX



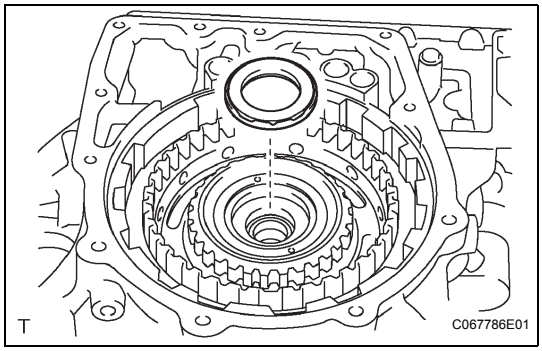
37. REMOVE THRUST NEEDLE ROLLER BEARING

(a) Using a magnetic finger, remove the C-2 hub thrust bearing race, thrust needle roller bearing and No. 3 thrust bearing race from the direct clutch hub.



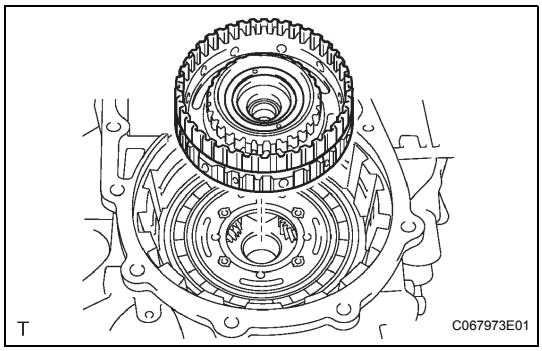
38. REMOVE DIRECT CLUTCH HUB

(a) Remove the direct clutch hub from the transaxle case.



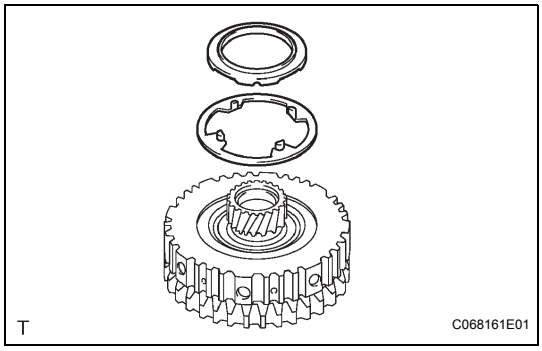
39. REMOVE REAR PLANETARY SUN GEAR, NO. 2 THRUST NEEDLE BEARING

(a) Using a magnetic finger, remove the thrust bearing from the rear thrust needle bearing.



40. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

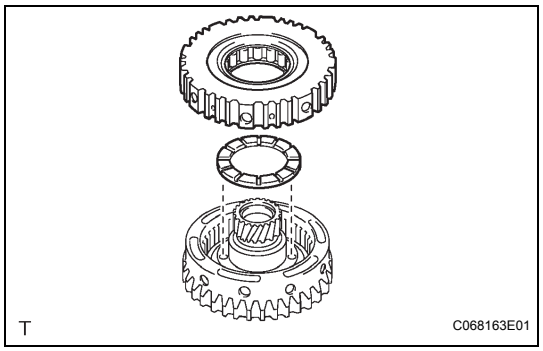
(a) Remove the rear planetary sun gear from the transaxle case.



41. REMOVE REAR PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

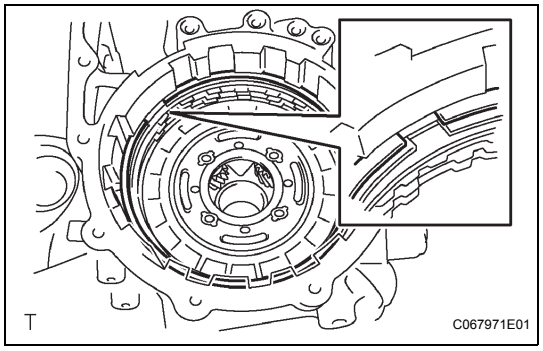
(a) Remove the rear planetary sun gear thrust needle roller bearing and No. 1 thrust washer from the rear planetary sun gear.

42. INSPECT 1-WAY CLUTCH ASSEMBLY (See page AX-173)



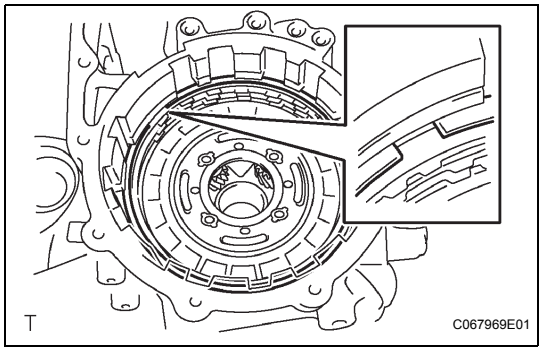
43. REMOVE 1-WAY CLUTCH ASSEMBLY

(a) Remove the 1-way clutch and planetary carrier No. 2 thrust washer from the rear planetary sun gear.



44. REMOVE 2ND COAST AND OVERDRIVE BRAKE FLANGE HOLE SNAP RING

(a) Using a screwdriver, remove the snap ring from the transaxle case.

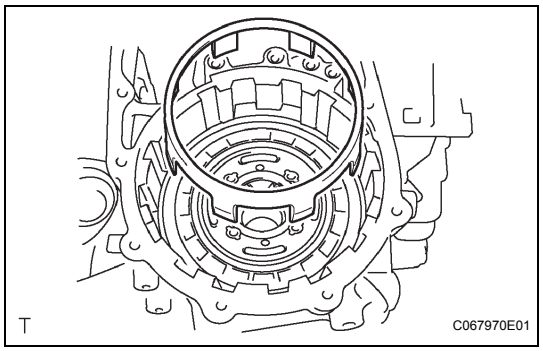


45. REMOVE 2ND BRAKE DISC

(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange, 3 discs and 3 plates from the transaxle.

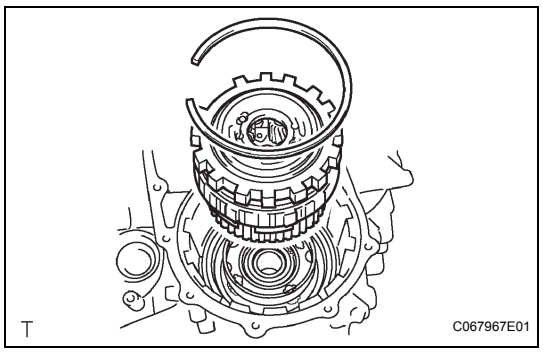
46. INSPECT 2ND BRAKE DISC (See page AX-173)



47. REMOVE 2ND BRAKE PISTON SLEEVE

(a) Remove the 2nd brake piston sleeve from the transaxle case.

48. INSPECT NO. 2 1-WAY CLUTCH (See page AX-174)

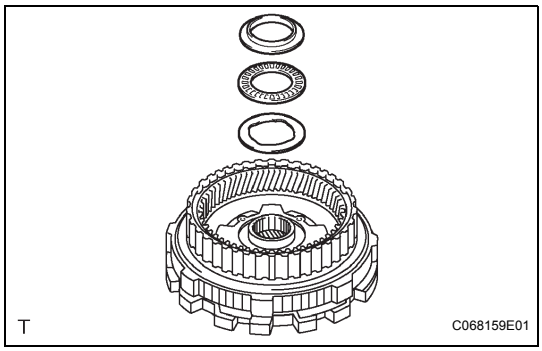


49. REMOVE REAR PLANETARY GEAR ASSEMBLY

(a) Using a screwdriver, remove the snap ring.

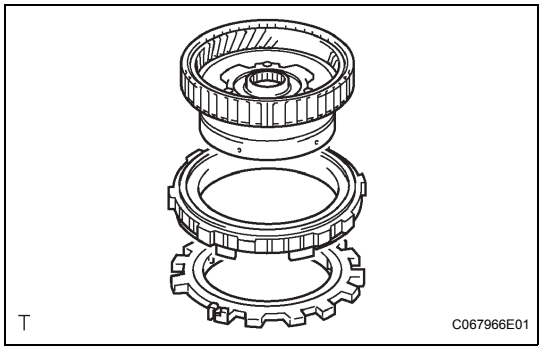
(b) Remove the rear planetary gear from the transaxle case.

AX



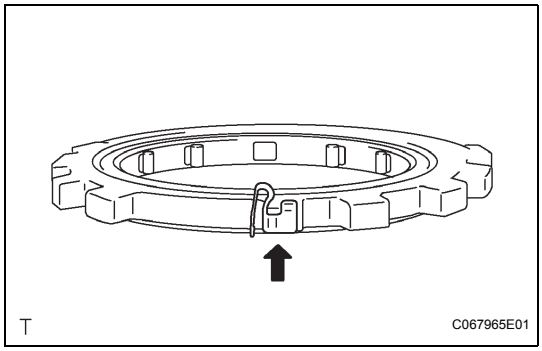
50. REMOVE PLANETARY GEAR REAR THRUST NEEDLE ROLLER BEARING

(a) Remove the thrust needle roller bearing and 2 bearing races from the rear planetary gear.



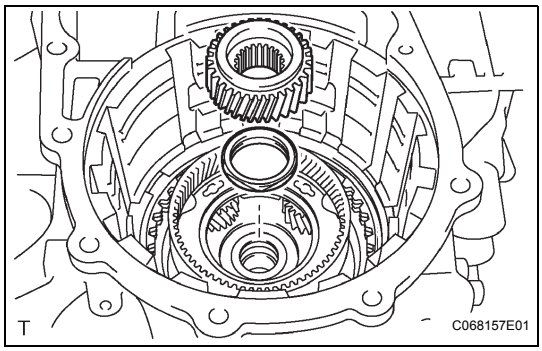
51. REMOVE NO. 2 1-WAY CLUTCH

(a) Separate the 2nd brake piston assembly, No. 2 1-way clutch and rear planetary gear.



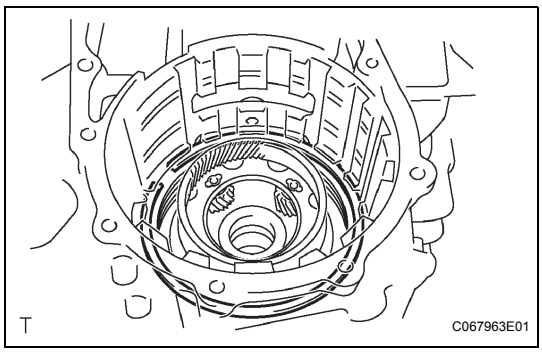
52. REMOVE OUTER RACE RETAINER

(a) Remove the retainer from the No. 2 1-way clutch.



53. REMOVE FRONT PLANETARY SUN GEAR

(a) Remove the front planetary sun gear and thrust needle roller bearing from the transaxle case.

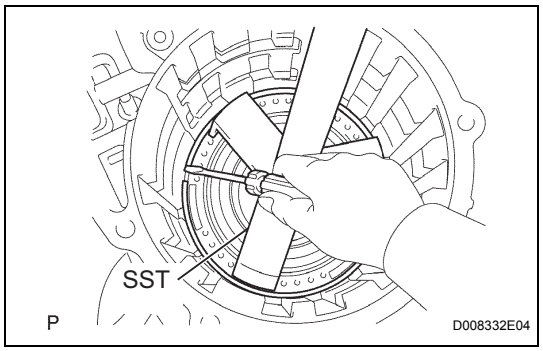


54. REMOVE 1ST AND REVERSE BRAKE DISC

(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange, 4 discs and 4 plates from the transaxle case.

55. INSPECT 1ST AND REVERSE BRAKE DISC (See page AX-174)

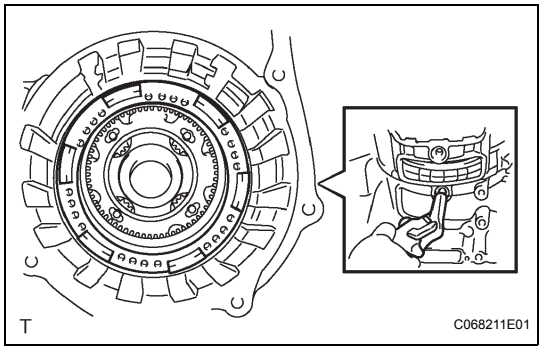


56. REMOVE 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST, a press and screwdriver, remove the snap ring.
SST 09387-00070

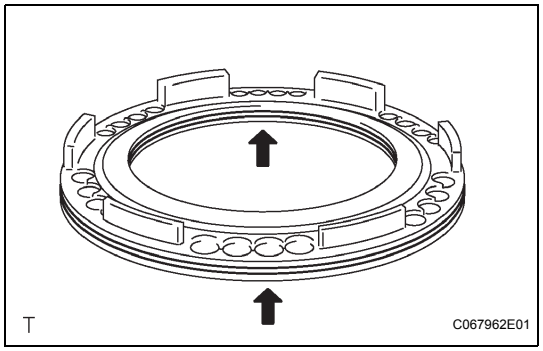
(b) Remove the 1st and reverse brake return spring sub-assembly.

57. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-174)



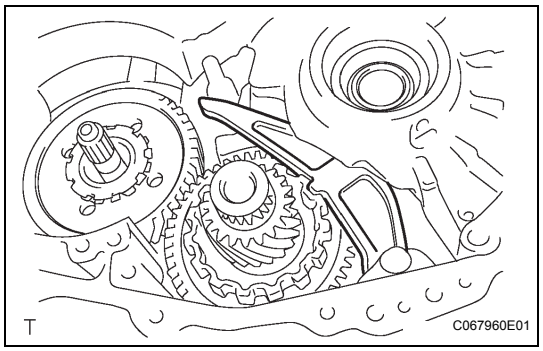
58. REMOVE 1ST AND NO. 2 REVERSE BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove the 1st and reverse brake piston.
NOTICE:
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



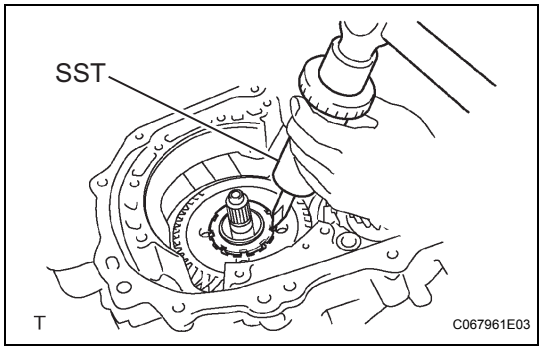
59. REMOVE 1ST AND NO. 2 REVERSE BRAKE PISTON O-RING

(a) Remove the 2 O-rings from the 1st and No. 2 reverse brake piston.



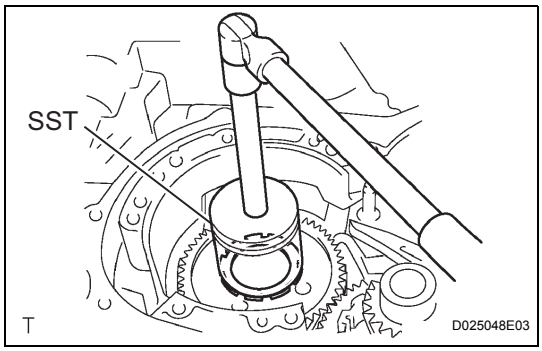
60. REMOVE COUNTER DRIVE GEAR NUT

(a) Fix the counter driven gear with the parking lock pawl.

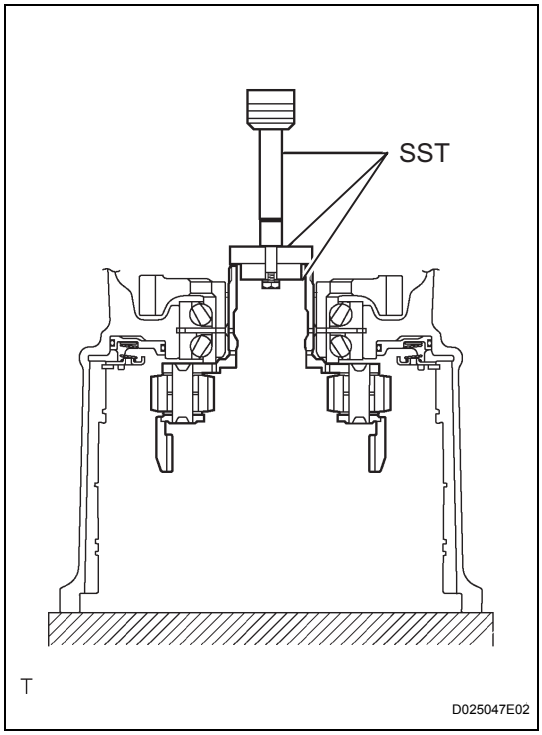


(b) Using SST and a hammer, unstake the lock washer.
SST 09930-00010

AX

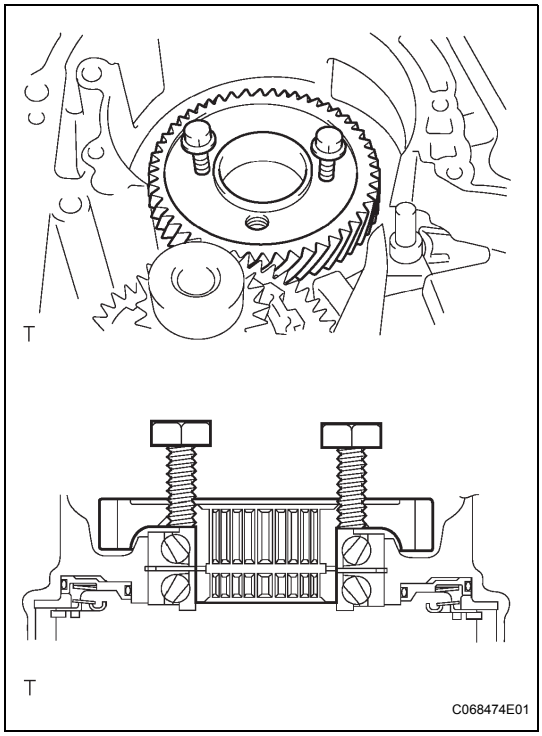


(c) Using SST, remove the nut and lock washer.
SST 09387-00120



61. REMOVE PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, press out the planetary gear from the transaxle case.
SST 09950-60010 (09951-00400, 09951-00320, 09952-06010), 09950-70010 (09951-07100)



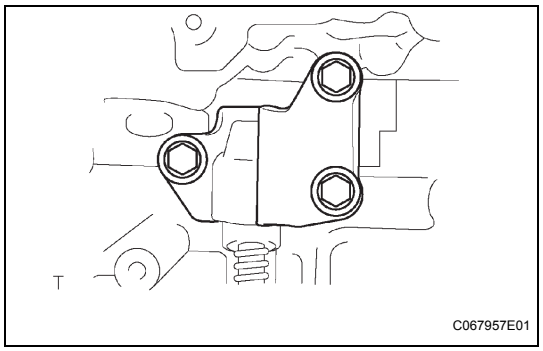
62. REMOVE COUNTER DRIVE GEAR

(a) Install the 2 bolts to the counter drive gear.
Bolt (M6):
Length = 40 to 80 mm
Pitch = 1.0 mm

(b) Rotate the 2 bolts in order and remove the counter drive gear and front planetary sun gear.

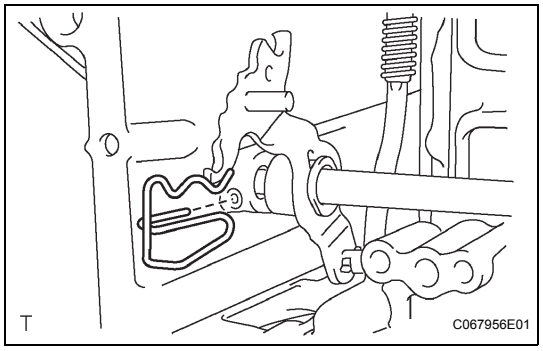
(c) Remove the 2 radial ball bearings from the counter drive gear and front planetary sun gear.

AX



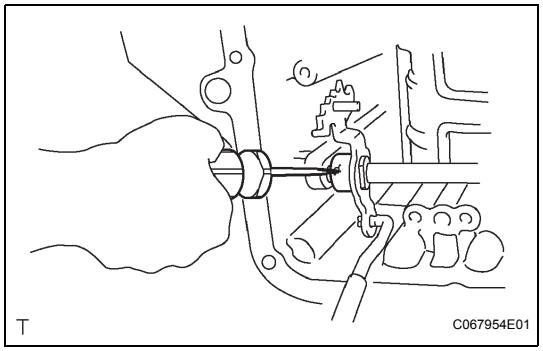
63. REMOVE PARKING LOCK PAWL BRACKET

(a) Remove the 3 bolts, cam guide and bracket.



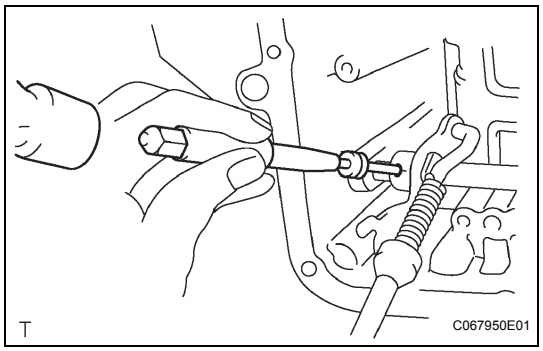
64. REMOVE MANUAL VALVE LEVER SHAFT RETAINER SPRING

(a) Remove the retainer spring.



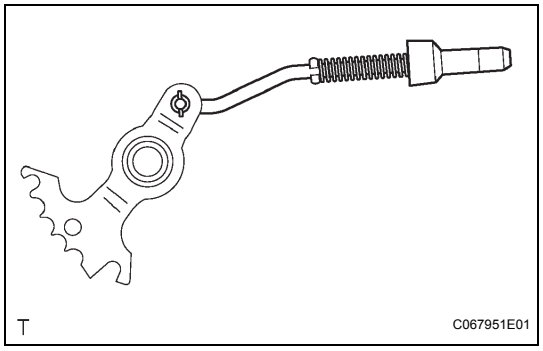
65. REMOVE MANUAL VALVE LEVER SUB-ASSEMBLY

(a) Using a screwdriver, unstake and remove the spacer.



(b) Using a pin punch and hammer, tap out the pin.

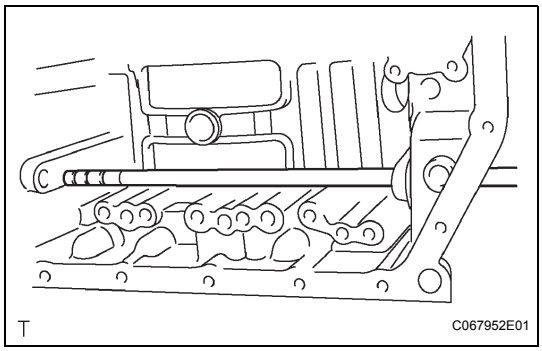
(c) Remove the manual valve lever shaft and manual valve lever.



66. REMOVE PARKING LOCK ROD SUB-ASSEMBLY

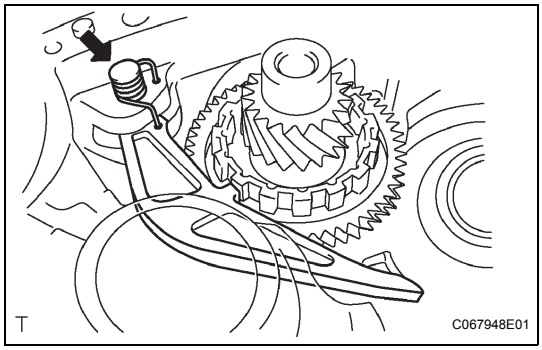
(a) Remove the parking lock rod from the manual valve lever.

AX



67. REMOVE MANUAL VALVE LEVER SHAFT

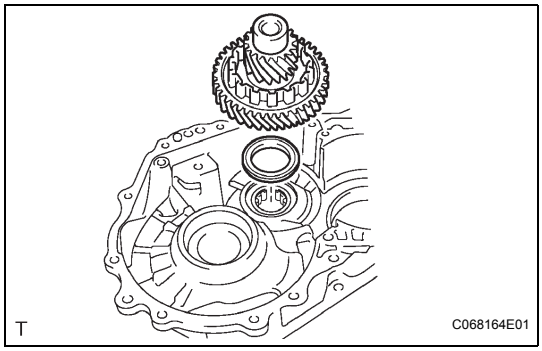
(a) Remove the manual valve lever shaft from the transaxle case.



68. REMOVE PARKING LOCK PAWL

(a) Using a screwdriver, remove the parking lock pawl shaft.

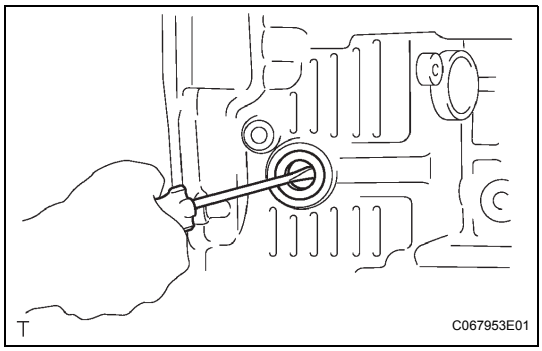
(b) Remove the torsion spring and parking lock pawl.



69. REMOVE COUNTER DRIVEN GEAR

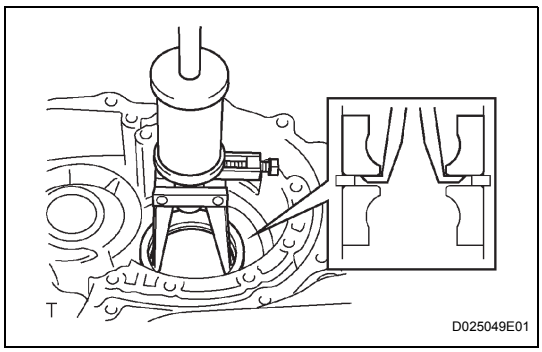
(a) Remove the counter driven gear, drive pinion and thrust needle roller bearing from the transaxle case.

AX



70. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

(a) Using a screwdriver, pry out the oil seal.

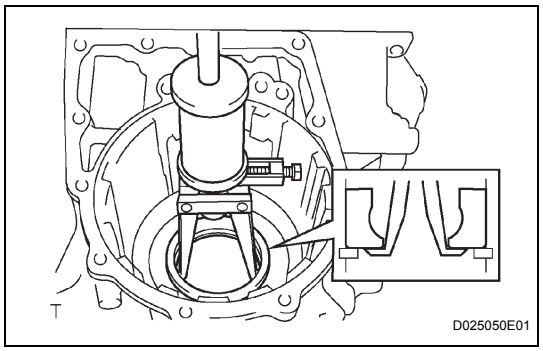


71. REMOVE COUNTER DRIVE GEAR BEARING

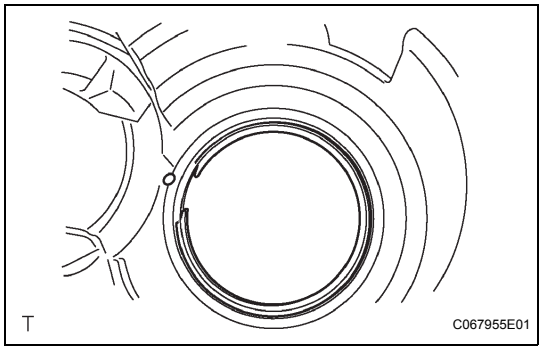
(a) Remove the 2 counter drive gear bearing inner races RH from the transaxle case.

(b) Using SST, remove the counter drive gear bearing LH outer race from the transaxle case.

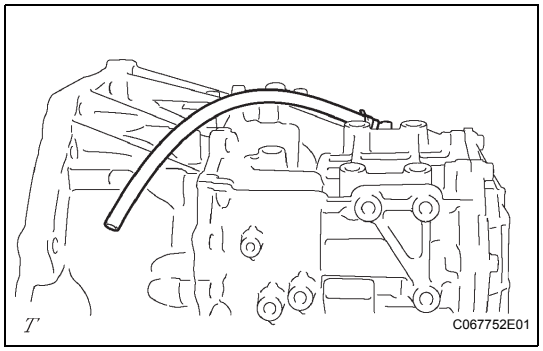
SST 09308-00010



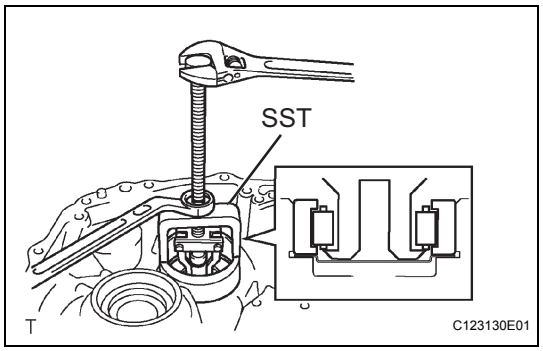
(c) Using SST, remove the counter drive gear bearing RH outer race from the transaxle case.
SST 09308-00010



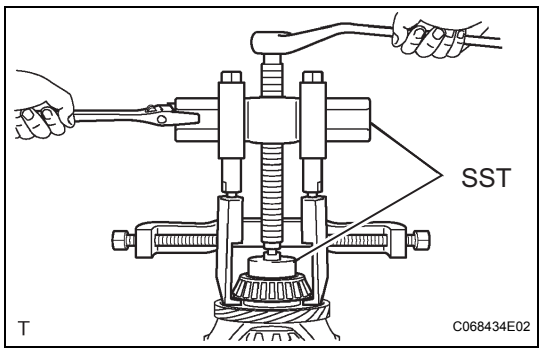
72. REMOVE COUNTER DRIVE GEAR HOLE SNAP RING
(a) Using a screwdriver, remove the counter drive gear hole snap ring from the transaxle case.



73. REMOVE BREATHER PLUG HOSE

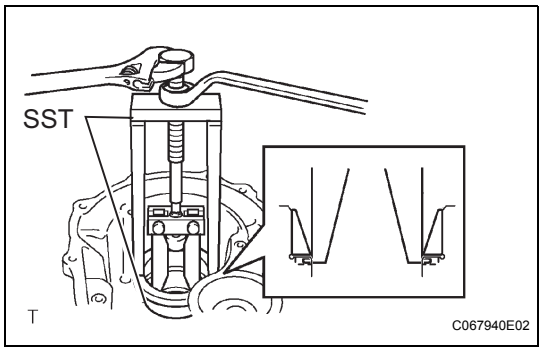


74. REMOVE FRONT DRIVE PINION REAR TAPERED ROLLER BEARING (for LH Side)
(a) Using SST, remove the drive pinion roller bearing from the transaxle case.
SST 09612-65014 (09612-01040)
(b) Remove the No. 1 transaxle case plate.

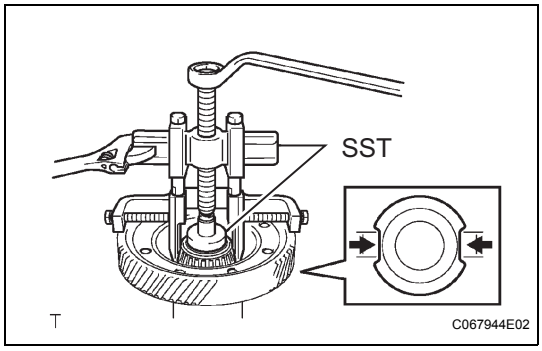


75. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING
(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00390)

AX

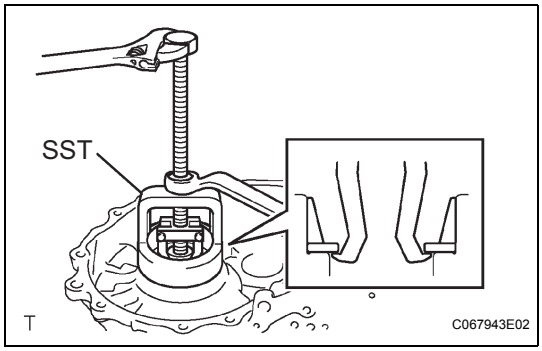


(b) Using SST, remove the front differential case tapered roller bearing outer race from the transaxle housing.
SST 09387-00041 (09387-02020, 09387-02010)

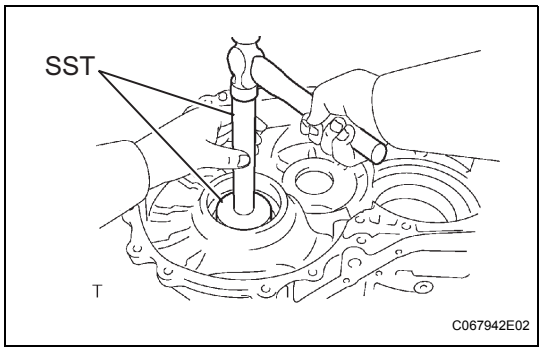


76. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00430)

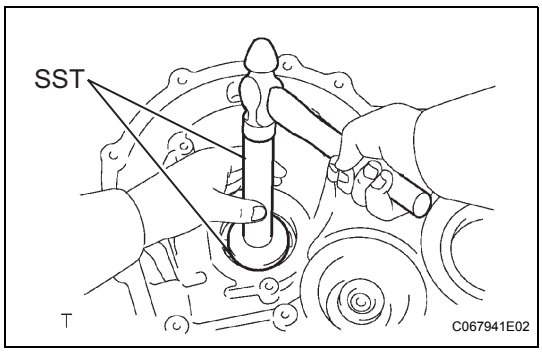


(b) Using SST, remove the front differential case tapered roller bearing outer race from the transaxle housing.
SST 09612-65014 (09612-01010)



77. REMOVE FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap out the oil seal from the transaxle case.
SST 09950-60010 (09951-00550), 09950-70010 (09951-07100)



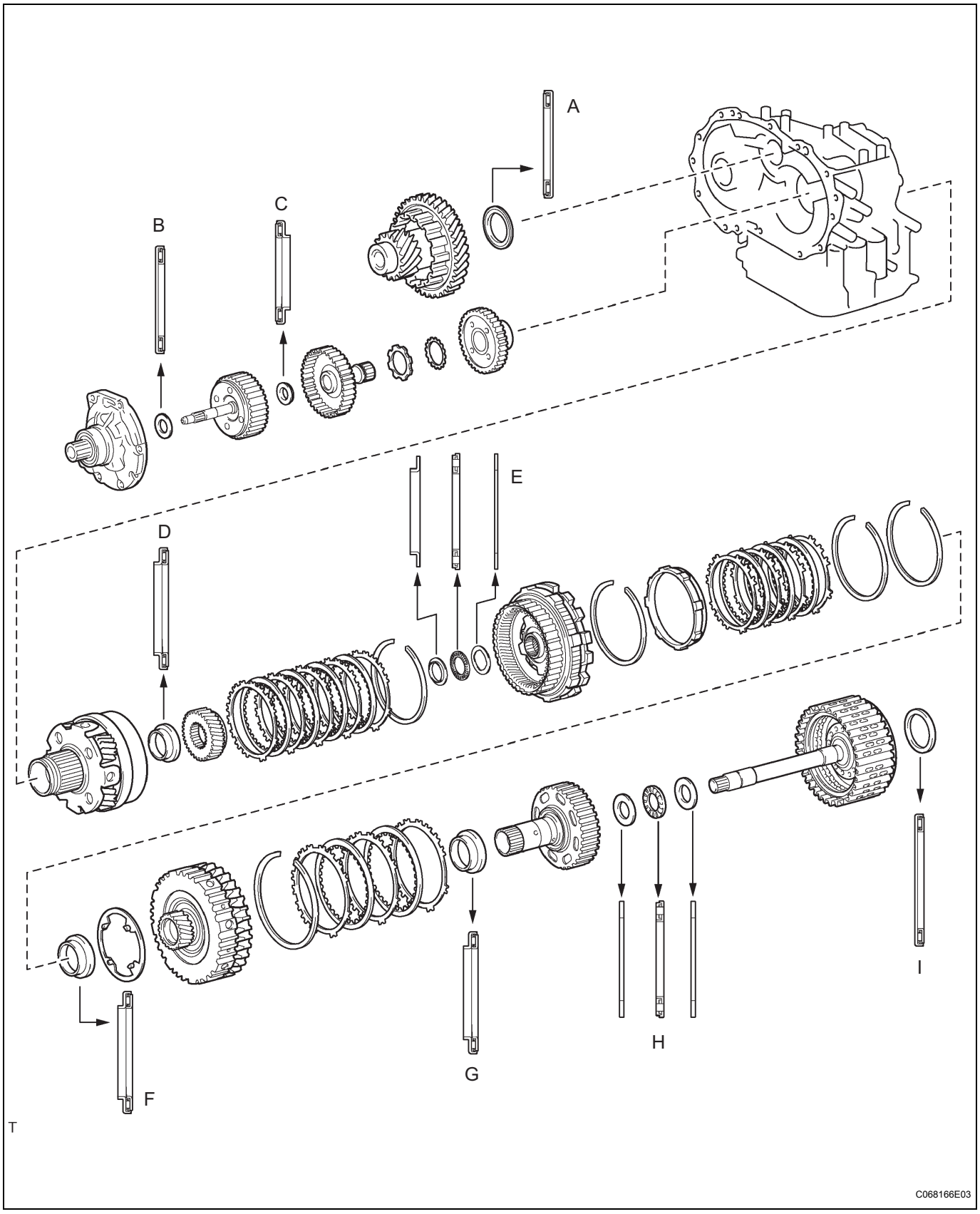
78. REMOVE TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap out the transaxle case oil seal from the transaxle housing.
SST 09950-60010 (09951-00530), 09950-70010 (09951-07100)

AX

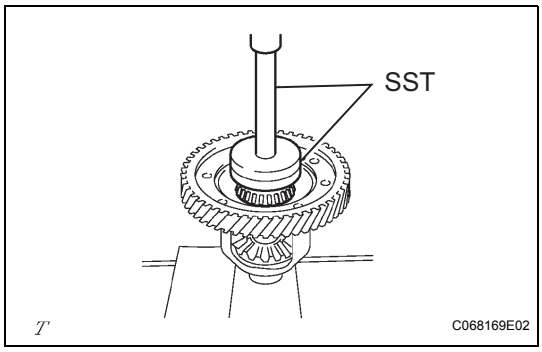
REASSEMBLY

1. BEARING POSITION



Bearing Position

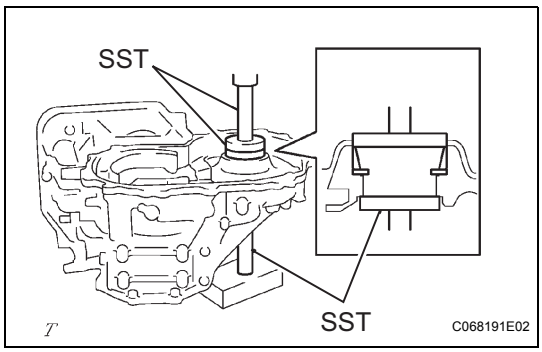
Mark	Front Race Diameter Inside / Outside	Thrust Bearing Diameter Inside / Outside	Rear Race Diameter Inside / Outside
A	-	45.1 mm (1.7756 in.) / 65.1 mm (2.5630 in.)	-
B	-	26 mm (1.0236 in.) / 43.4 mm (1.7087 in.)	-
C	-	21 mm (0.8268 in.) / 34.85 mm (1.3721 in.)	-
D	-	32.0 mm (1.260 in.) / 48.0 mm (1.890 in.)	-
E	36.75 mm (1.447 in.) / 49.95 mm (1.967 in.)	33.9 mm (1.335 in.) / 52.0 mm (2.047 in.)	- / 51.7 mm (2.035 in.)
F	-	43.45 mm (1.7101 in.) / 58.5 mm (2.3031 in.)	-
G	-	29.4 mm (1.1574 in.) / 44.4 mm (1.7480 in.)	-
H	23.5 mm (0.9252) / 37.3 mm (1.4685 in.)	22.5 mm (0.8858 in.) / 37.3 mm (1.4685 in.)	20.3 mm (0.7992 in.) / 33.8 mm (1.3307 in.)
I	-	43.45 mm (1.7101 in.) / 61.2 mm (2.4094 in.) or 43.45 mm (1.7101 in.) / 61.74 mm (2.4307 in.)	-



2. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

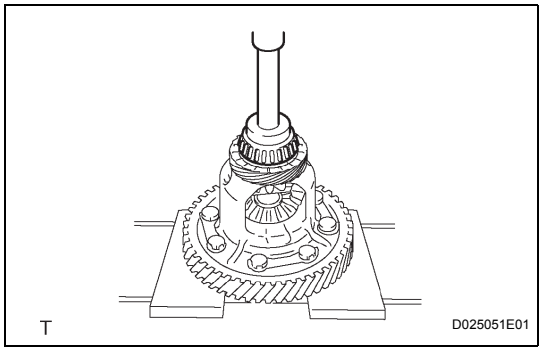
(a) Using SST and a press, press in the front differential case rear tapered roller bearing inner race to the differential case.

SST 09726-40010, 09950-60020 (09951-00790)



(b) Using SST and a press, press in the shim and bearing outer race to the transaxle case.

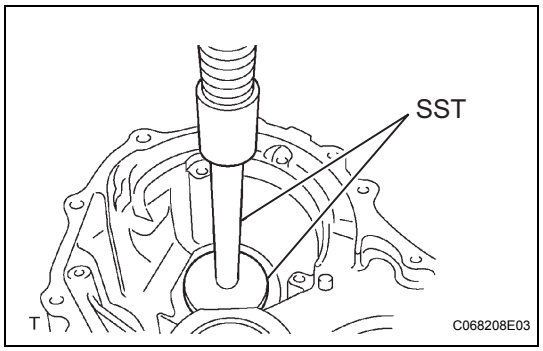
SST 09950-60010 (09951-00650, 09950-60020 (09951-00720), 09950-70010 (09951-07100, 09951-07200)



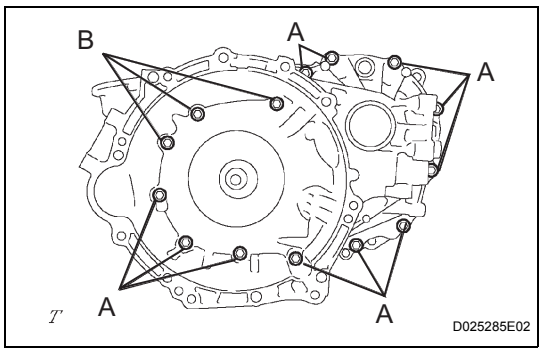
3. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, press in the bearing inner race to the differential case.

SST 09950-60010 (09951-00460), 09950-70010 (09951-07100)



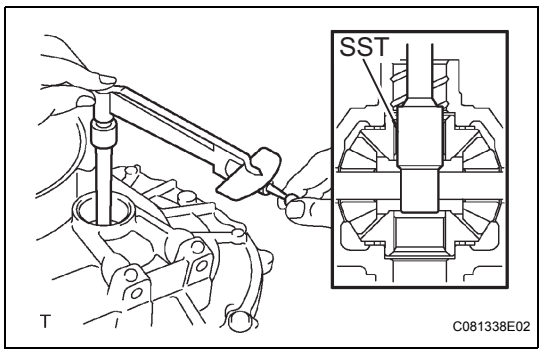
(b) Using SST and a press, press in the tapered roller bearing to the transaxle housing.
SST 09950-60020 (09951-00680
09950-70010 (09951-07150)



4. ADJUST TAPERED ROLLER BEARING PRELOAD

(a) Coat the front differential case and bearing with ATF and install them to the transaxle case.

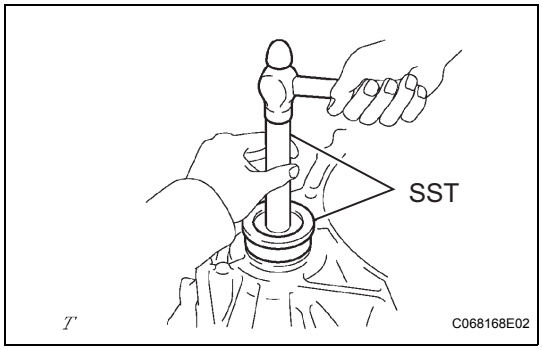
(b) Install the transaxle housing with the 14 bolts.
Torque: 29.4 N*m (300 kgf*cm, 22 ft.*lbf) for bolt A
22.1 N*m (225 kgf*cm, 16 ft.*lbf) for bolt B



(c) Using SST and a small torque wrench, measure the preload of the differential gear.
SST 09564-32011
Standard preload:
New bearing:
0.98 to 1.57 N*m (10.0 to 16.0 kgf*cm, 8.7 to 13.9 in.*lbf)
Used bearing:
0.49 to 0.78 N*m (5.0 to 8.0 kgf*cm, 4.3 to 6.9 in.*lbf)
If the preload is not within the specification, remove the differential from the transaxle case. Reselect the transaxle case side adjusting shim according to the following table.
Standard adjusting shim thickness

Mark	Thickness	Mark	Thickness
01	1.90 mm (0.0748 in.)	11	2.40 mm (0.0945 in.)
02	1.95 mm (0.0768 in.)	12	2.45 mm (0.0965 in.)
03	2.00 mm (0.0787 in.)	13	2.50 mm (0.0984 in.)
04	2.05 mm (0.0807 in.)	14	2.55 mm (0.1004 in.)
05	2.10 mm (0.0827 in.)	15	2.60 mm (0.1024 in.)
06	2.15 mm (0.0846 in.)	16	2.65 mm (0.1043 in.)
07	2.20 mm (0.0866 in.)	17	2.70 mm (0.1063 in.)
08	2.25 mm (0.0885 in.)	18	2.75 mm (1.1082 in.)
09	2.30 mm (0.0906 in.)	19	2.80 mm (0.1102 in.)

Mark	Thickness	Mark	Thickness
10	2.35 mm (0.0925 in.)	-	-



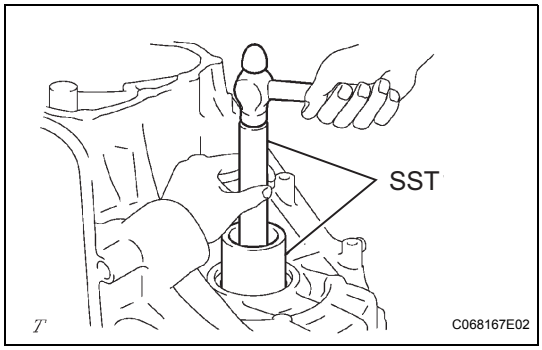
5. INSTALL TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap in a new oil seal.

SST 09554-14010, 09950-70010 (09951-07100)

Standard depth:

2 +-0.5 mm (0.079 +-0.020 in.)



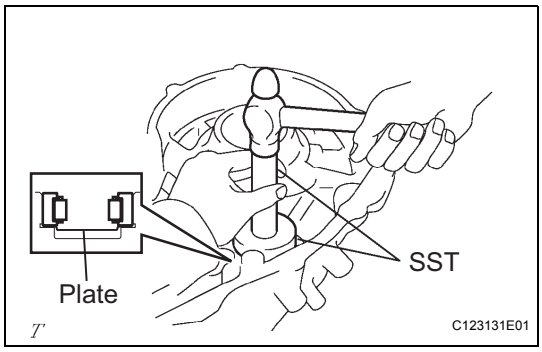
6. INSTALL FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap in a new oil seal.

SST 09726-27012 (09726-02041), 09950-70010 (09951-07150)

Standard depth:

5.9 +-0.5 mm (0.232 +-0.020 in.)

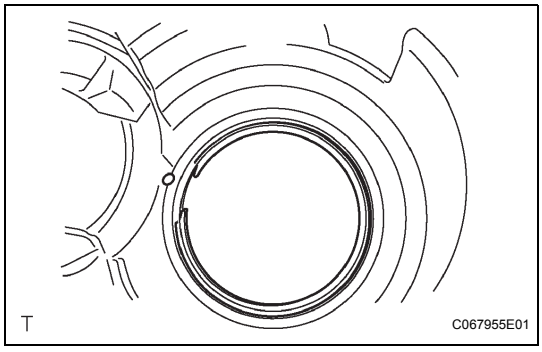


7. INSTALL FRONT DRIVE PINION REAR CYLINDRICAL ROLLER BEARING

(a) Install the No. 1 transaxle case plate.

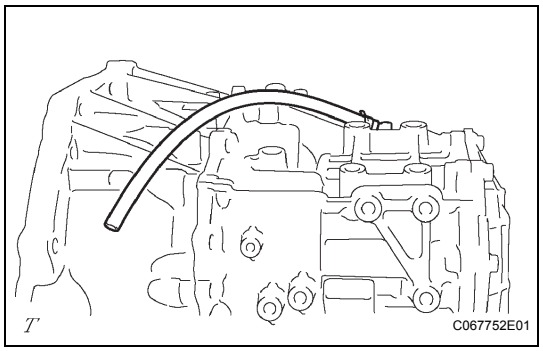
(b) Using SST and a hammer, tap in the roller bearing into the transaxle case.

SST 09950-60010 (09951-00610), 09950-70010 (09951-07150)

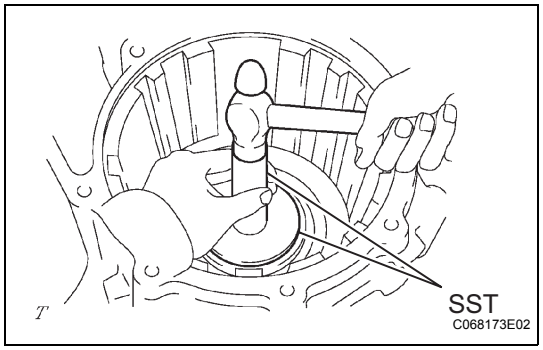


8. INSTALL COUNTER DRIVE GEAR HOLE SNAP RING

(a) Using a screwdriver, install the counter drive gear hole snap ring to the transaxle case.

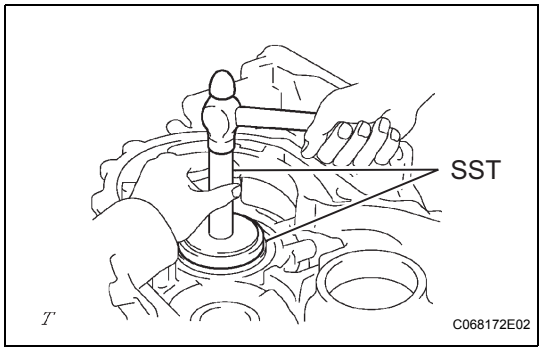


9. INSTALL BREATHER PLUG HOSE



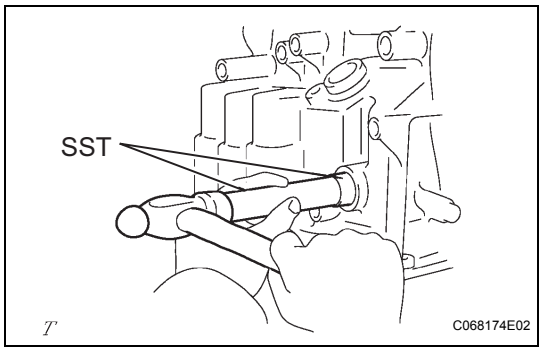
10. INSTALL COUNTER DRIVE GEAR BEARING

(a) Using SST and a hammer, tap in the counter drive gear bearing LH outer race to the transaxle case.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)



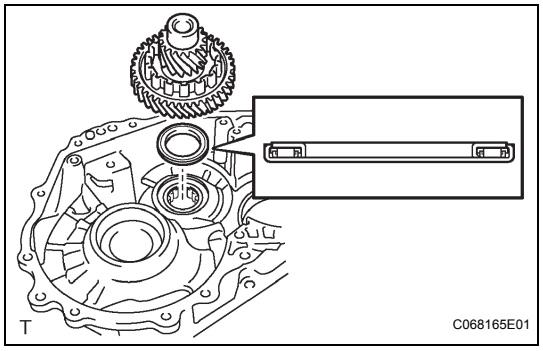
(b) Using SST and a hammer, tap in the counter drive gear bearing RH outer race to the transaxle case.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)

(c) Install the counter drive gear bearing to the transaxle case.



11. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL

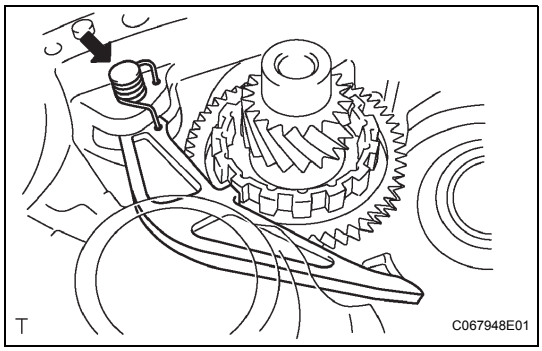
(a) Using SST and a hammer, tap in a new manual valve lever shaft oil seal.
SST 09950-60010 (09951-00220), 09950-70010 (09951-07100)
Standard depth:
0 +-0.5 mm (0 +-0.020 in.)



12. INSTALL COUNTER DRIVEN GEAR

(a) Install the counter driven gear and drive pinion thrust bearing to the transaxle case.

AX



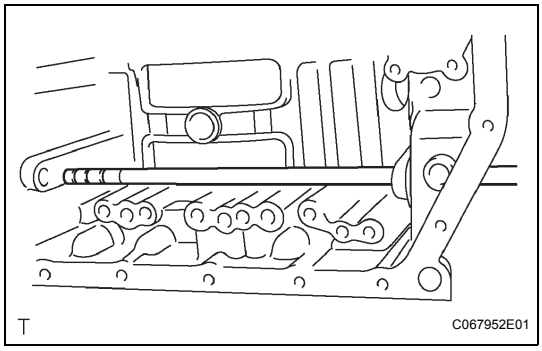
13. INSTALL PARKING LOCK PAWL

(a) Coat the parking lock pawl shaft with ATF.

(b) Install the parking lock pawl, torsion spring and shaft to the transaxle case.

HINT:

Check that the parking lock pawl can move smoothly.

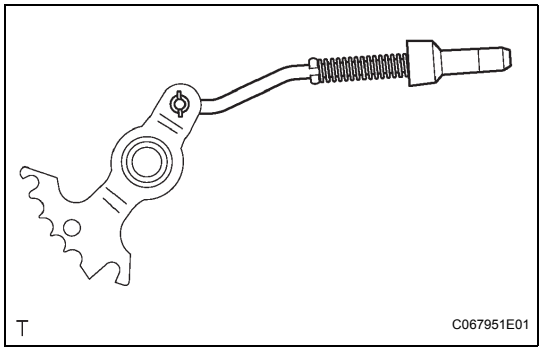


14. INSTALL MANUAL VALVE LEVER SHAFT

(a) Install the manual valve lever shaft to the transaxle case.

NOTICE:

Be careful not to damage the lip of the oil seal.

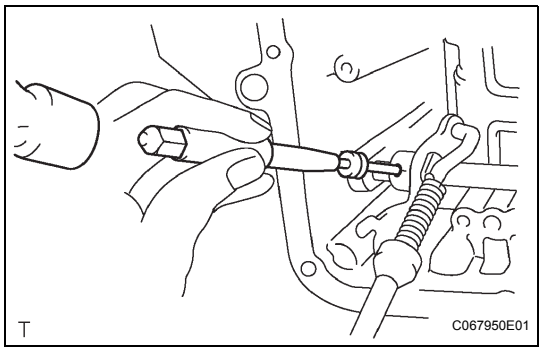


15. INSTALL PARKING LOCK ROD SUB-ASSEMBLY

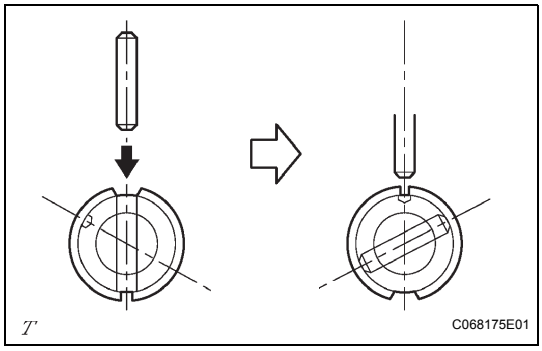
16. INSTALL MANUAL VALVE LEVER SUB-ASSEMBLY

(a) Coat the manual valve lever sub-assembly with ATF.

(b) Install the manual valve lever and a new manual valve lever spacer to the manual valve lever shaft.



(c) Using a pin punch and hammer, drive in the pin.

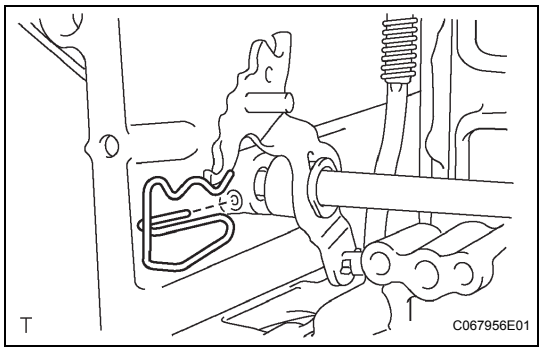


(d) Align the small hole of the spacer and the staking position mark on the lever shaft.

(e) Using a pin punch, stake the spacer through the small hole.

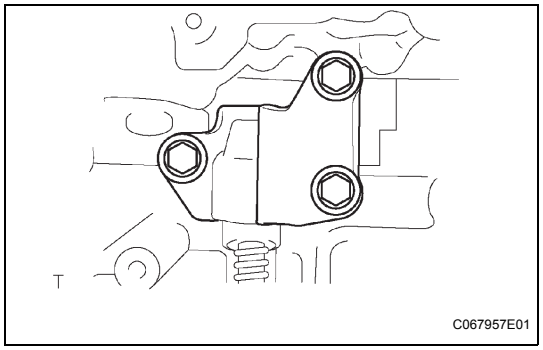
(f) Check that the spacer does not turn.

AX



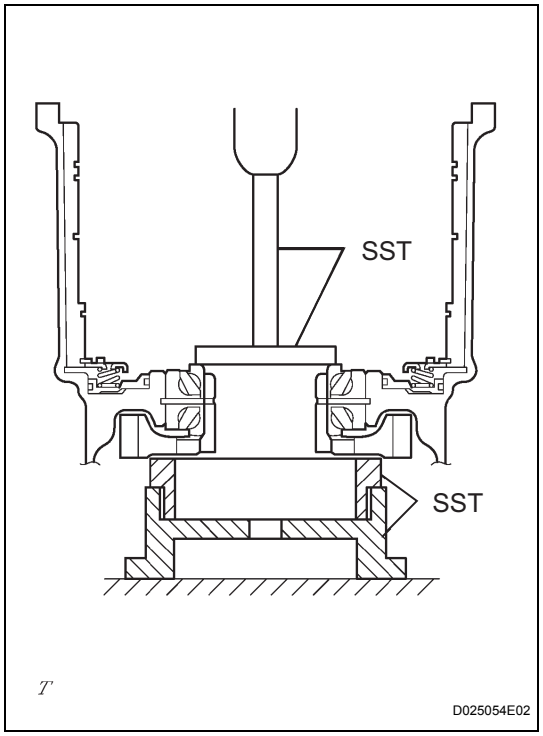
17. INSTALL MANUAL VALVE LEVER SHAFT RETAINER SPRING

(a) Install the retainer spring.



18. INSTALL PARKING LOCK PAWL BRACKET

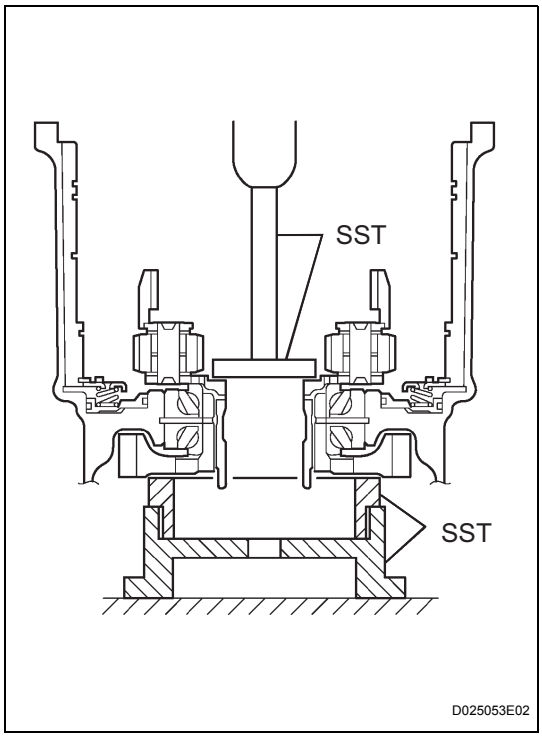
(a) Install the cam guide and bracket with the 3 bolts.
Torque: 20.1 N*m (205 kgf*cm, 15 ft.*lbf)



19. INSTALL COUNTER DRIVE GEAR

(a) Using SST and a press, press in the counter drive gear to the transaxle case.
SST 09223-15030, 09527-17011, 09950-60010 (09951-00650), 09950-70010 (09951-07150)

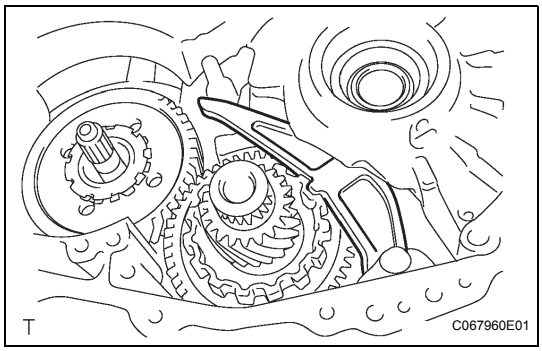
AX



20. INSTALL PLANETARY GEAR ASSEMBLY

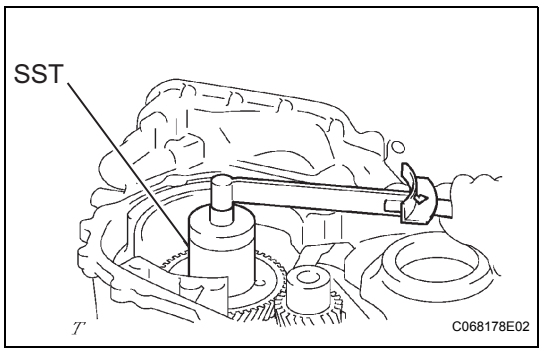
(a) Using SST and a press, press in the planetary gear to the transaxle case.

SST 09950-60010 (09951-00480), 09223-15030, 09527-17011, 09950-70010 (09951-07150)



21. INSTALL COUNTER DRIVE GEAR NUT

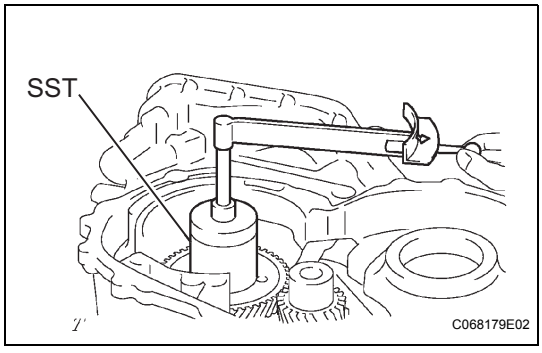
(a) Fix the counter driven gear with the parking lock pawl.



(b) Using SST, install a new lock washer and nut.

SST 09387-00120

Torque: 280 N*m (2,855 kgf*cm, 207 ft.*lbf)



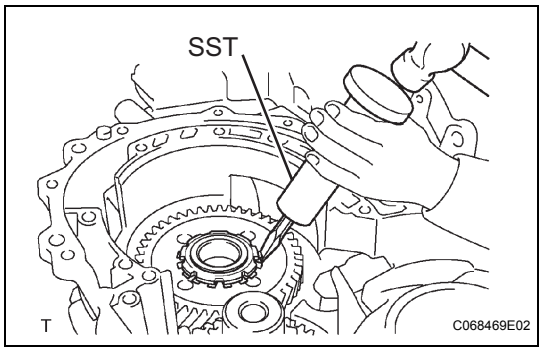
(c) Using SST and a small torque wrench, turn the counter drive gear at 60 turns per minute and measure the rotating torque.

SST 09387-00120

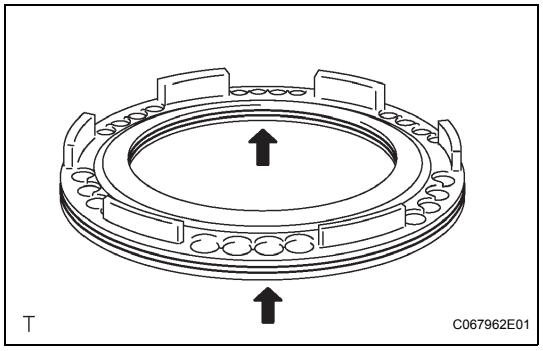
Standard rotating torque:

0.20 to 0.49 N*m (2 to 5 kgf*cm, 2 to 4 in.*lbf)

AX

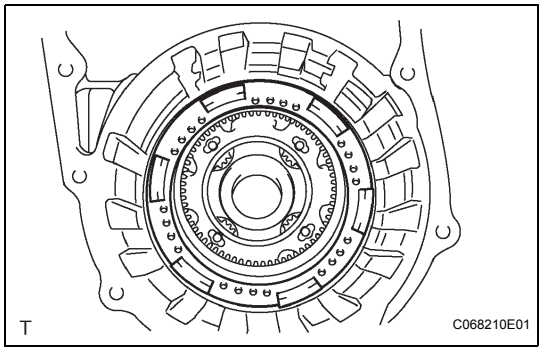


(d) Using SST and a hammer, stake the lock washer.
SST 09930-00010



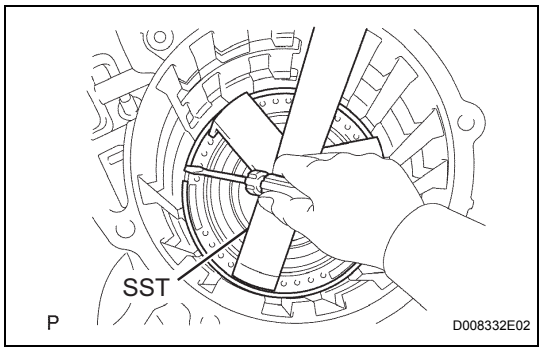
22. INSTALL 1ST AND NO. 2 REVERSE BRAKE PISTON O-RING

(a) Install the 2 O-rings.



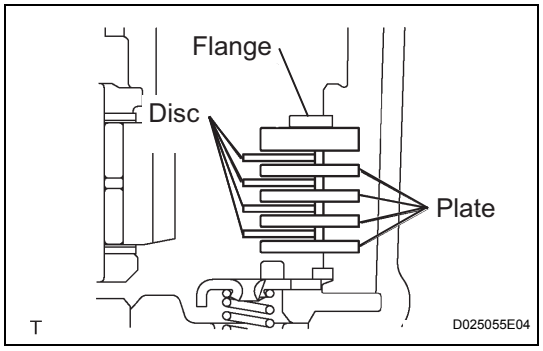
23. INSTALL 1ST AND NO. 2 REVERSE BRAKE PISTON

(a) Install the 1st and reverse brake piston to the transaxle case.
NOTICE:
Be careful not to damage the lip of the oil seal.



24. INSTALL 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

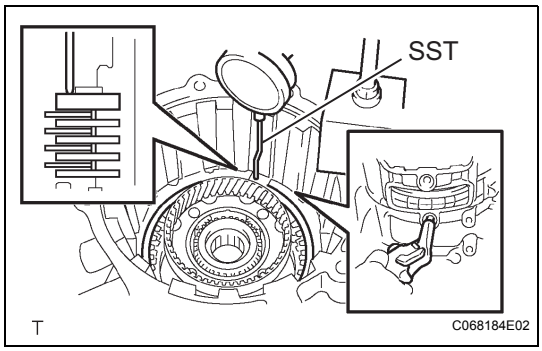
(a) Install the 1st and reverse brake return spring sub-assembly to the transaxle case.
(b) Using SST, a press and screwdriver, install the snap ring.
SST 09387-00070



25. INSTALL 1ST AND REVERSE BRAKE DISC

(a) Install the 4 plates, 4 discs and flange to the transaxle case.
(b) Using a screwdriver, install the snap ring.

AX



26. INSPECT PACK CLEARANCE OF 1ST AND REVERSE BRAKE DISC

(a) Using SST and a dial indicator, measure the dimension "A" in the illustration while pressing the disc and plate from the rear side.

SST 09350-36010

Standard pack clearance:

0.806 to 1.206 mm (0.0317 to 0.0475 in.)

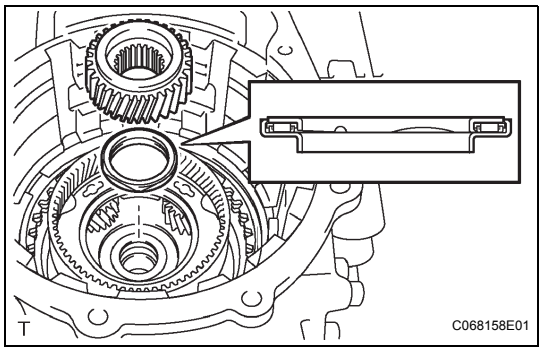
HINT:

Pack clearance = Dimension A - Flange thickness - Snap ring thickness

Standard select flange thickness

Mark	Thickness	Mark	Thickness
-	3.4 mm (0.134 in.)	2	3.8 mm (0.150 in.)
1	3.6 mm (0.142 in.)	3	4.0 mm (0.157 in.)

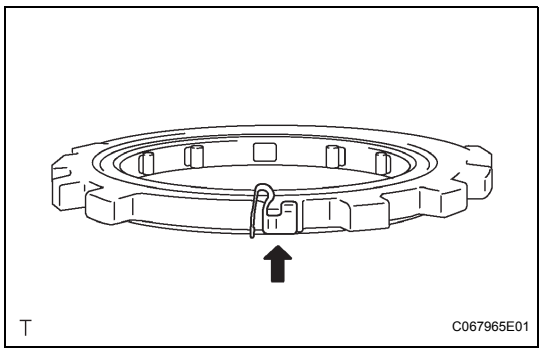
(b) Check that the 1st and reverse brake piston moves when applying compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole.



27. INSTALL FRONT PLANETARY SUN GEAR

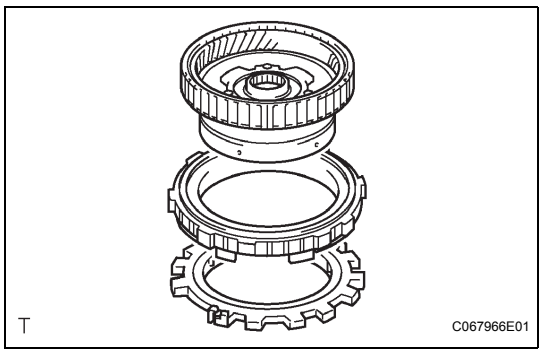
(a) Install the planetary sun gear and needle roller bearing to the planetary gear.

AX



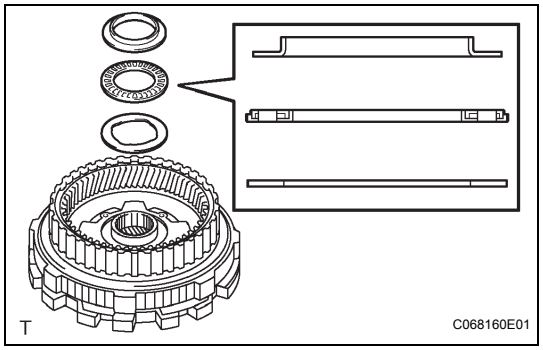
28. INSTALL OUTER RACE RETAINER

(a) Install the retainer to the No. 2 1-way clutch.



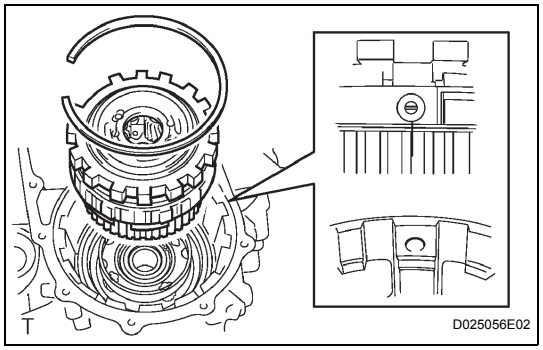
29. INSTALL NO. 2 1-WAY CLUTCH

(a) Install the 1-way clutch and 2nd brake piston assembly to the rear planetary gear.



30. INSTALL PLANETARY GEAR REAR THRUST NEEDLE ROLLER BEARING

(a) Install the No. 2 thrust bearing race, planetary gear thrust needle roller bearing and No. 1 thrust bearing race to the rear planetary gear.

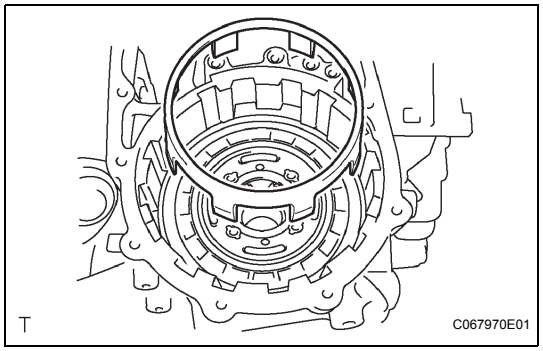


31. INSTALL REAR PLANETARY GEAR ASSEMBLY

(a) Install the rear planetary gear to the transaxle case.

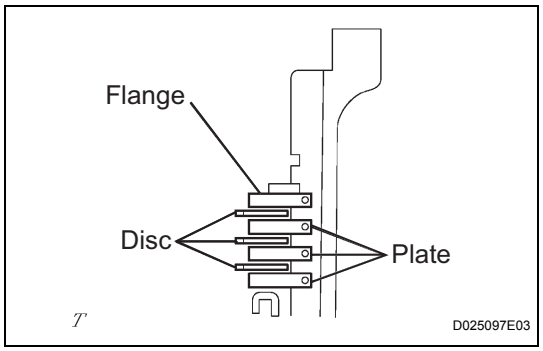
(b) Using a screwdriver, install the snap ring.

32. INSPECT NO. 2 1-WAY CLUTCH (See page AX-174)



33. INSTALL 2ND BRAKE PISTON SLEEVE

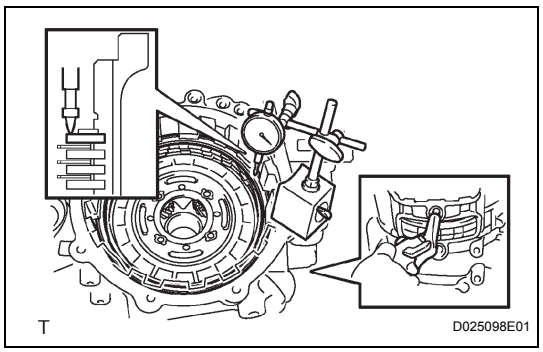
(a) Install the 2nd brake piston sleeve to the transaxle case.



34. INSTALL 2ND BRAKE DISC

(a) Install the 3 discs, 3 plates and flange to the transaxle case.

(b) Using a screwdriver, install the snap ring to the transaxle case.



35. INSPECT PACK CLEARANCE OF 2ND BRAKE

(a) Using a dial indicator, measure the 2nd brake pack clearance while applying and releasing compressed air (392 to 785 kPa, 4 to 8 kgf/cm^2, 57 to114 psi).

Standard pack clearance:

0.847 to 1.247 mm (0.0333 to 0.0491 in.)

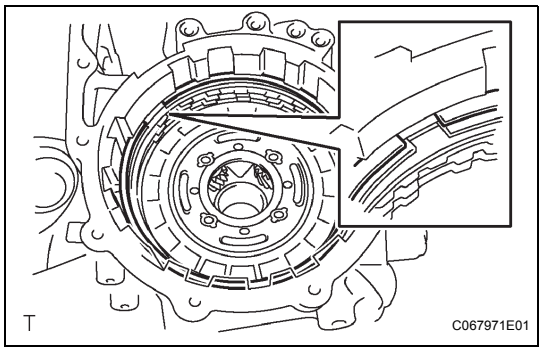
HINT:

Pack clearance = Dimension A - Selected flange thickness - Snap ring thickness.

AX

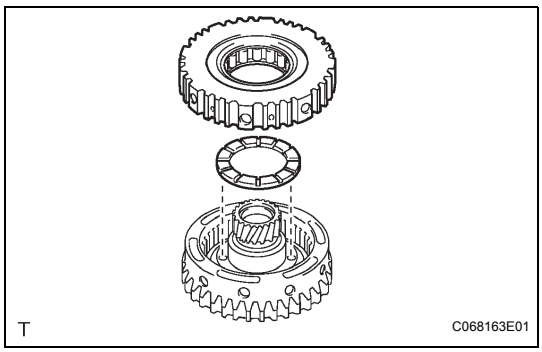
Standard selected flange thickness

Mark	Thickness	Mark	Thickness
-	3.0 mm (0.118 in.)	2	3.4 mm (0.134 in.)
1	3.2 mm (0.126 in.)	3	3.6 mm (0.142 in.)



36. INSTALL 2ND COAST AND OVERDRIVE BRAKE FLANGE HOLE SNAP RING

(a) Using a screwdriver, install the snap ring to the transaxle case.

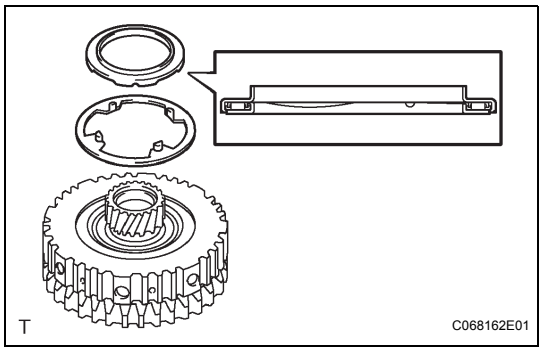


37. INSTALL 1-WAY CLUTCH ASSEMBLY

(a) Install the No. 2 thrust washer to the rear planetary gear.

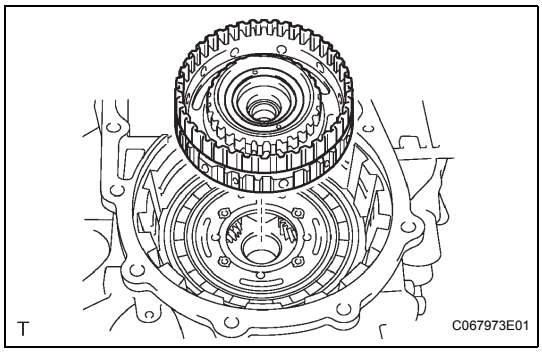
(b) Install the 1-way clutch to the rear planetary sun gear.

38. INSPECT 1-WAY CLUTCH ASSEMBLY (See page AX-173)



39. INSTALL REAR PLANETARY SUN GEAR THRUST NEEDLE ROLLER BEARING

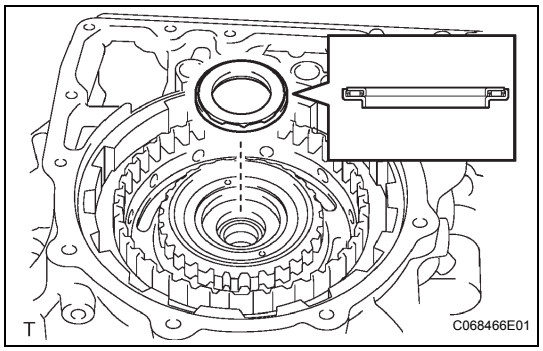
(a) Install the thrust bearing and washer to the rear planetary sun gear.



40. INSTALL REAR PLANETARY SUN GEAR ASSEMBLY

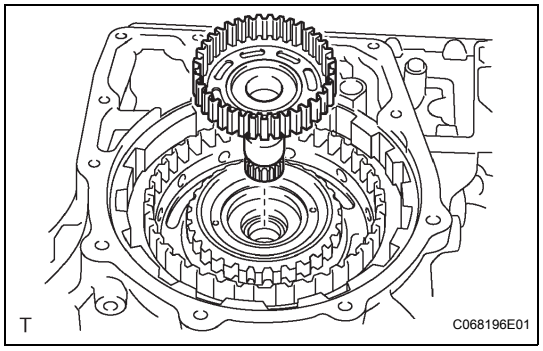
(a) Install the rear planetary sun gear assembly.

AX



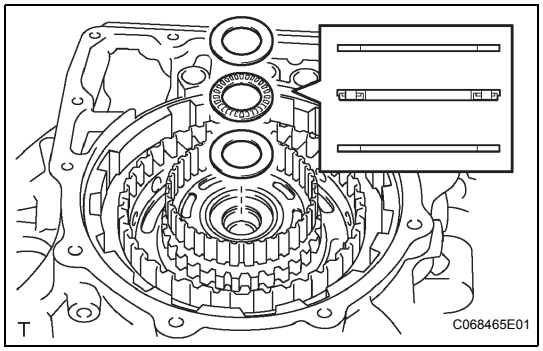
41. INSTALL REAR PLANETARY SUN GEAR, NO. 2 THRUST NEEDLE BEARING

(a) Install the thrust bearing to the rear planetary sun gear.



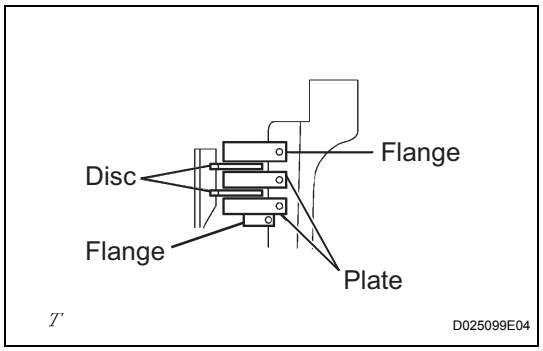
42. INSTALL DIRECT CLUTCH HUB

(a) Install the direct clutch hub.



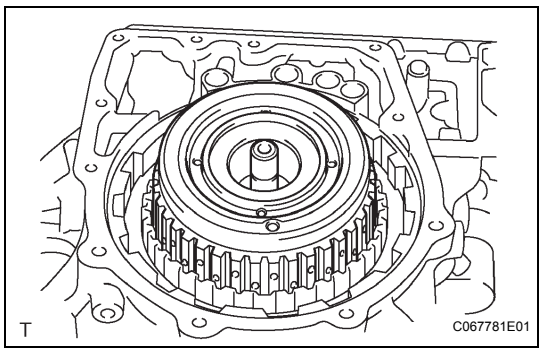
43. INSTALL THRUST NEEDLE ROLLER BEARING

(a) Install the No. 3 thrust bearing race, thrust needle roller bearing and C-2 hub thrust bearing race to the direct clutch hub.



44. INSTALL 2ND COAST AND OVERDRIVE BRAKE DISC

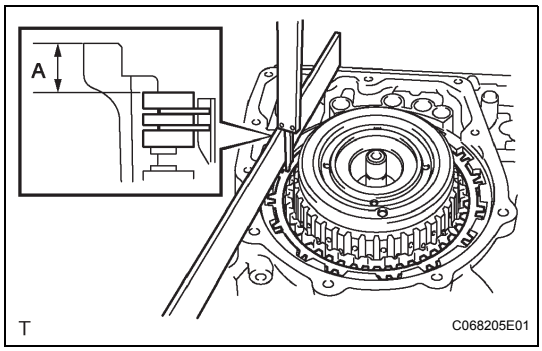
(a) Install the 2 discs, 2 plates and 2 flanges to the transaxle case.



45. INSTALL INTERMEDIATE SHAFT ASSEMBLY

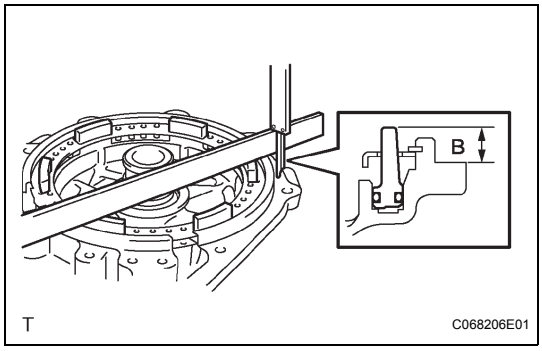
(a) Install the intermediate shaft to the transaxle case.

AX



46. INSPECT PACK CLEARANCE OF 2ND COAST AND OVERDRIVE BRAKE

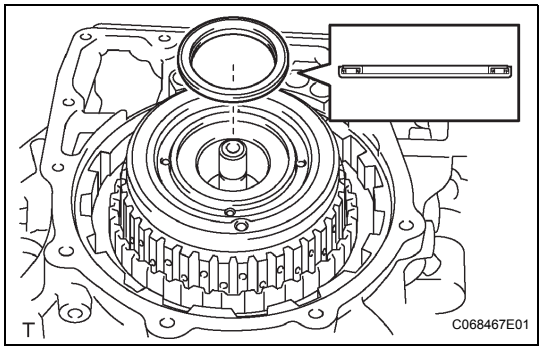
(a) As shown in the illustration, place a straightedge on the transaxle case and measure the distance between the 2nd coast and O/D brake flange and straightedge using a vernier caliper (Dimension A).



(b) As shown in the illustration, place a straightedge on the O/D brake piston and measure the distance between the transaxle rear cover and straightedge using a vernier caliper (Dimension B).
Calculate the piston stroke valve using the following formula. Select a flange which satisfies the piston stroke valve and install it.
Standard pack clearance:
2.091 to 2.491 mm (0.0823 to 0.0981 in.)
HINT:
Pack clearance = Dimension "A" - Dimension "B" - Selected flange thickness.
Selected flange thickness

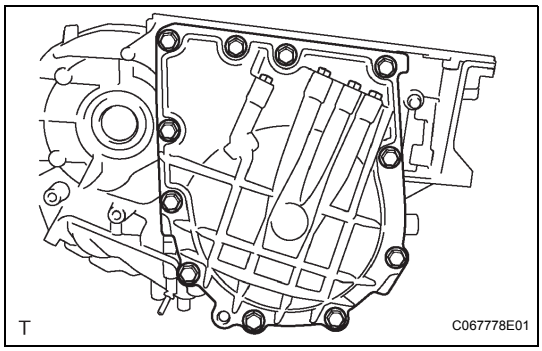
Mark	Thickness	Mark	Thickness
4	4.0 mm (0.1575 in.)	6	4.4 mm (0.1732 in.)
5	4.2 mm (0.1654 in.)	7	4.6 mm (0.1811 in.)

AX



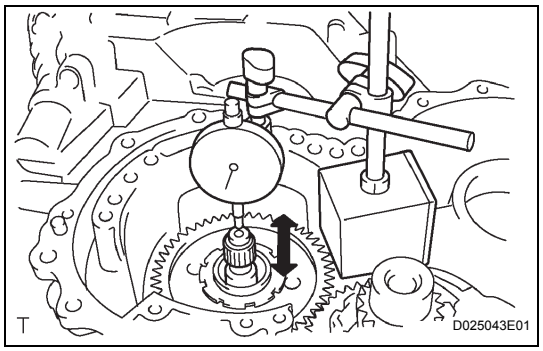
47. INSTALL REAR CLUTCH DRUM THRUST NEEDLE ROLLER BEARING

(a) Install the bearing to the intermediate shaft.

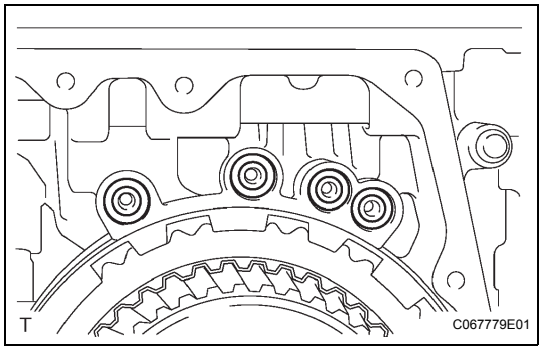


48. INSPECT INTERMEDIATE SHAFT ASSEMBLY

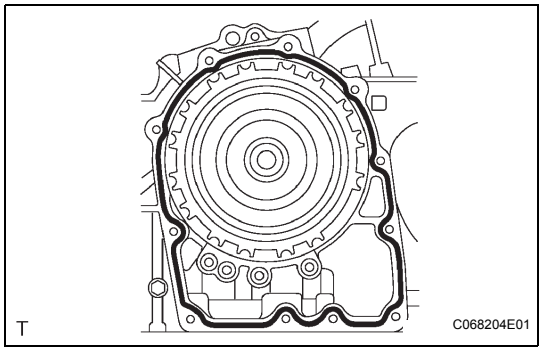
(a) Install the transaxle rear cover with the 11 bolts.
Torque: 24.5 N*m (250 kgf*cm, 18 ft.*lbf)



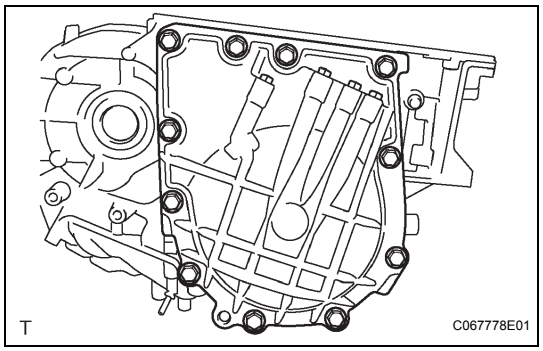
(b) Using a dial indicator, measure the end play of intermediate shaft.
Standard end play:
0.204 to 0.966 mm (0.008 to 0.038 in.)
(c) Remove 11 bolts and transaxle rear cover.



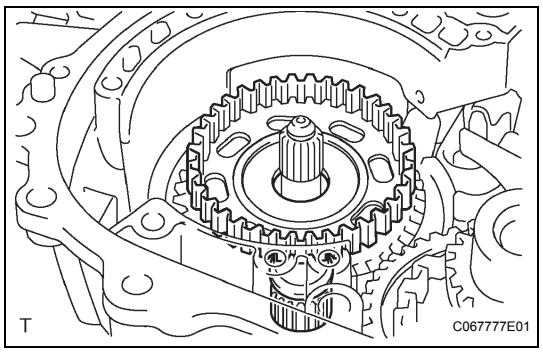
49. INSTALL TRANSAXLE CASE GASKET
(a) Install 4 new gaskets to the transaxle case.



50. INSTALL TRANSAXLE REAR COVER ASSEMBLY
(a) Apply FIPG to the transaxle case.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

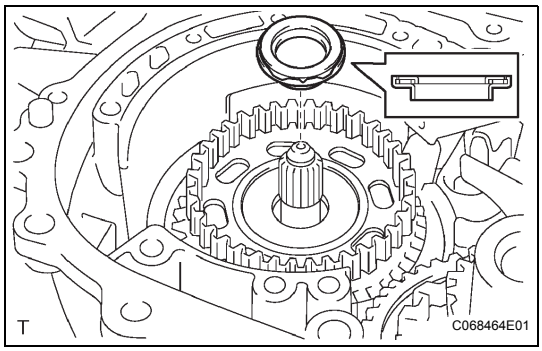


(b) Install the transaxle rear cover with the 11 bolts.
Torque: 24.5 N*m (250 kgf*cm, 18 ft.*lbf)



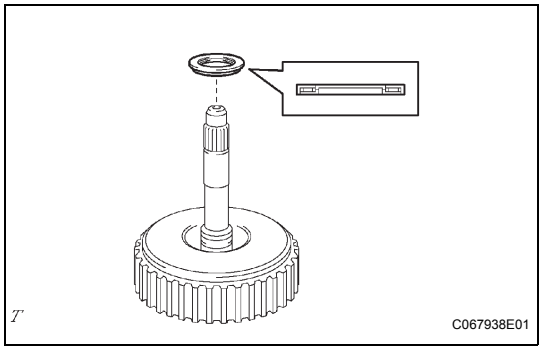
51. INSTALL FORWARD CLUTCH HUB SUB-ASSEMBLY
(a) Install the forward clutch hub to the transaxle case.

AX



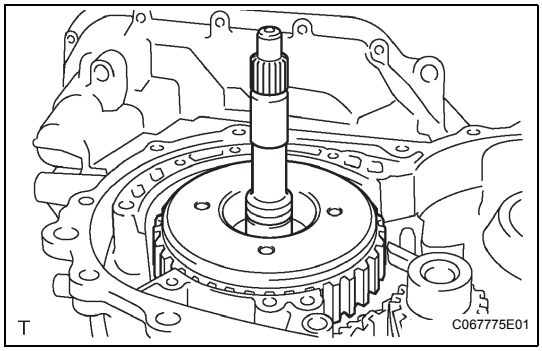
52. INSTALL FORWARD CLUTCH HUB THRUST NEEDLE ROLLER BEARING

(a) Install the bearing to the forward clutch hub.



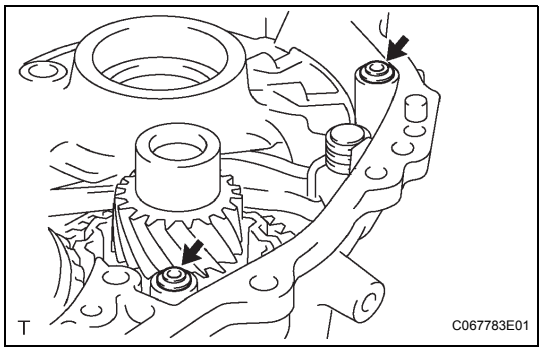
53. INSTALL STATOR SHAFT THRUST NEEDLE ROLLER BEARING

(a) Install the bearing to the input shaft.



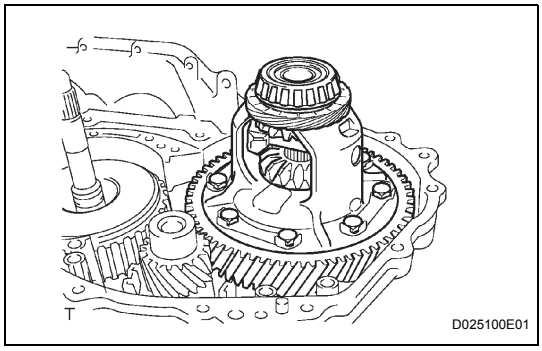
54. INSTALL INPUT SHAFT ASSEMBLY

(a) Install the input shaft to the transaxle case.



55. INSTALL OVERDRIVE BRAKE GASKET

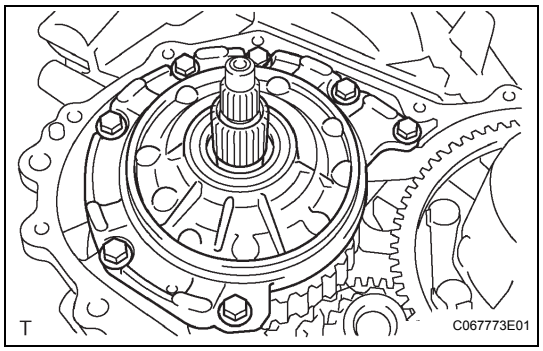
(a) Install 2 new gaskets to the transaxle case.



56. INSTALL DIFFERENTIAL GEAR ASSEMBLY

(a) Install the differential gear to the transaxle case.

AX



57. INSTALL OIL PUMP ASSEMBLY

(a) Install the oil pump with the 7 bolts.
Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)

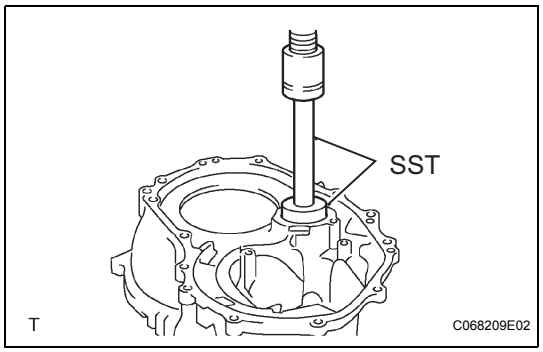
58. INSPECT INPUT SHAFT ASSEMBLY (See page AX-174)

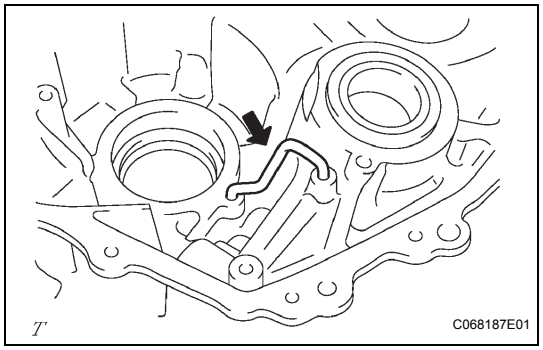
59. INSPECT INPUT SHAFT END PLAY (See page AX-173)

60. INSTALL FRONT DRIVE PINION FRONT TAPERED ROLLER BEARING

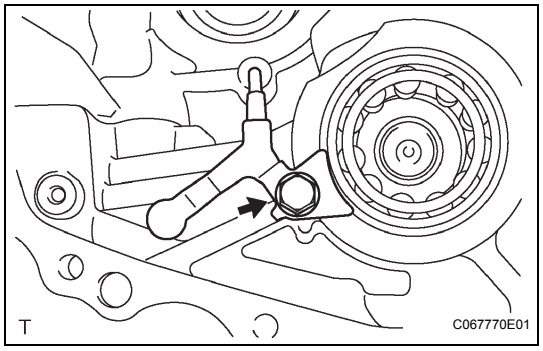
(a) Install the thrust bearing to the transaxle housing.

(b) Using SST and a press, press in the cylindrical roller bearing to the transaxle housing.
SST 09950-60010 (09951-00650), 09950-70010





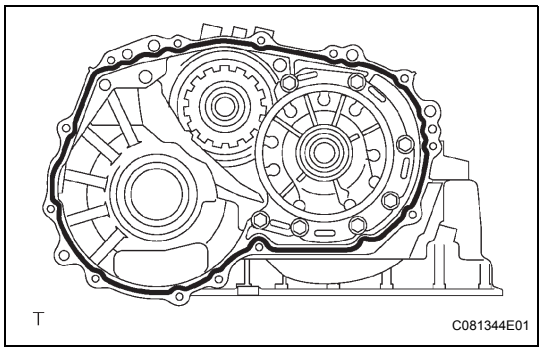
61. INSTALL DIFFERENTIAL GEAR LUBE APPLY TUBE



62. INSTALL BEARING LOCK PLATE

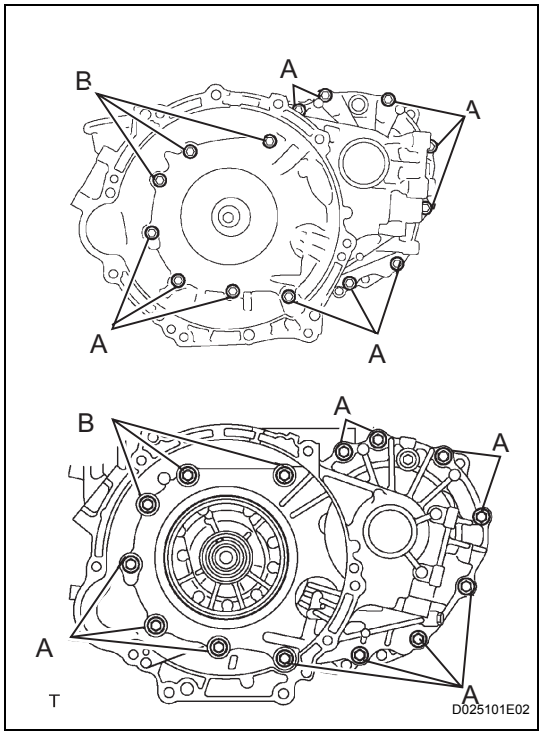
(a) Install the bearing lock plate to the transaxle housing with the bolt.
Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

AX

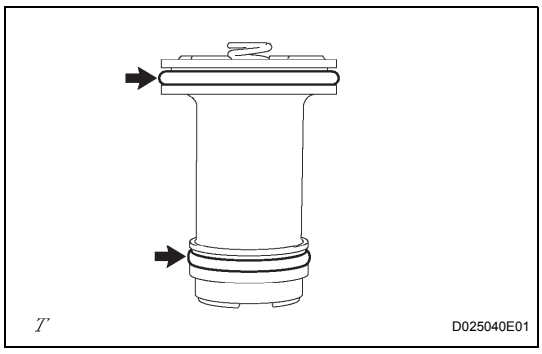


63. INSTALL TRANSAXLE HOUSING

(a) Apply FIPG to the transaxle case.
FIPG:
Part No. 08826-0090, THREE BOND 1281 or equivalent

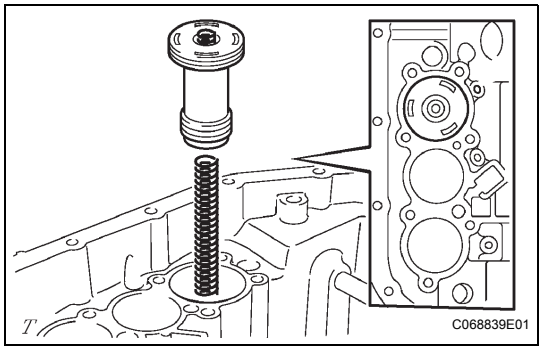


(b) Install the transaxle housing with the 14 bolts.
Torque: 29.4 N*m (300 kgf*cm, 22 ft.*lbf) for bolt A
22.1 N*m (225 kgf*cm, 16 ft.*lbf) for bolt B



64. INSTALL C-2 ACCUMULATOR PISTON

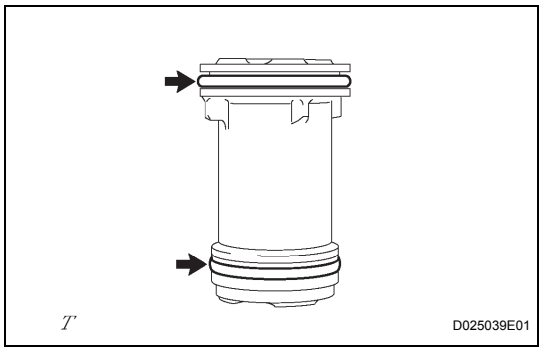
(a) Coat 2 new O-rings with ATF and install them to the C-2 accumulator piston.
NOTICE:
Be careful not to damage the O-rings.



(b) Install the spring and C-2 accumulator piston.
Standard accumulator spring

Spring	Free length / Outer diameter	Color
C-2	66.90 mm (2.6339 in.) / 17.20 mm (0.6772 in.)	-

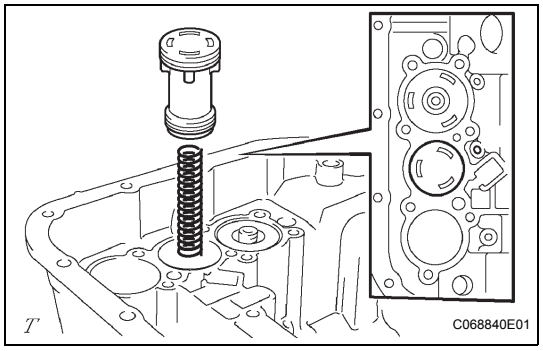
AX



65. INSTALL C-3 ACCUMULATOR PISTON

(a) Coat 2 new O-rings with ATF and install them to the C-3 accumulator piston.

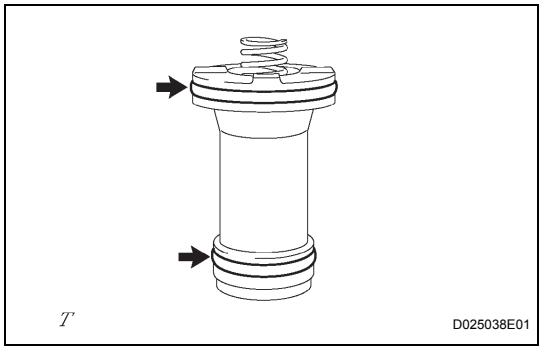
NOTICE:
Be careful not to damage the O-rings.



(b) Install the spring and C-3 accumulator piston.

Standard accumulator spring

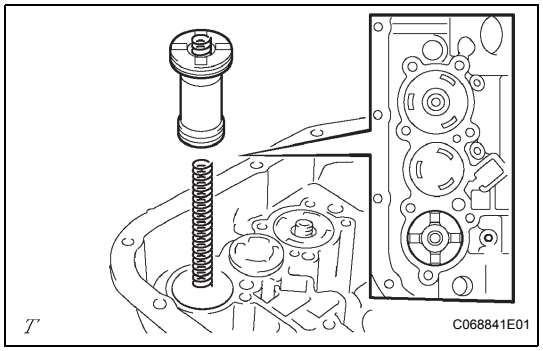
Spring	Free length / Outer diameter	Color
C-3	80.20 mm (3.1575 in.) / 18.70 mm (0.7362 in.)	Blue



66. INSTALL B-2 ACCUMULATOR PISTON

(a) Coat 2 new O-rings with ATF and install them to the B-2 accumulator piston.

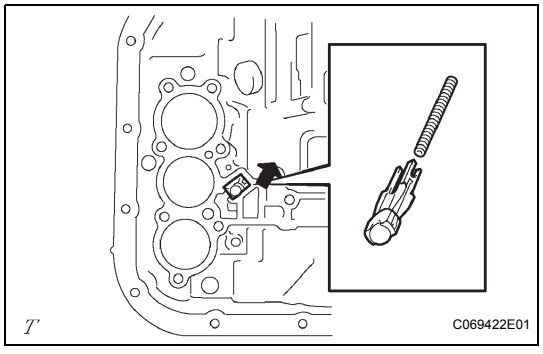
NOTICE:
Be careful not to damage the O-rings.



(b) Install the spring and B-2 accumulator piston.

Standard accumulator spring

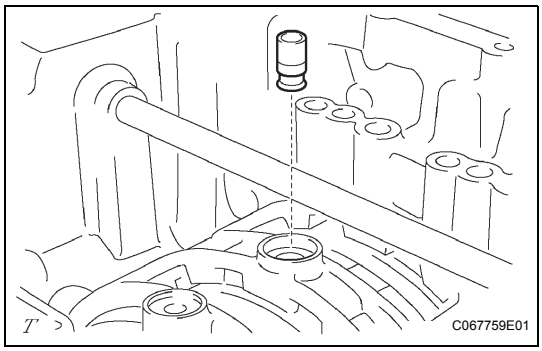
Spring	Free length / Outer diameter	Color
B-2	66.90 mm (2.6339 in.) / 15.50 mm (0.6102 in.)	Green



67. INSTALL CHECK BALL BODY

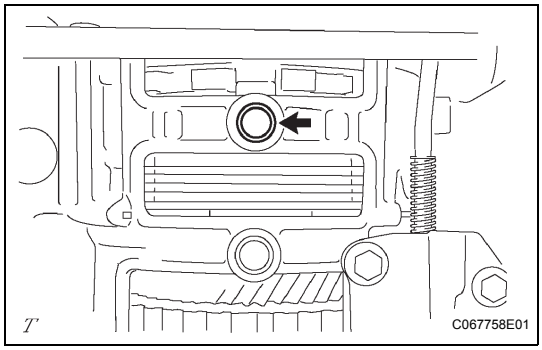
(a) Install the spring and check ball body.

AX



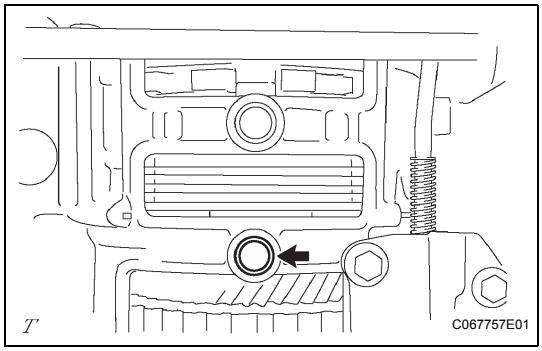
68. INSTALL BRAKE DRUM GASKET

(a) Install a new brake drum gasket.



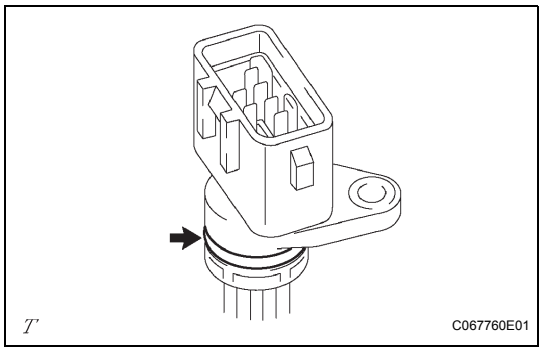
69. INSTALL TRANSAXLE CASE GASKET

(a) Install a new transaxle case gasket.



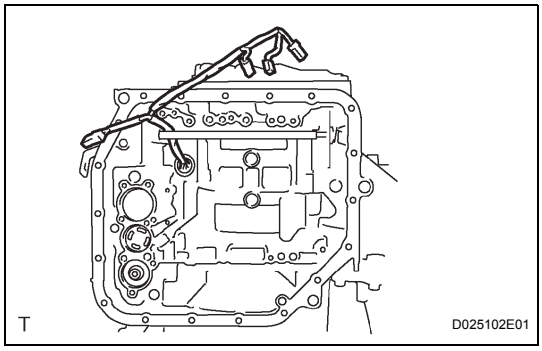
70. INSTALL TRANSAXLE CASE 2ND BRAKE GASKET

(a) Install a new transaxle case 2nd brake gasket.

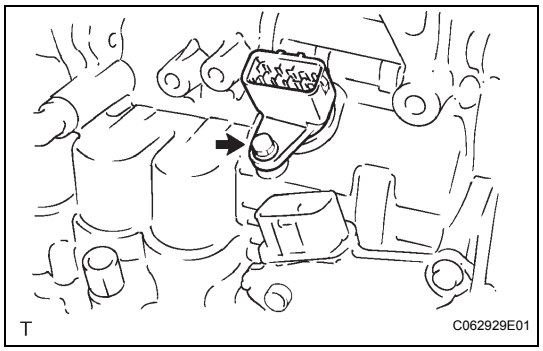


71. INSTALL TRANSMISSION WIRE

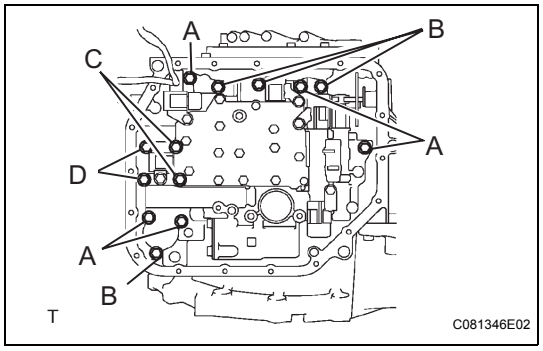
(a) Coat a new O-ring with ATF, and install it to the transmission wire.



(b) Pass the transmission wire through the transaxle.

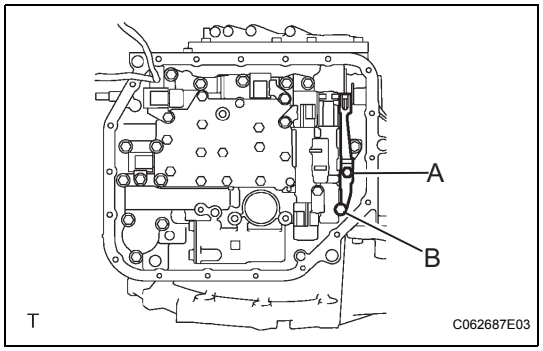


(c) Install the bolt and transmission wire.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



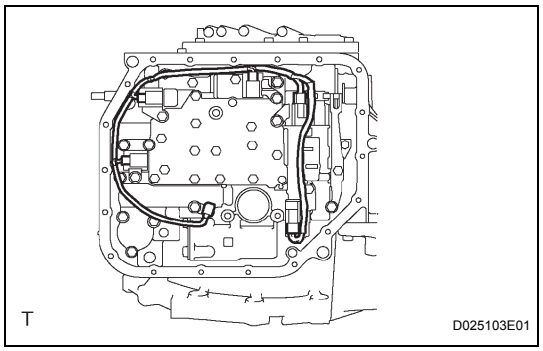
72. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Install the valve body with the 13 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
32 mm (1.26 in.) for bolt A
22 mm (0.87 in.) for bolt B
55 mm (2.17 in.) for bolt C
45 mm (1.77 in.) for bolt D



(b) Install the detent spring, detent spring cover with the 2 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
14 mm (0.55 in.) for bolt A
45 mm (1.77 in.) for bolt B

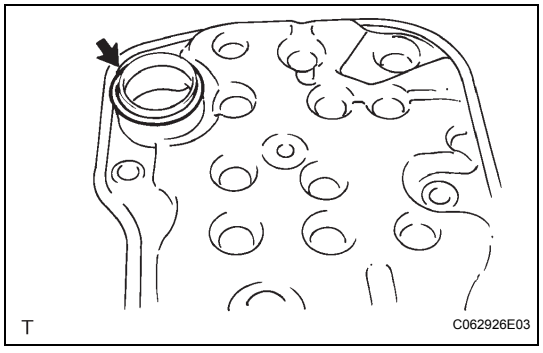
(c) Check that the manual valve lever is touching the center of the detent spring tip roller.



(d) Connect the 5 solenoid connectors.

(e) Coat a new O-ring with ATF, and install it to the ATF temperature sensor.

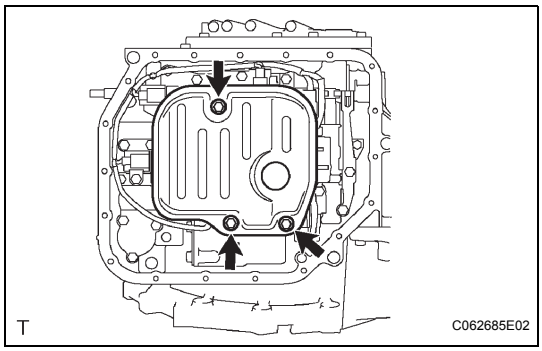
(f) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)
HINT:
Bolt length:
55 mm (2.17 in.)



73. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

(a) Coat a new O-ring with ATF, and install it to the oil strainer.

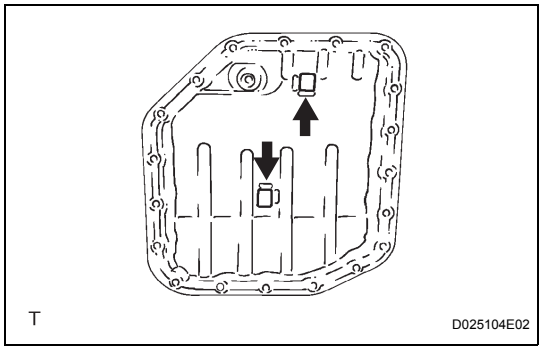
AX



(b) Install the oil strainer with the 3 bolts.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

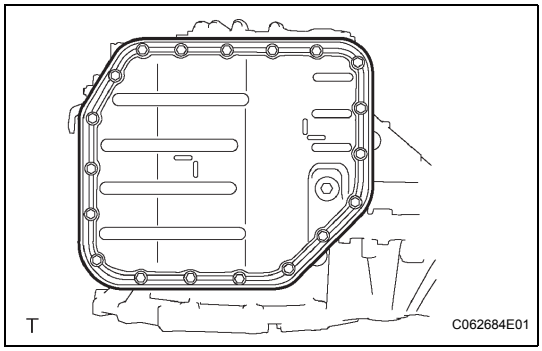
74. INSTALL AUTOMATIC TRANSAXLE OIL PAN GASKET

(a) Install a new gasket to the oil pan.

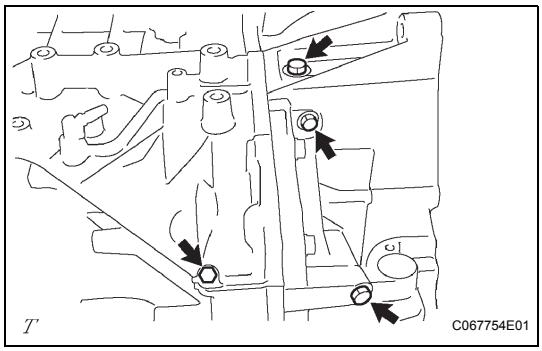


75. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the oil pan.



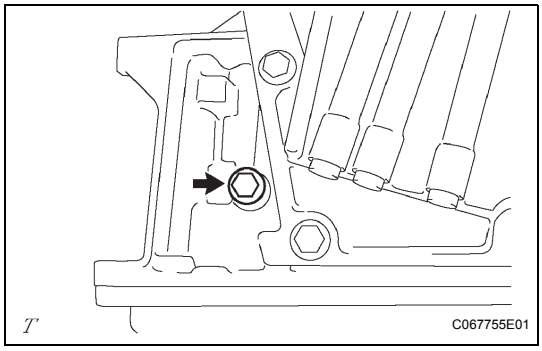
(b) Install the oil pan with the 19 bolts.
Torque: 7.8 N*m (80 kgf*cm, 71 in.*lbf)



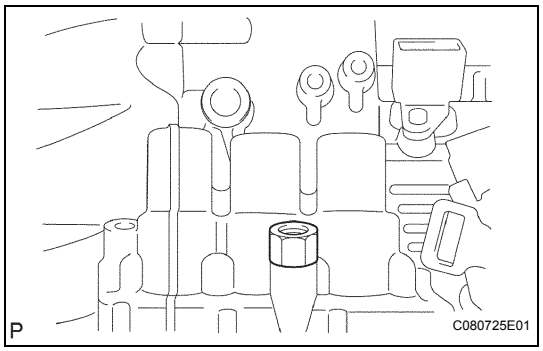
76. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Coat 5 new O-rings with ATF, and install them to the case plugs.

(b) Install the 4 case plugs.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



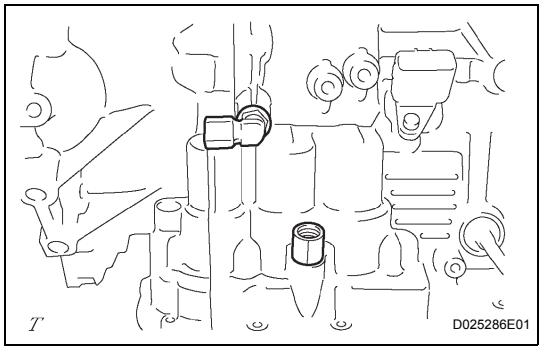
(c) Install the case plug.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



77. INSTALL OIL COOLER TUBE UNION (OUTLET)

(a) Coat 2 new O-rings with ATF, and install them to the union.

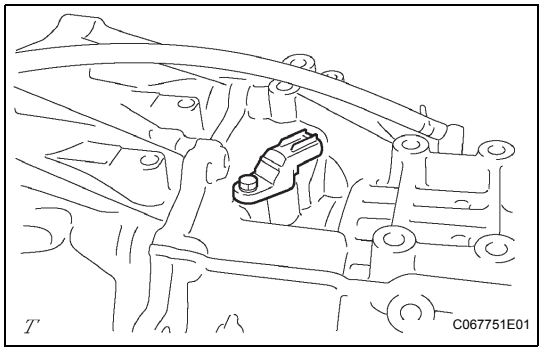
(b) Install the union.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



78. INSTALL OIL COOLER TUBE UNION (INLET)

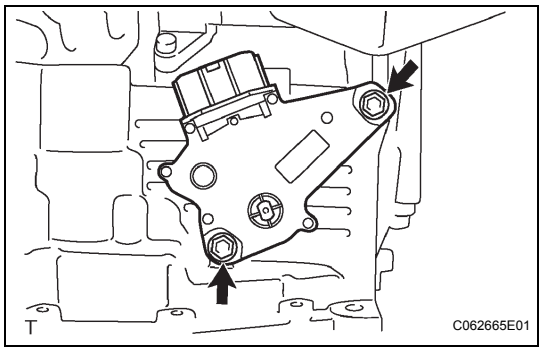
(a) Coat 2 new O-rings with ATF, and install them to the union.

(b) Install the union.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



79. INSTALL TRANSMISSION REVOLUTION SENSOR

(a) Install the transmission revolution sensor with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

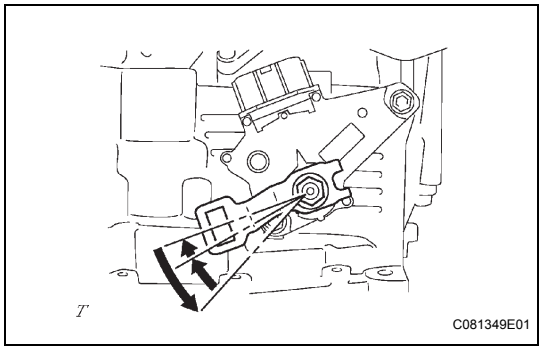


80. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Install the park/neutral position switch onto the manual valve lever shaft and temporarily install the 2 adjusting bolts.

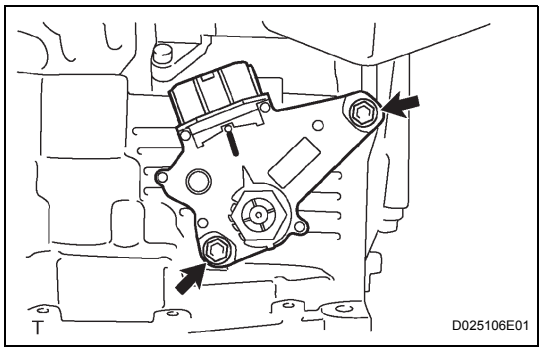
(b) Install a new lock washer with the nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

(c) Temporarily install the control shaft lever.

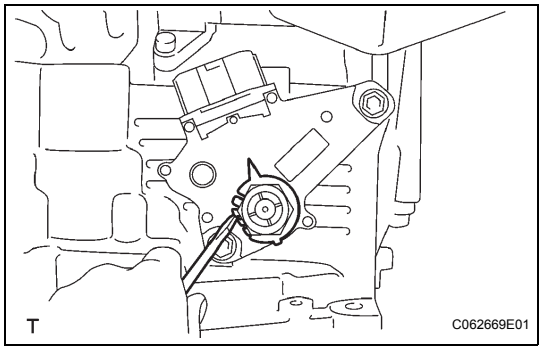


(d) Turn the lever counterclockwise until it stops, and then turn it clockwise 2 notches.

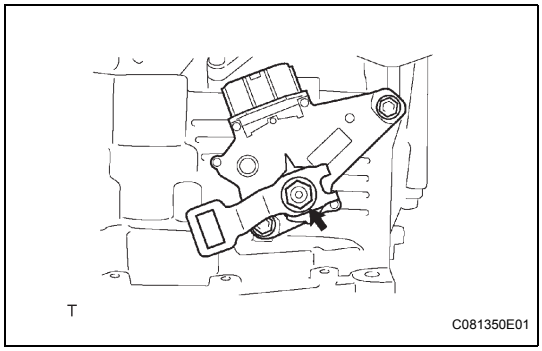
(e) Remove the control shaft lever.



(f) Align the groove with the neutral basic line.
(g) Tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



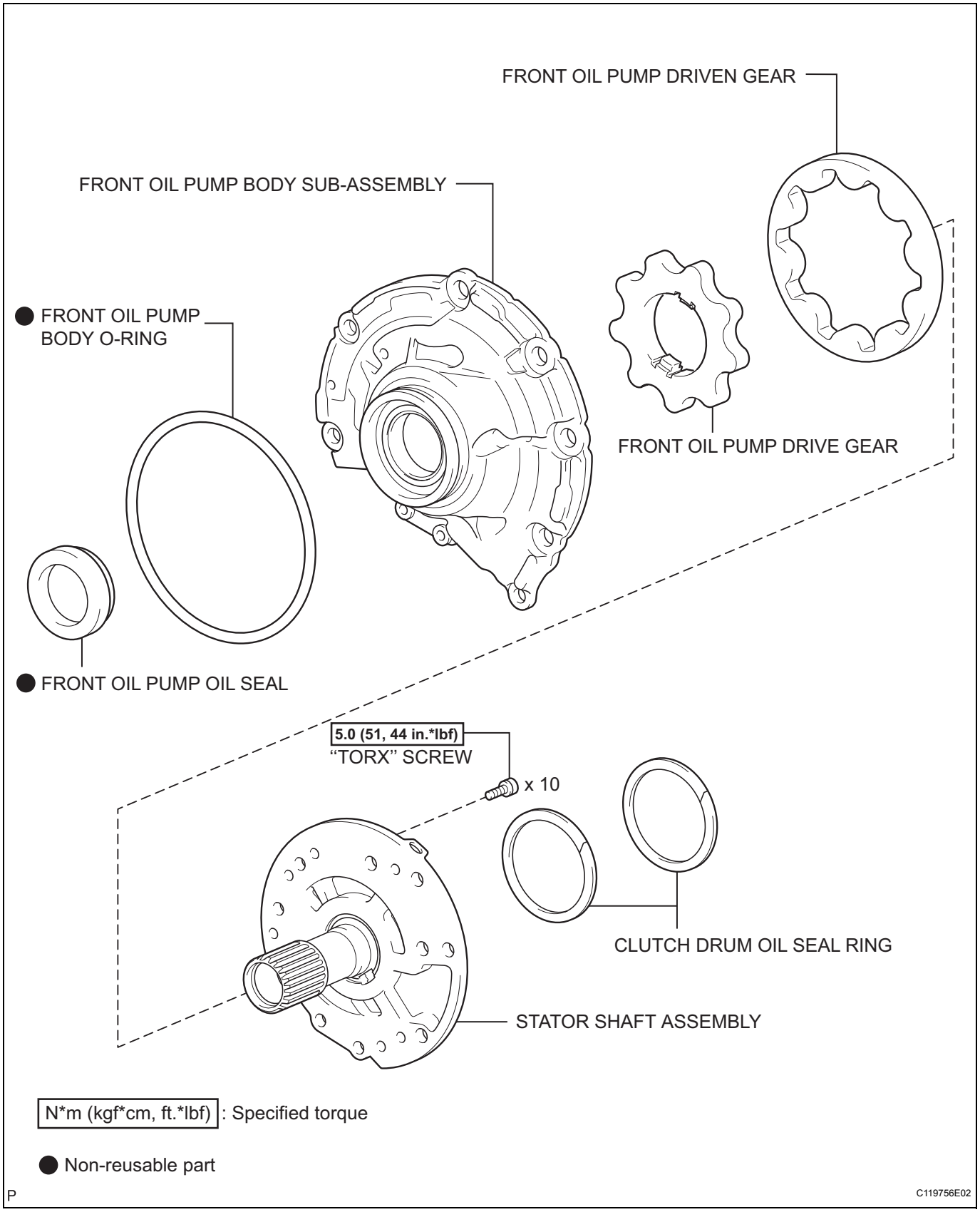
(h) Using a screwdriver, stake the nut with the lock washer.



(i) Install the control shaft lever, washer and nut.
Torque: 12.7 N*m (130 kgf*cm, 9 ft.*lbf)

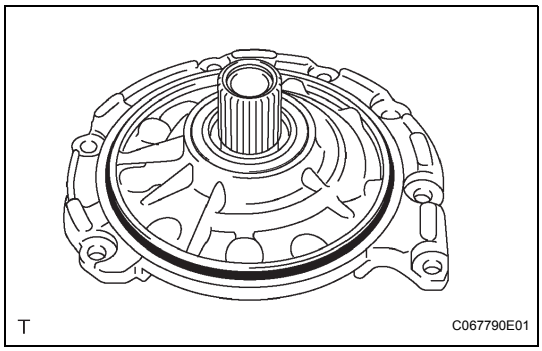
OIL PUMP

COMPONENTS

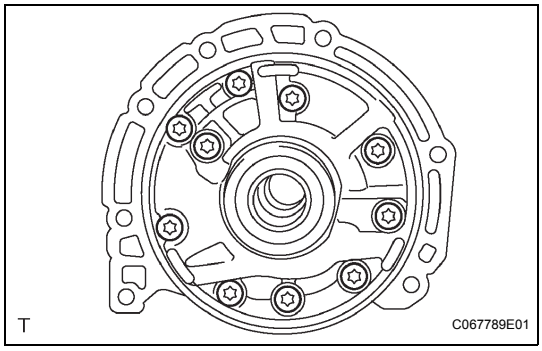


AX

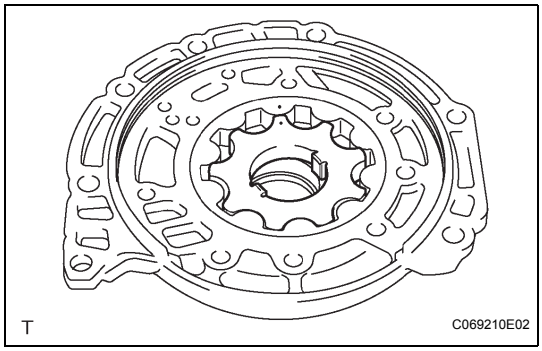
DISASSEMBLY



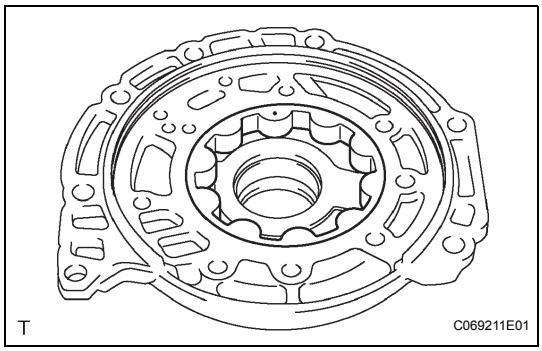
1. **REMOVE FRONT OIL PUMP BODY O-RING**
   (a) Remove the O-ring from the oil pump.
2. **INSPECT STATOR SHAFT ASSEMBLY (See page AX-201)**



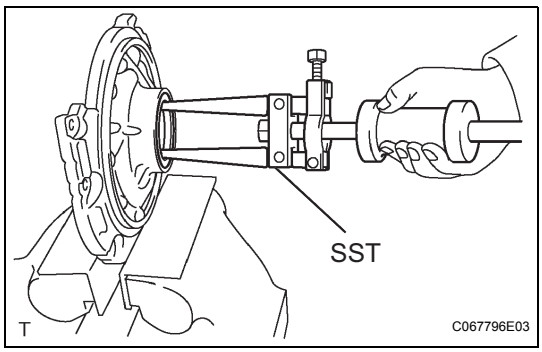
3. **REMOVE STATOR SHAFT ASSEMBLY**
   (a) Using a T30 "torx" socket wrench, remove the 10 screws.
4. **INSPECT CLEARANCE OF OIL PUMP ASSEMBLY (See page AX-201)**



5. **REMOVE FRONT OIL PUMP DRIVE GEAR**
   (a) Remove the front oil pump drive gear from the oil pump body.

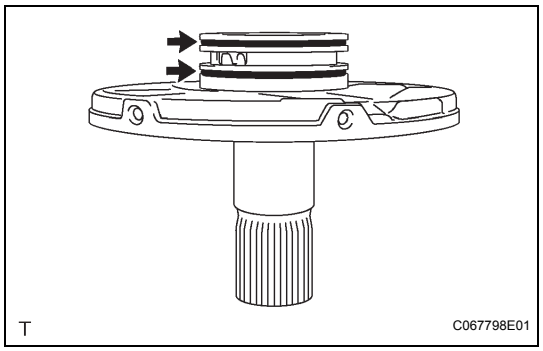


6. **REMOVE FRONT OIL PUMP DRIVEN GEAR**
   (a) Remove the front oil pump driven gear from the oil pump body.



7. **REMOVE FRONT OIL PUMP OIL SEAL**
   (a) Using SST, tap out the oil seal from the oil pump body.
   SST 09308-00010
8. **INSPECT FRONT OIL PUMP BODY SUB-ASSEMBLY (See page AX-202)**

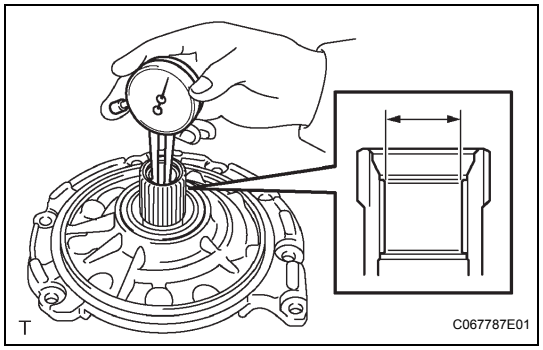
AX



9. REMOVE CLUTCH DRUM OIL SEAL RING

(a) Using a screwdriver, remove the 2 oil seals from the stator shaft.

INSPECTION

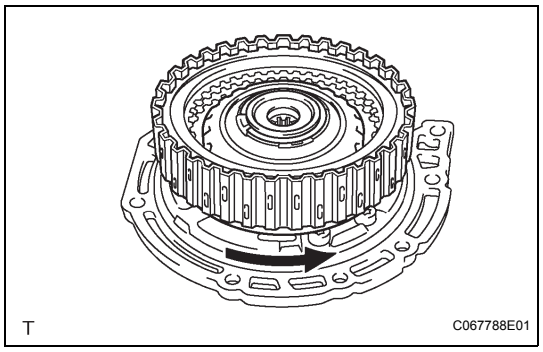


1. INSPECT STATOR SHAFT ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the stator shaft bushings.

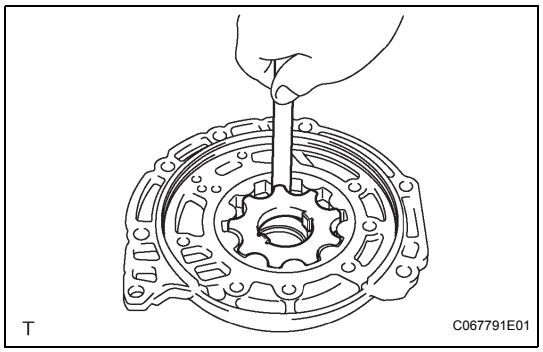
Standard inside diameter:
21.500 to 21.526 mm (0.84646 to 0.84748 in.)
Maximum inside diameter:
21.526 mm (0.84748 in.)

If the inside diameter is greater than the maximum, replace the stator shaft.



(b) Install the input shaft assembly to the stator shaft assembly, check that the input shaft assembly turns smoothly.

NOTICE:
Replace the stator shaft assembly with a new one if rough movement or unusual noise is identified. When replacing, inspect the input shaft's contact surface with the bearing and if any damage or discoloring is found, replace the input shaft with a new one.

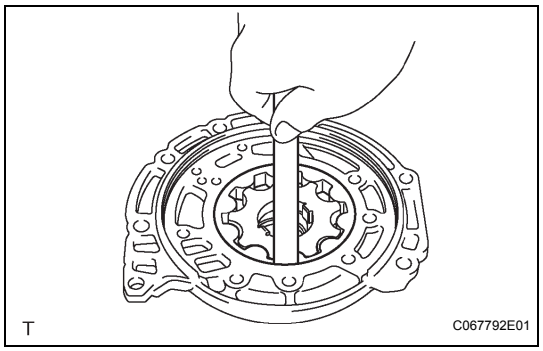


2. INSPECT CLEARANCE OF OIL PUMP ASSEMBLY

(a) Using a feeler gauge, measure the tip clearance between the driven gear teeth and drive gear teeth.

Standard tip clearance:
0.10 to 1.15 mm (0.0039 to 0.0059 in.)
Maximum tip clearance:
0.15 mm (0.0059 in.)

If the tip clearance is greater than the maximum, replace the oil pump body sub-assembly.

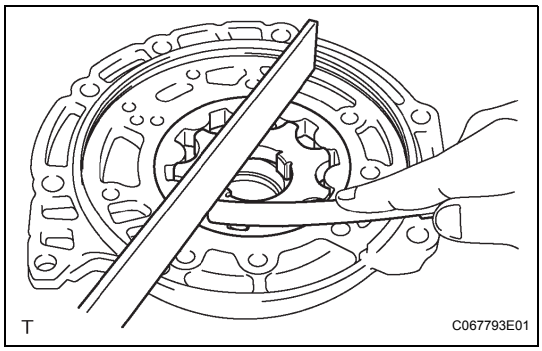


(b) Push the driven gear to one side of the body. Using a feeler gauge, measure the clearance.

Standard body clearance:
0.07 to 0.15 mm (0.0028 to 0.0059 in.)
Maximum body clearance:
0.15 mm (0.0059 in.)

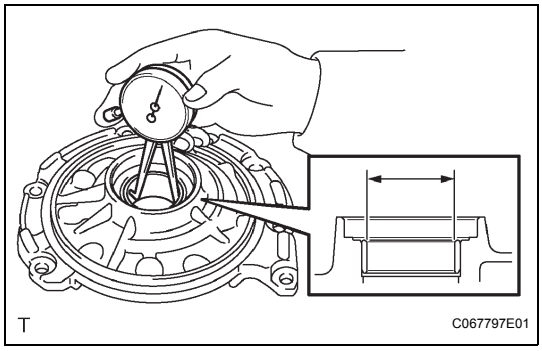
If the body clearance is greater than the maximum, replace the oil pump body sub-assembly.

AX



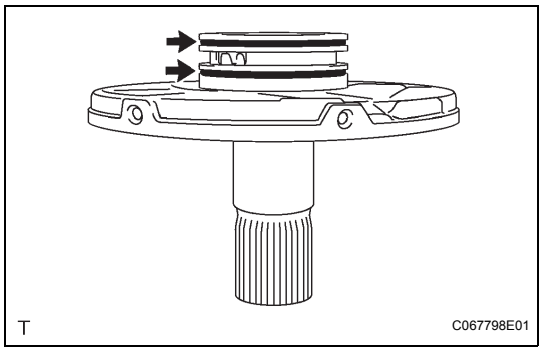
(c) Using a steel straightedge and feeler gauge, measure the side clearance of both gears.
Standard side clearance:
0.02 to 0.05 mm (0.0008 to 0.0020 in.)
Maximum side clearance:
0.05 mm (0.0020 in.)
If the side clearance is greater than the maximum, replace the drive gear, driven gear or pump body.
Standard driven gear thickness

No.	Thickness
1	9.44 to 9.45 mm (0.3709 to 0.3713 in.)
2	9.45 to 9.46 mm (0.3713 to 0.3717 in.)
3	9.46 to 9.47 mm (0.3717 to 0.3721 in.)
4	9.47 to 9.48 mm (0.3721 to 0.3725 in.)
5	9.48 to 9.49 mm (0.3725 to 0.3729 in.)

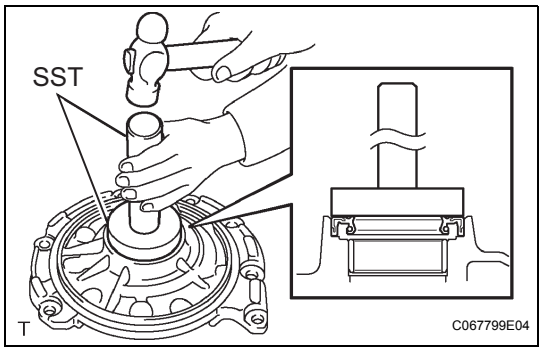


3. INSPECT FRONT OIL PUMP BODY SUB-ASSEMBLY
(a) Using a caliper gauge, measure the inside diameter of the oil pump body bushing.
Standard inside diameter:
38.113 to 38.138 mm (1.5005 to 1.5015 in.)
Maximum inside diameter:
38.138 mm (1.5015 in.)
If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.

REASSEMBLY

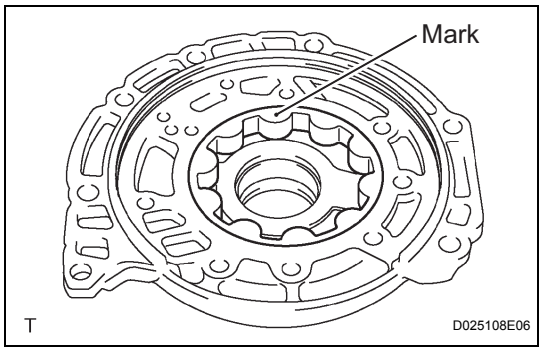


1. INSTALL CLUTCH DRUM OIL SEAL RING
(a) Install the 2 seal rings to the stator shaft assembly.



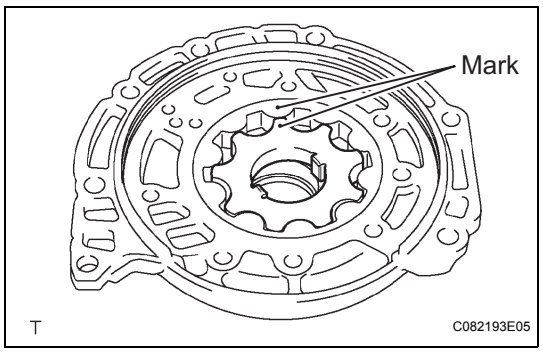
2. INSTALL FRONT OIL PUMP OIL SEAL
(a) Using SST and a hammer, tap in the oil seal to the oil pump body.
SST 09950-60010 (09951-00550), 09950-70010 (09951-07100)
Standard oil seal depth:
0 +-0.5 mm (0 +-0.020 in.)

AX



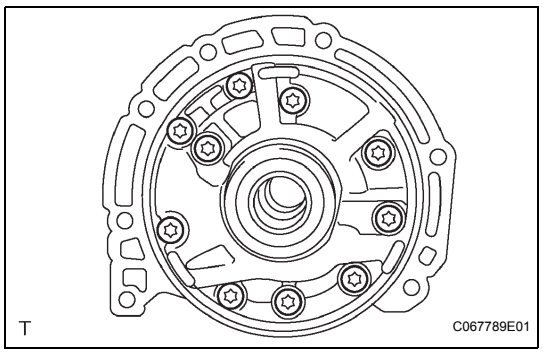
3. INSTALL FRONT OIL PUMP DRIVEN GEAR

(a) Apply ATF to the front oil pump driven gear and install it to the oil pump body with the marked side facing upward.



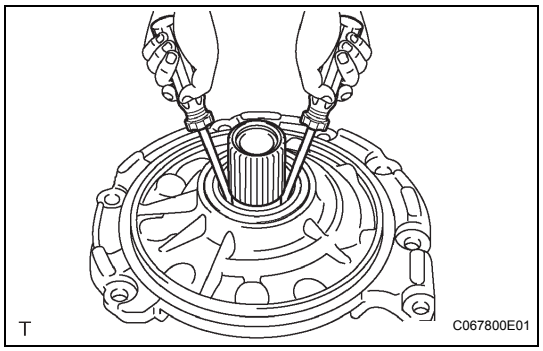
4. INSTALL FRONT OIL PUMP DRIVE GEAR

(a) Apply ATF to the front oil pump drive gear and install it to the oil pump body with the marked side facing upward.



5. INSTALL STATOR SHAFT ASSEMBLY

(a) Using a T30 "torx" socket wrench, install the 10 screws.

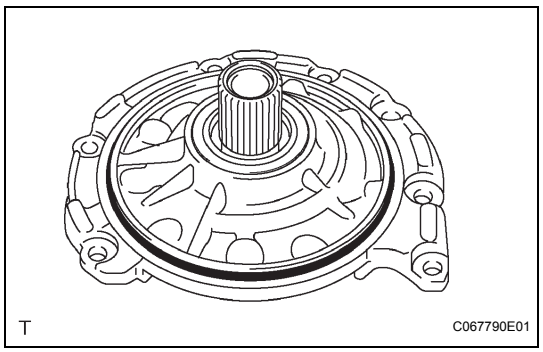


6. INSPECT OIL PUMP ASSEMBLY

(a) Turn the drive gear with 2 screwdrivers and make sure it rotates smoothly.

NOTICE:

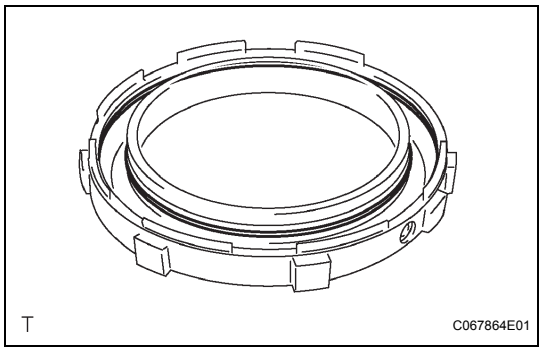
Be careful not to damage the lip of the oil seal.



7. INSTALL FRONT OIL PUMP BODY O-RING

(a) Apply ATF to the O-ring and install it to the oil pump.

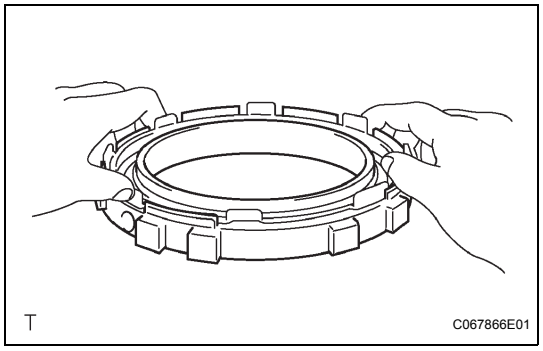
AX



REASSEMBLY

1. INSTALL 2ND BRAKE CYLINDER O-RING

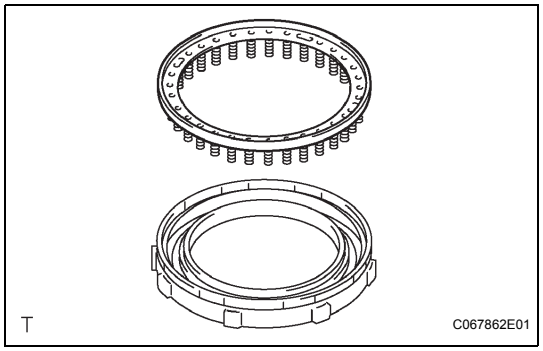
(a) Install 2 new O-rings to the 2nd brake cylinder.
NOTICE:
Be careful not to damage the O-rings.



2. INSTALL 2ND BRAKE PISTON

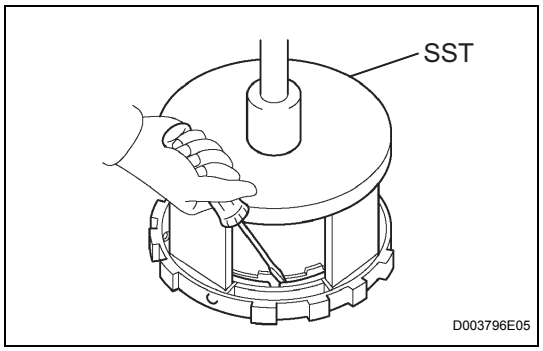
(a) Coat 2 new O-rings with ATF and install them in the 2nd brake cylinder.

(b) Be careful not to damage the O-rings and press in the 2nd brake piston into the 2nd brake cylinder with your hands.



3. INSTALL 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Install the piston return spring.

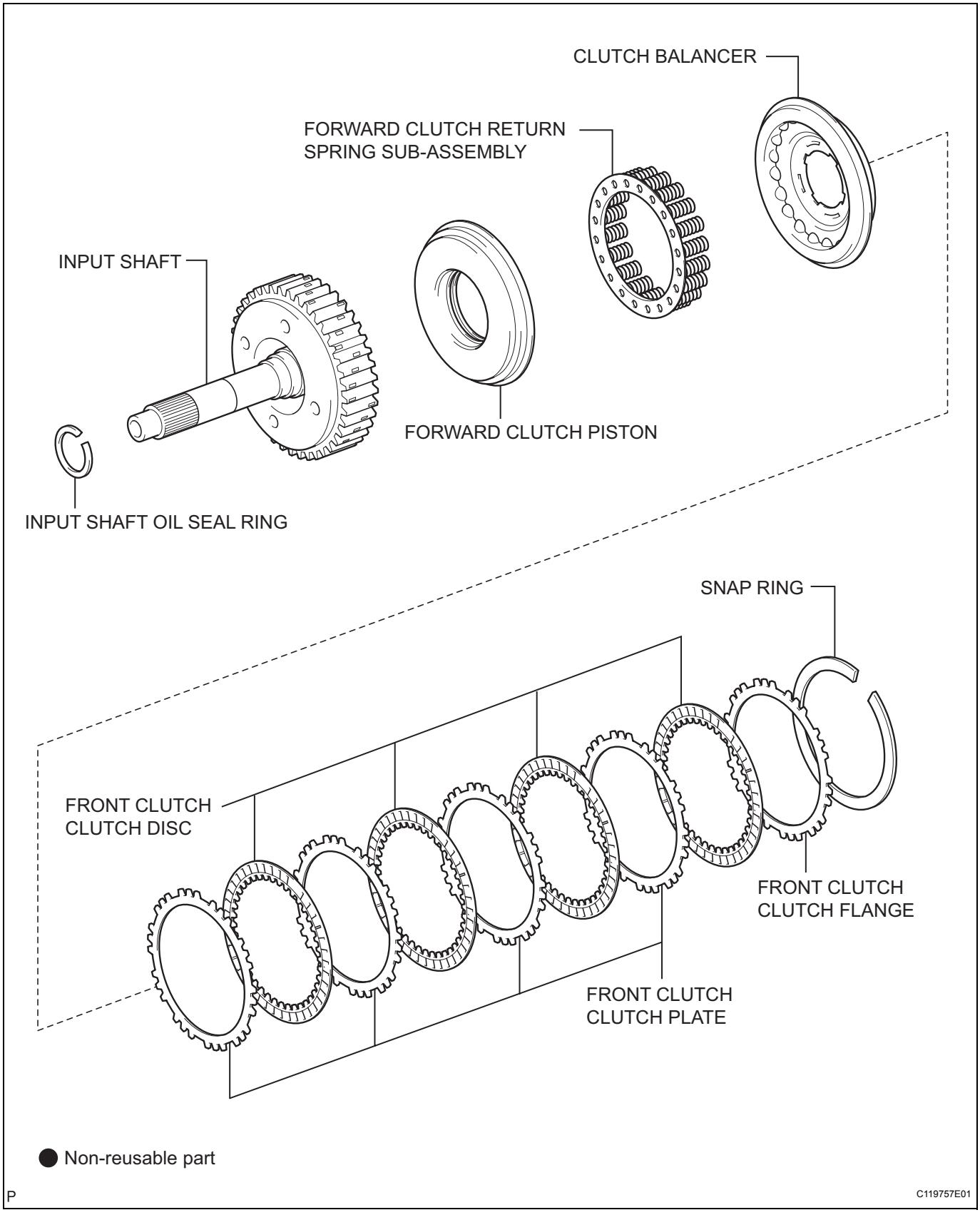


(b) Place SST on the piston return spring, and compress the piston return spring with a press.
SST 09387-00060

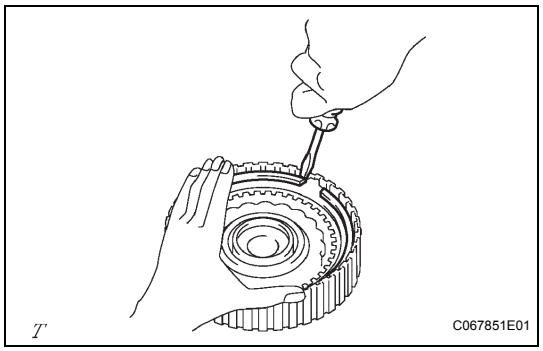
(c) Using a screwdriver, install the snap ring.
NOTICE:
Be sure the end gap of the snap ring is not aligned with the piston return spring claw.

INPUT SHAFT

COMPONENTS



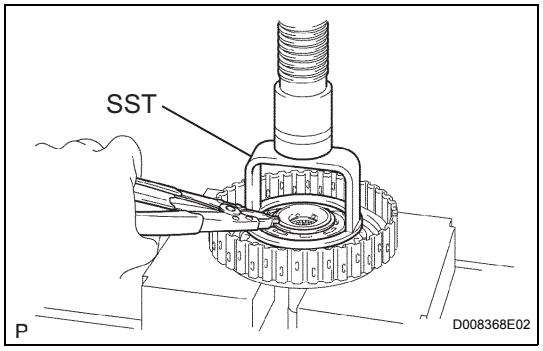
AX



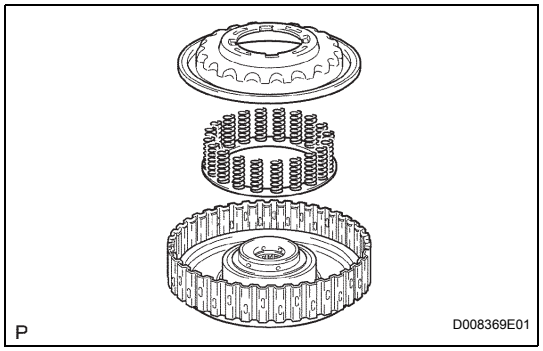
DISASSEMBLY

1. **REMOVE FRONT CLUTCH CLUTCH DISC**
   (a) Using a screwdriver, remove the snap ring.
   (b) Remove the flange, 4 discs and 4 plates.

2. **INSPECT FRONT CLUTCH CLUTCH DISC (See page AX-206)**

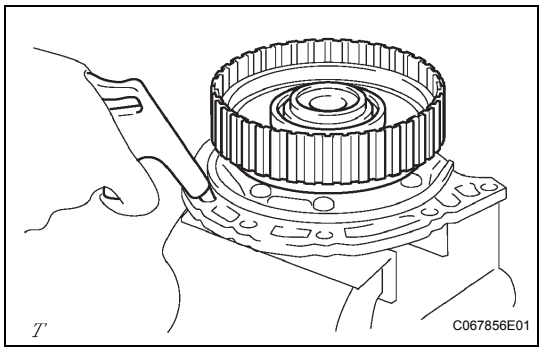


3. **REMOVE FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY**
   (a) Using SST on the clutch balancer, and compress the return spring with a press.
   SST 09320-89010
   NOTICE:
   Do not compress the return spring excessively.
   (b) Using a snap ring expander, remove the snap ring.

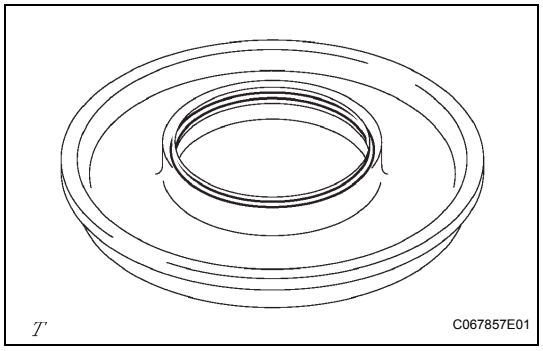


   (c) Remove the clutch balancer and piston return spring.

4. **INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY (See page AX-206)**

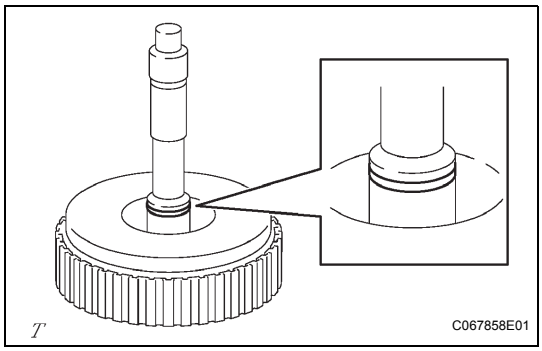


5. **REMOVE FORWARD CLUTCH PISTON**
   (a) Place the input shaft onto the oil pump.
   (b) Holding the forward clutch piston with your hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil pump to remove the forward clutch piston.
   HINT:
   When the piston cannot be removed because it is slanted, either blow air again with the protruding side pushed, or remove the piston using needle nose pliers with vinyl tape on its tip.



6. **REMOVE FORWARD CLUTCH PISTON O-RING**
   (a) Using a screwdriver, remove the O-ring.

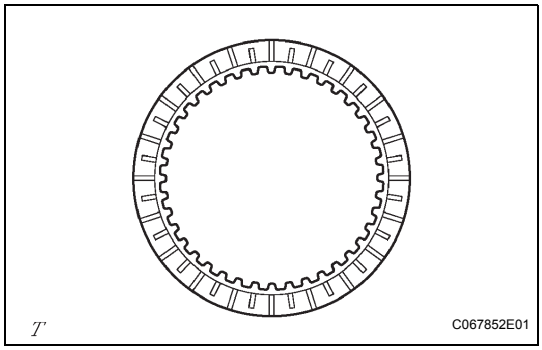
AX



7. REMOVE INPUT SHAFT OIL SEAL RING

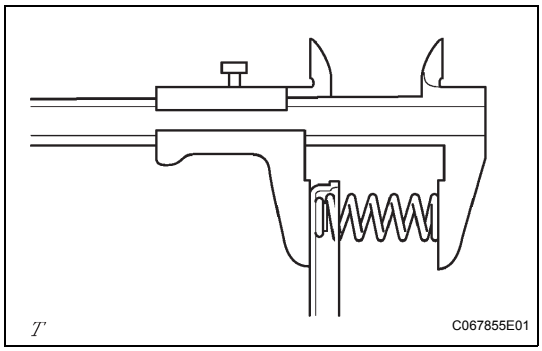
(a) Using a screwdriver, remove the oil seal ring from the input shaft.

INSPECTION



1. INSPECT FRONT CLUTCH CLUTCH DISC

(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc is peeling off or discolored, or even if a part of the printed number is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

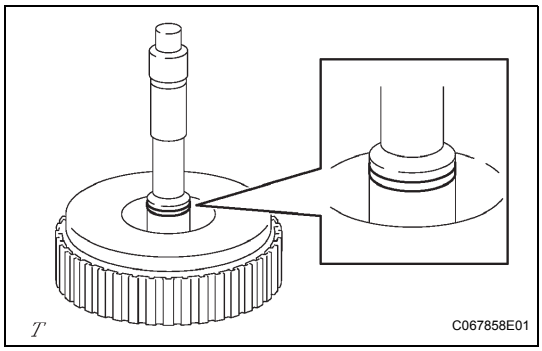


2. INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
Standard free length:
21.69 mm (0.8540 in)

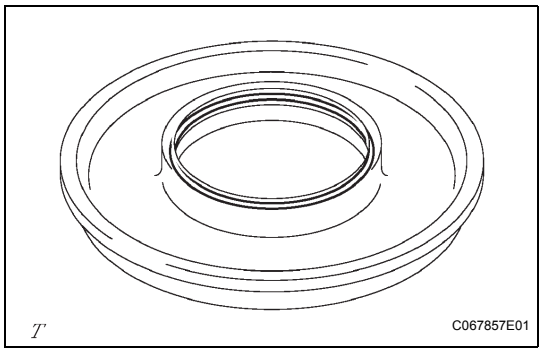
AX

REASSEMBLY



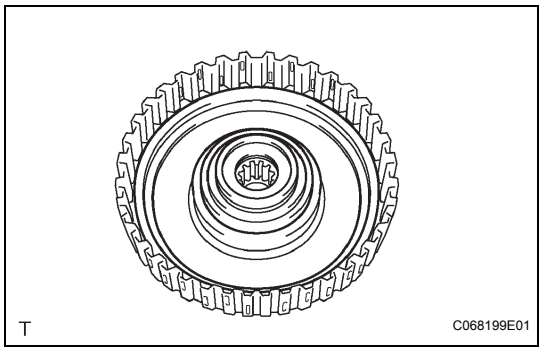
1. INSTALL INPUT SHAFT OIL SEAL RING

(a) Coat a new oil seal ring with ATF, and install it to the input shaft.



2. INSTALL FORWARD CLUTCH PISTON O-RING

(a) Coat a new O-ring with ATF, and install it to the forward clutch piston.

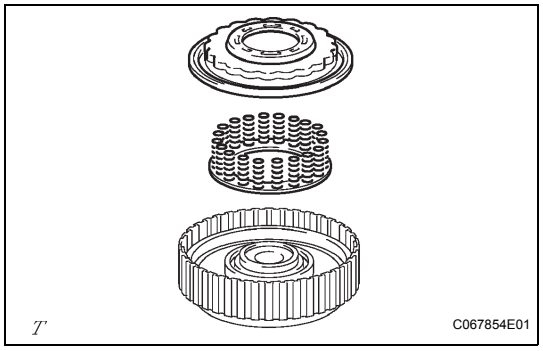


3. INSTALL FORWARD CLUTCH PISTON

(a) Install the forward clutch piston to the input shaft.

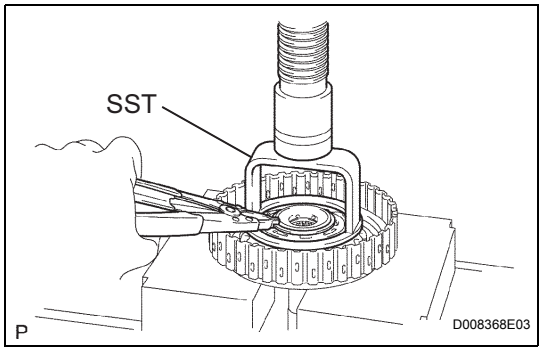
NOTICE:

Be careful not to damage the O-ring.



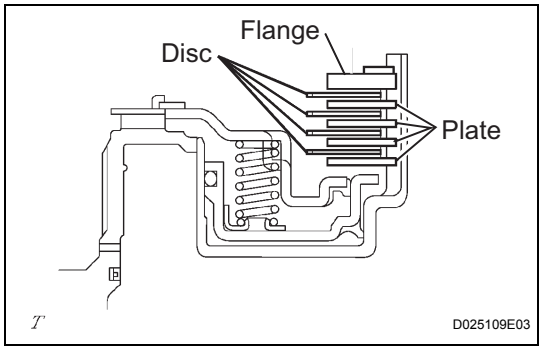
4. INSTALL FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Install the clutch balancer and return spring to the input shaft.



(b) Using SST, a press and snap ring pliers, install the snap ring to the forward clutch return spring.

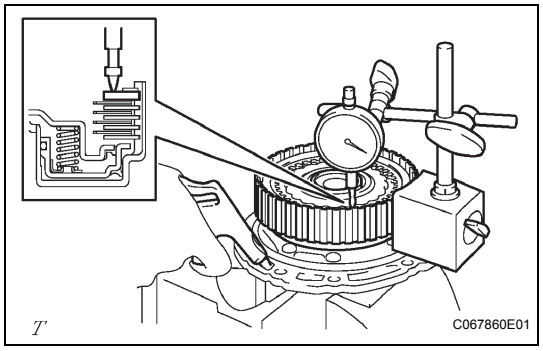
SST 09320-89010



5. INSTALL FRONT CLUTCH CLUTCH DISC

(a) Install the 4 plates, 4 discs and flange.

(b) Using a screwdriver, install the snap ring.



6. INSPECT PACK CLEARANCE OF FORWARD CLUTCH

(a) Using a dial indicator, measure the pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Standard pack clearance:

1.406 to 1.806 mm (0.05535 to 0.07110 in.)

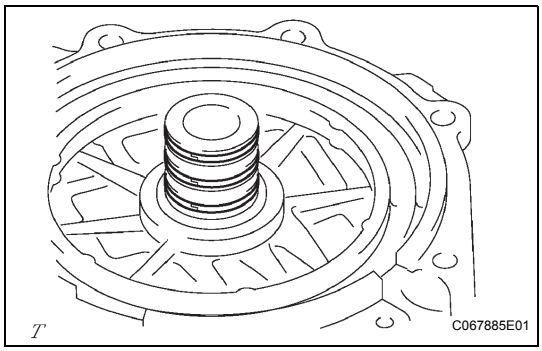
If the pack clearance is less than the limit, parts may have been assembled incorrectly. Check and reassemble.

AX

If the clearance is non-standard, select another flange.

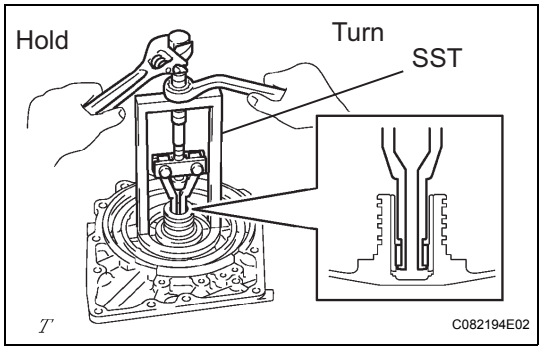
Standard flange thickness

No.	Thickness	No.	Thickness
-	3.00 mm (0.1181 in.)	2	3.40 mm (0.1339 in.)
1	3.20 mm (0.1260 in.)	3	3.60 mm (0.1417 in.)



6. REMOVE CLUTCH DRUM OIL SEAL RING

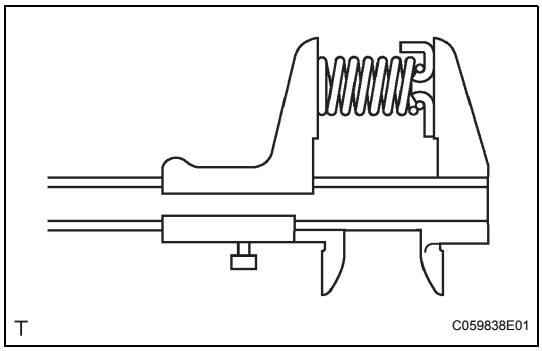
(a) Remove the 3 oil seal rings.



7. REMOVE TRANSAXLE REAR COVER NEEDLE ROLLER BEARING

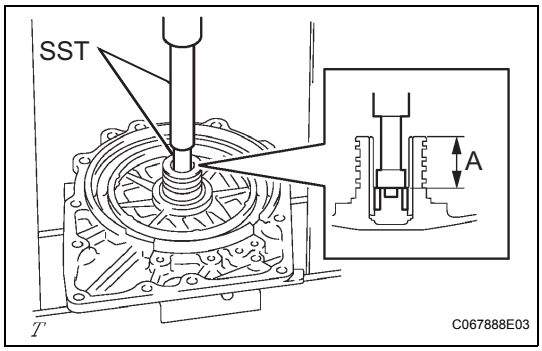
(a) Using SST, remove the bearing.
SST 09387-00041 (09387-01021)

INSPECTION



1. INSPECT OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

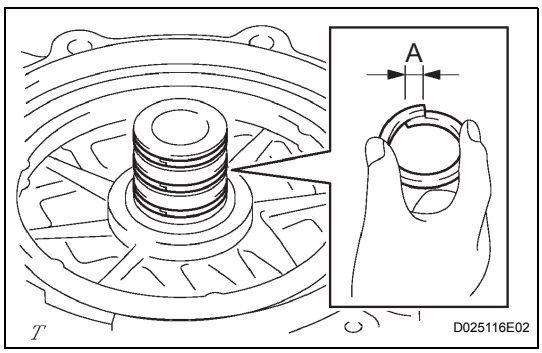
(a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
Standard free length:
17.88 mm (0.7039 in.)



REASSEMBLY

1. INSTALL TRANSAXLE REAR COVER NEEDLE ROLLER BEARING

(a) Using SST and a press, press in the new bearing to the transaxle rear cover.
SST 09950-60010 (09951-00190, 09952-06010), 09950-70010 (09951-07100)
Standard clearance A:
25.2 mm (0.992 in.)

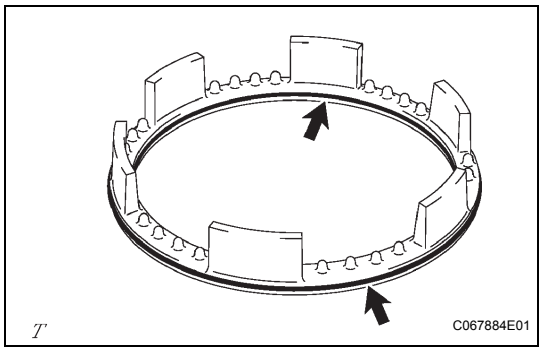


2. INSTALL CLUTCH DRUM OIL SEAL RING

(a) Compress the oil seal ring from both sides to reduce dimension A.
Standard dimension A:
5.0 mm (0.197 in.)

(b) Coat the oil seal ring with ATF and install it to the transaxle rear cover.

AX

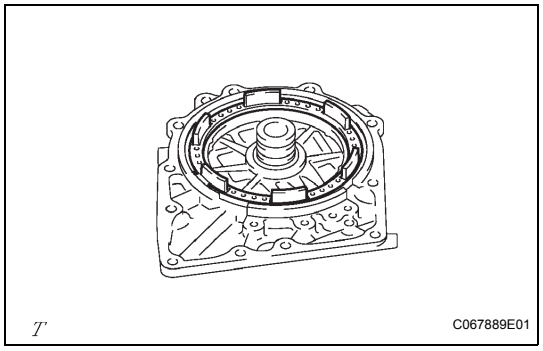


3. INSTALL 2ND COAST AND OVERDRIVE O-RING

(a) Coat 2 new O-rings with ATF, and install them to the transaxle rear cover.

NOTICE:

Be careful not to damage the lip of the oil seal.

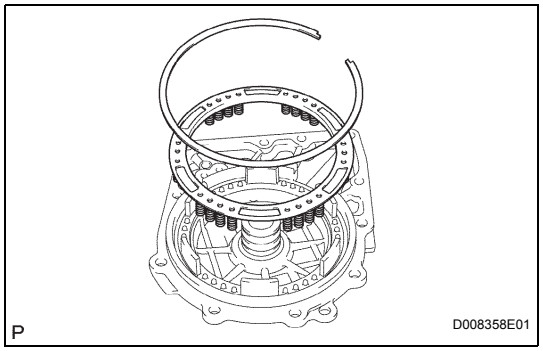


4. INSTALL 2ND COAST AND OVERDRIVE BRAKE PISTON

(a) Coat the piston with ATF, and install it to the transaxle rear cover.

NOTICE:

Be careful not to damage the lip of the oil seal.



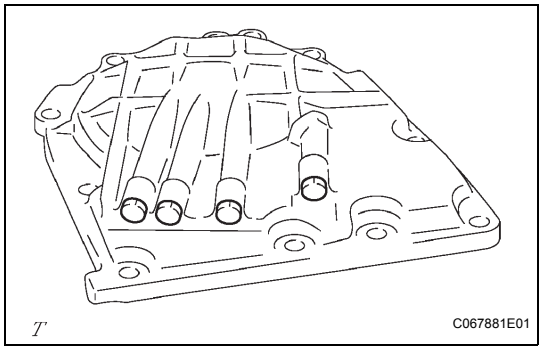
5. INSTALL OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST and a press, press in the overdrive brake return spring and snap ring to the transaxle rear cover.

SST 09387-00070

NOTICE:

Stop the press when the overdrive brake piston is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the overdrive brake piston from being deformed.



6. INSTALL TRANSAXLE REAR COVER PLUG

(a) Install 4 new O-rings and the 4 cover plugs to the transaxle rear cover.

Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)

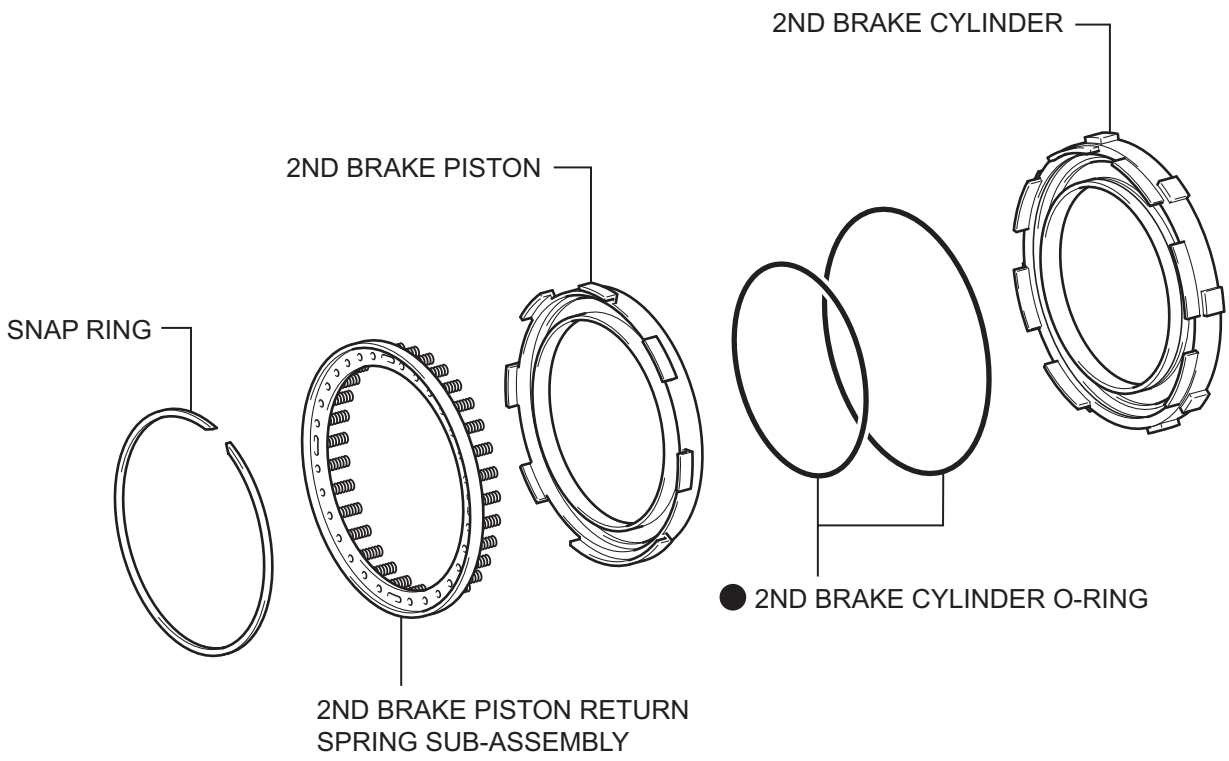
NOTICE:

Be careful not to damage the lip of the oil seal.

AX

SECOND BRAKE PISTON

COMPONENTS

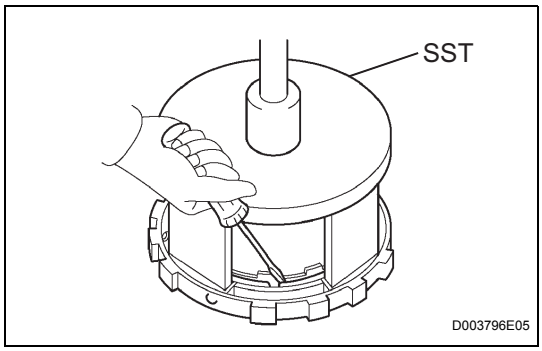


● Non-reusable part

P

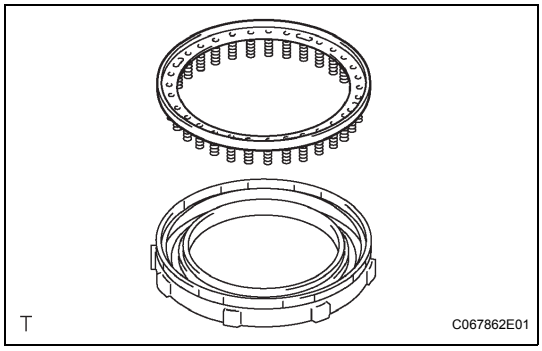
C119758E01

AX



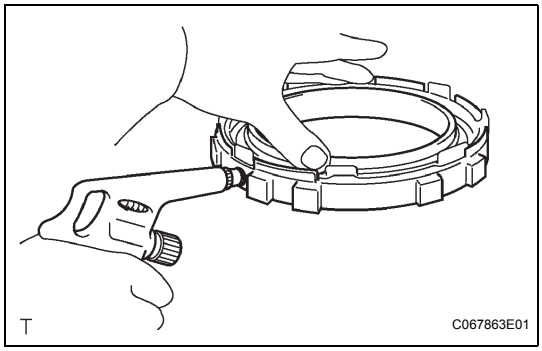
DISASSEMBLY

1. **REMOVE 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY**
   (a) Place SST on the piston return spring and compress the piston return spring with a press.
   SST 09387-00060
   (b) Using a screwdriver, remove the snap ring.



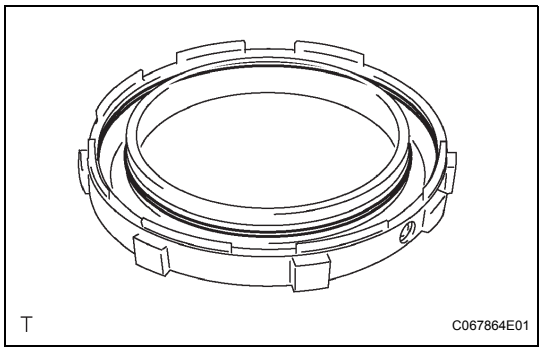
   (c) Remove the piston return spring from the 2nd brake cylinder.

2. **INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY (See page AX-210)**



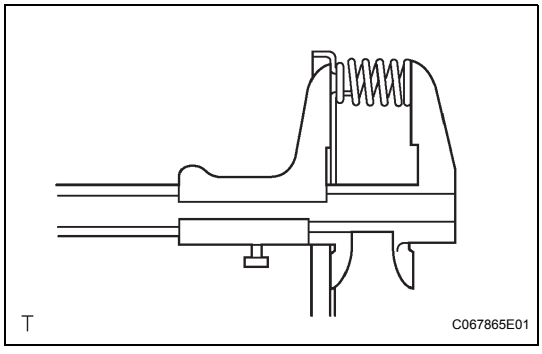
3. **REMOVE 2ND BRAKE PISTON**
   (a) Hold the 2nd brake piston and apply compressed air (392 kPa,4.0 kgf/cm^2, 57 psi) to the 2nd brake cylinder to remove the 2nd brake piston.

AX



4. **REMOVE 2ND BRAKE CYLINDER O-RING**
   (a) Using a screwdriver, remove the 2 O-rings from the 2nd brake cylinder.

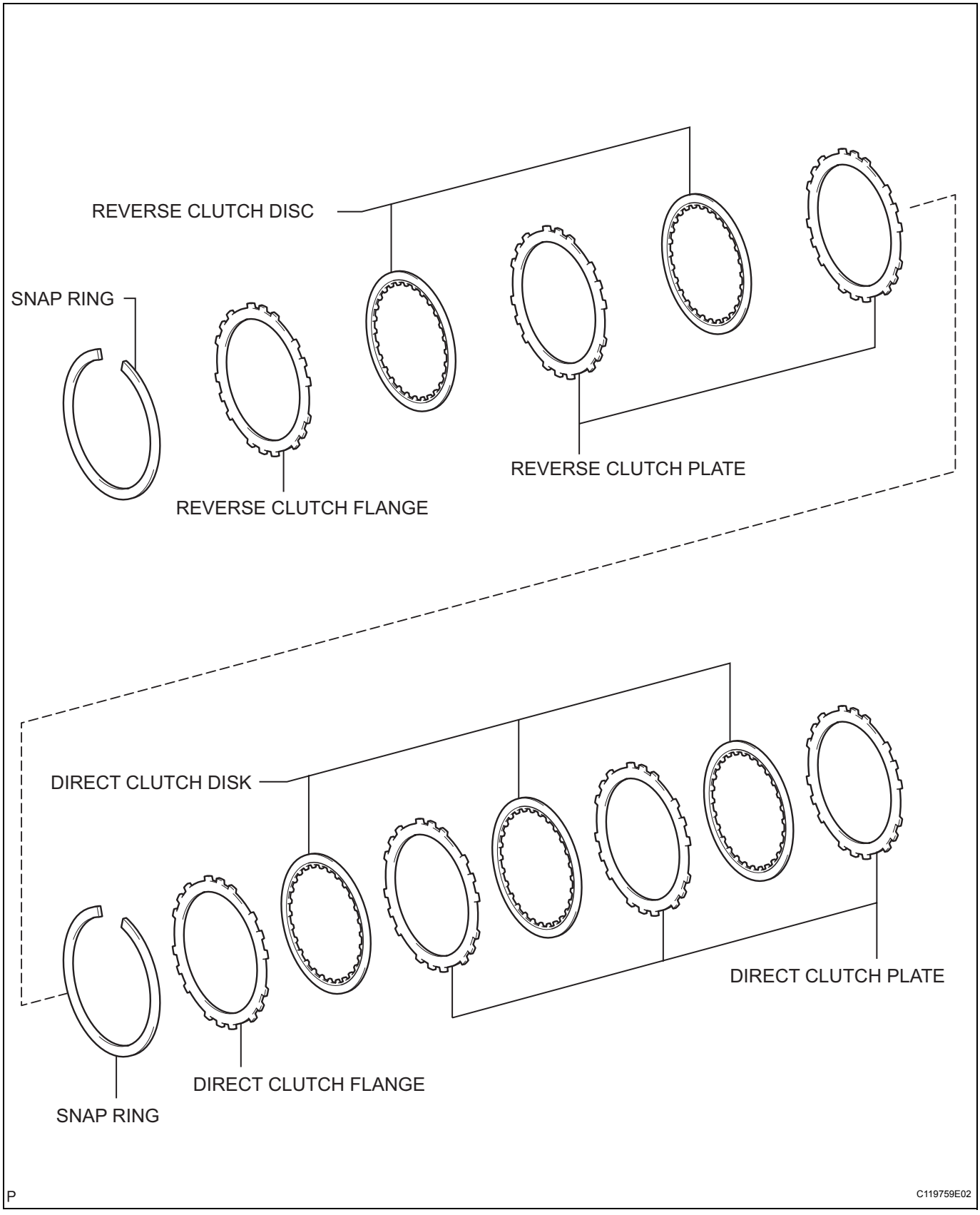
INSPECTION

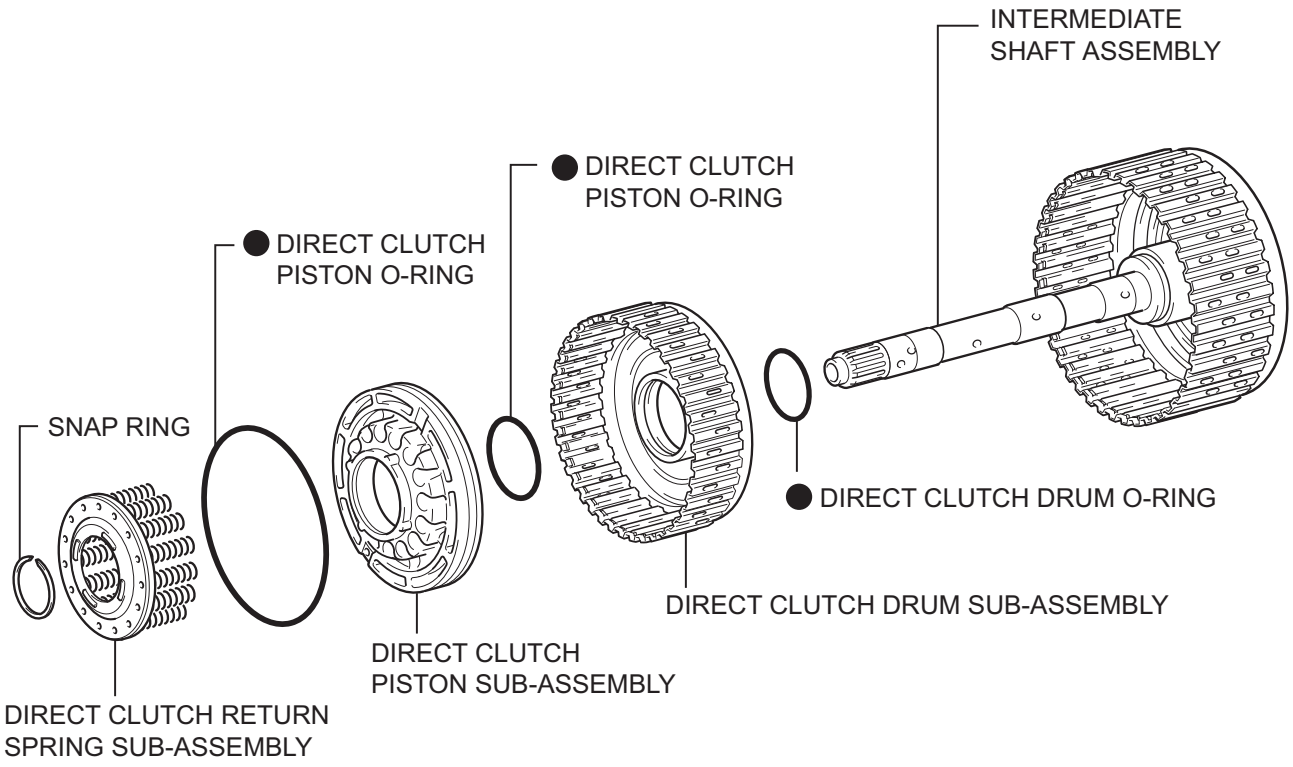


1. **INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY**
   (a) Using a vernier caliper, measure the free length of the spring together with the spring seat.
   Standard free length:
   14.65 mm (0.5768 in.)

INTERMEDIATE SHAFT

COMPONENTS



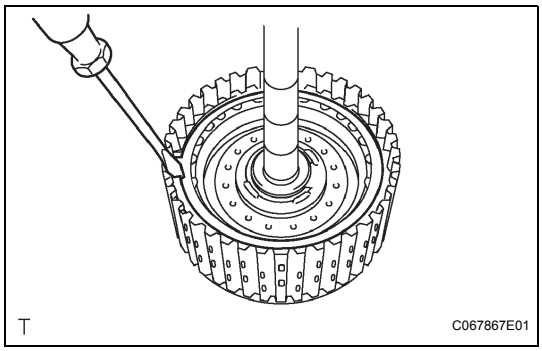


● Non-reusable part

P

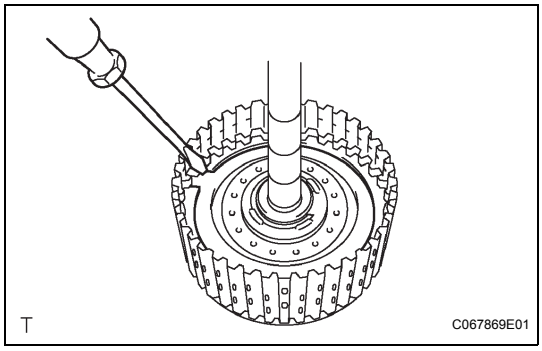
C119760E01

AX

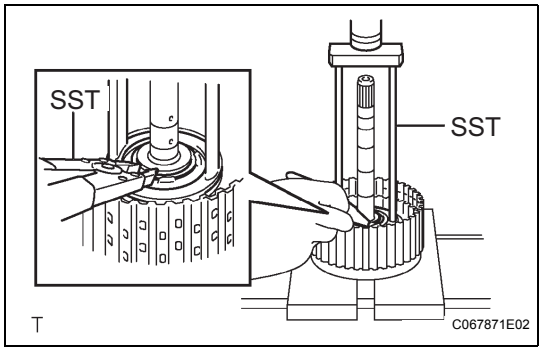


DISASSEMBLY

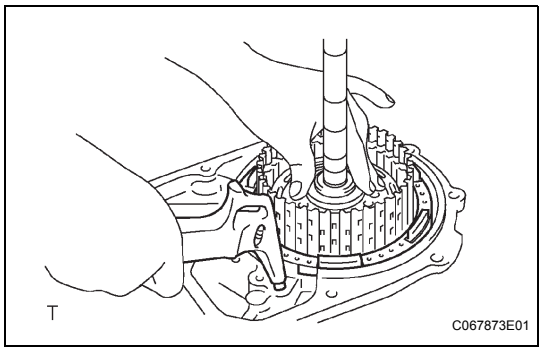
1. **REMOVE REVERSE CLUTCH DISC**
   (a) Using a screwdriver, remove the snap ring.
   (b) Remove the flange, 2 discs and 2 plates.
2. **INSPECT REVERSE CLUTCH DISC (See page AX-215)**



3. **REMOVE DIRECT CLUTCH DISK**
   (a) Using a screwdriver, remove the snap ring.
   (b) Remove the 3 plates, flange and 3 discs.
4. **INSPECT DIRECT CLUTCH DISK (See page AX-215)**



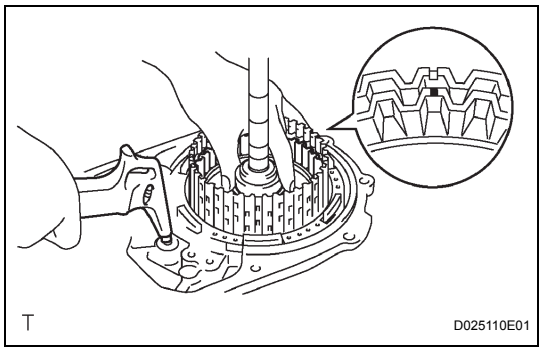
5. **REMOVE DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY**
   (a) Using SST and a press, remove the snap ring and direct clutch return spring from the intermediate shaft.
6. **INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY (See page AX-216)**



7. **REMOVE DIRECT CLUTCH PISTON SUB-ASSEMBLY**
   (a) Install the direct and reverse clutch on the transaxle rear cover.
   (b) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle rear cover to remove the direct clutch drum and direct clutch piston.
   NOTICE:
   - **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
   - **Take care not to splash ATF when blowing air.**

   HINT:
   When the piston cannot be removed because it is slanted, either blow air again with the protruding side pushed, or remove the piston using needle nose pliers with vinyl tape on its tip.
8. **INSPECT DIRECT CLUTCH PISTON SUB-ASSEMBLY (See page AX-216)**

AX

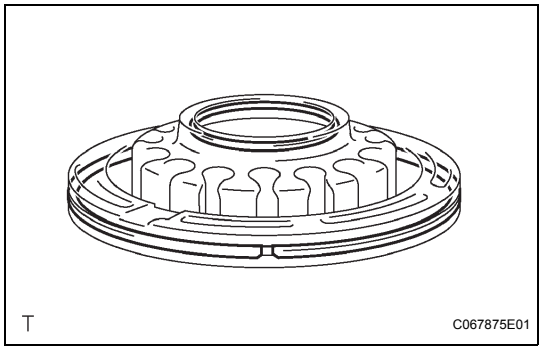


9. REMOVE DIRECT CLUTCH DRUM SUB-ASSEMBLY

(a) Put a matchmark on the direct clutch drum at the same position with the cutout of the intermediate shaft.

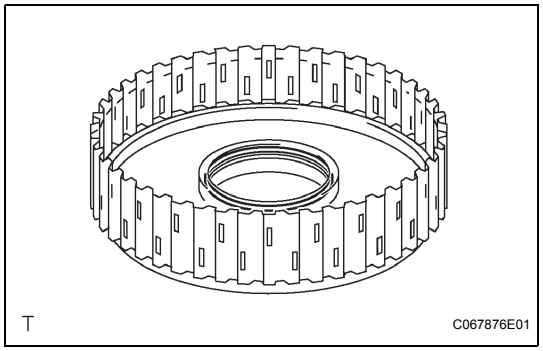
(b) Apply compressed air into the oil hole shown in the illustration and remove the direct clutch drum from the intermediate shaft.

10. INSPECT INTERMEDIATE SHAFT SUB-ASSEMBLY (See page AX-216)



11. REMOVE DIRECT CLUTCH PISTON O-RING

(a) Using a screwdriver, remove the 2 O-rings.

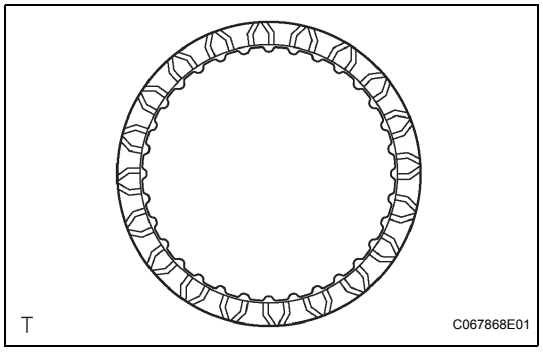


12. REMOVE DIRECT CLUTCH DRUM O-RING

(a) Using a screwdriver, remove the 2 O-rings.

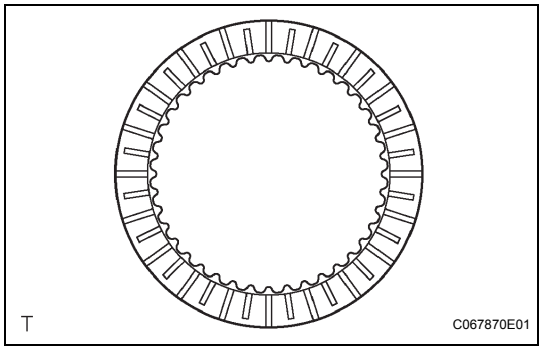
AX

INSPECTION



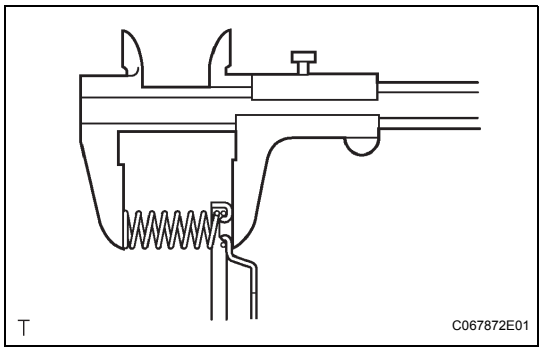
1. INSPECT REVERSE CLUTCH DISC

(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



2. INSPECT DIRECT CLUTCH DISK

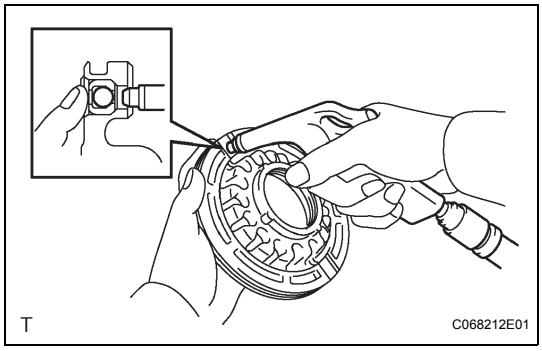
(a) Visually check if the sliding surface of the disc, plate and flange are worn or burnt. Replace as necessary.
HINT:
- If the lining of the disc peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



3. INSPECT DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Using a vernier caliper, measure the free length of the spring together with the spring seat.

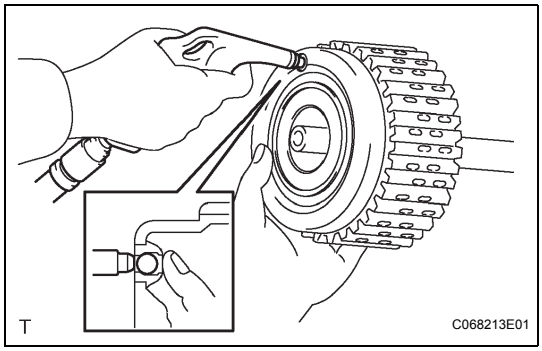
Standard free length:
32.9 mm (1.2953 in.)



4. INSPECT DIRECT CLUTCH PISTON SUB-ASSEMBLY

(a) Shake the direct clutch pin and check that a check ball is not stuck.

(b) Apply low pressure air to the check ball with compressed air and check that no air leak is identified.



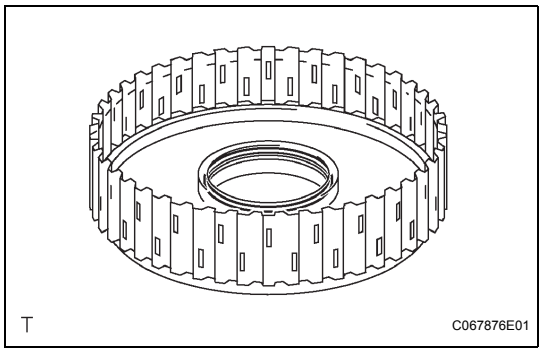
5. INSPECT INTERMEDIATE SHAFT SUB-ASSEMBLY

(a) Shake the direct clutch pin and check that a check ball is not stuck.

(b) Apply low pressure compressed air to the check ball and check that no air leak is identified.

AX

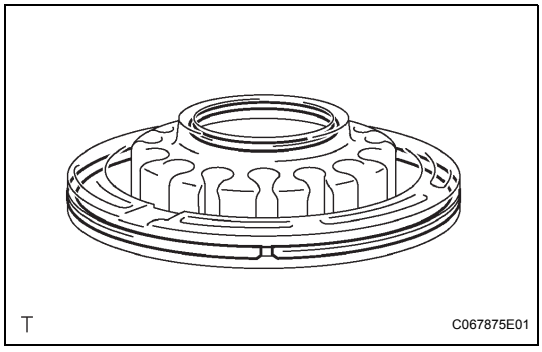
REASSEMBLY



1. INSTALL DIRECT CLUTCH DRUM O-RING

(a) Coat the 2 O-rings with ATF, and install it to the direct clutch drum.

NOTICE:
Be careful not to damage the O-rings.



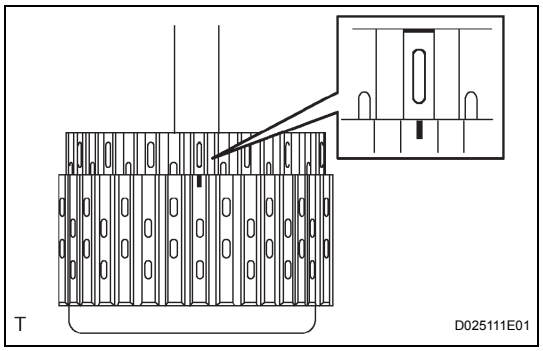
2. INSTALL DIRECT CLUTCH PISTON O-RING

(a) Coat the 2 O-rings with ATF, and install it to the direct clutch piston.

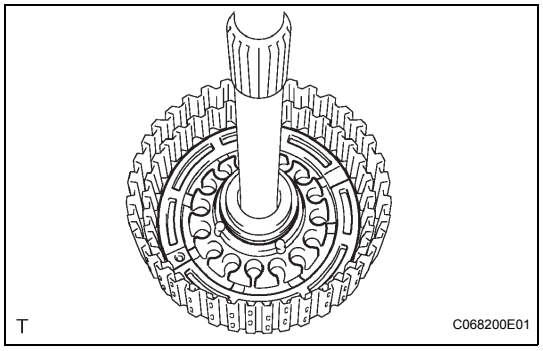
NOTICE:
Be careful not to damage the O-rings.

3. INSTALL DIRECT CLUTCH DRUM SUB-ASSEMBLY

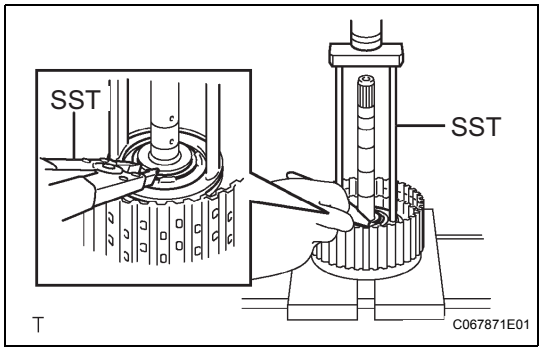
(a) Coat the direct clutch drum with ATF.



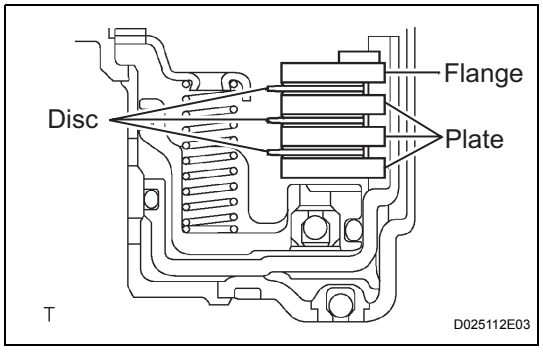
(b) Aligning the cutout in the intermediate shaft with the matchmark on the direct clutch drum, install the direct clutch drum to the intermediate shaft.
NOTICE:
Be careful not to damage the O-ring and the lip of the clutch drum.



4. INSTALL DIRECT CLUTCH PISTON SUB-ASSEMBLY
(a) Coat the direct clutch piston with ATF, and install it to the intermediate shaft.
NOTICE:
Do not damage the O-ring of the direct clutch piston.

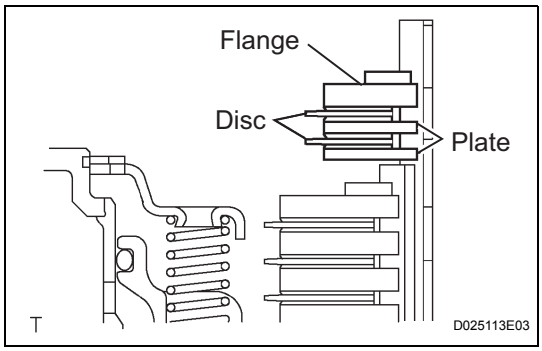


5. INSTALL DIRECT CLUTCH RETURN SPRING SUB-ASSEMBLY
(a) Install the direct clutch return spring on the direct clutch piston.
(b) Place SST on the piston return spring and compress the springs with a press.
SST 09387-00020
(c) Using a snap ring expander, install the snap ring from the direct clutch drum.
NOTICE:
- **Stop the press when the spring sheet is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the spring sheet from being deformed.**
- **Do not expand the snap ring excessively.**



6. INSTALL DIRECT CLUTCH DISK
(a) Coat the 3 plates, 3 discs and flange with ATF, and install them to the intermediate shaft.
(b) Install the snap ring.

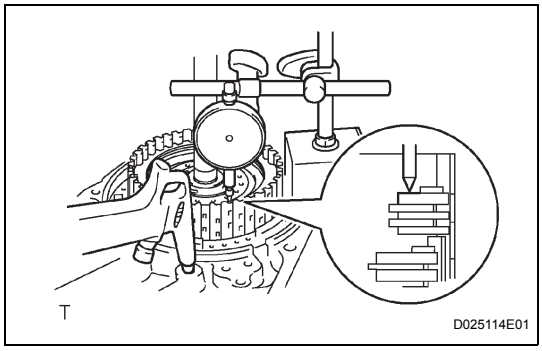
AX



7. INSTALL REVERSE CLUTCH DISC

(a) Install the 2 plates, 2 discs and flange.

(b) Install the snap ring.



8. INSPECT PACK CLEARANCE OF REVERSE CLUTCH

(a) Install the forward reverse clutch and thrust needle roller bearing on the transaxle rear cover.

(b) Using a dial indicator, measure the reverse clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Standard pack clearance:

0.86 to 1.26 mm (0.0339 to 0.0496 in.)

If the pack clearance is less than the limit of pack clearance, parts may have been assembled incorrectly. Check and reassemble.

If the pack clearance is non-standard, select another flange.

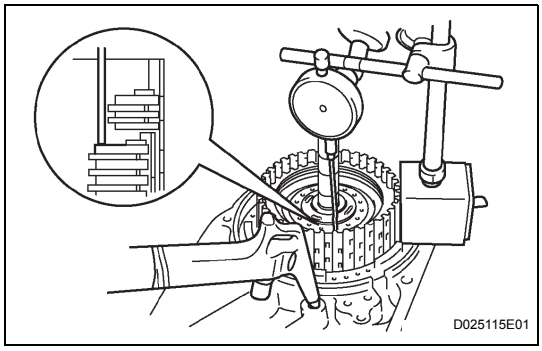
HINT:

There are 4 flanges with different thickness.

Standard flange thickness

No.	Thickness	No.	Thickness
-	3.0 mm (0.118 in.)	2	3.4 mm (0.134 in.)
1	3.2 mm (0.126 in.)	3	3.6 mm (0.142 in.)

AX



9. INSPECT PACK CLEARANCE OF DIRECT CLUTCH

(a) Install the direct and reverse clutch and thrust needle roller bearing on the transaxle rear cover.

(b) Using a dial indicator and measuring terminal (SST), measure the forward clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

SST 09350-36010

HINT:

The direct and reverse clutch will come out as you apply the compressed air. Therefore, while the checking is being done, press on the input shaft of the direct and reverse clutch using a stamping machine or equivalent so that the pressure is not applied on the direct and reverse clutch.

Standard pack clearance:

0.62 to 1.02 mm (0.0244 to 0.0402 in.)

If the pack clearance is less than the limit of pack clearance, parts may have been assembled incorrectly. Check and reassemble.

If the pack clearance is non-standard, select another flange.

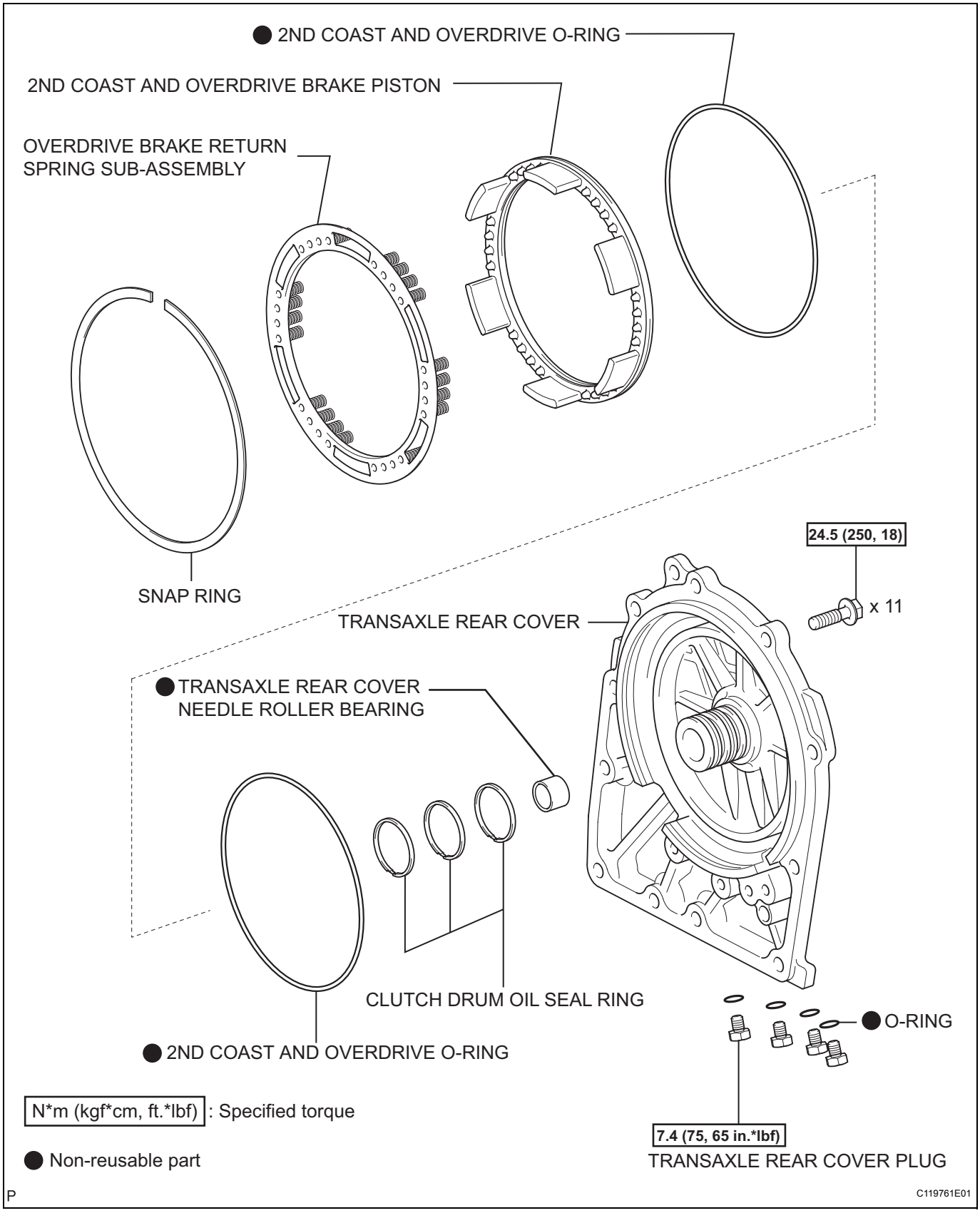
HINT:
There are 4 flanges with different thickness.

Standard flange thickness

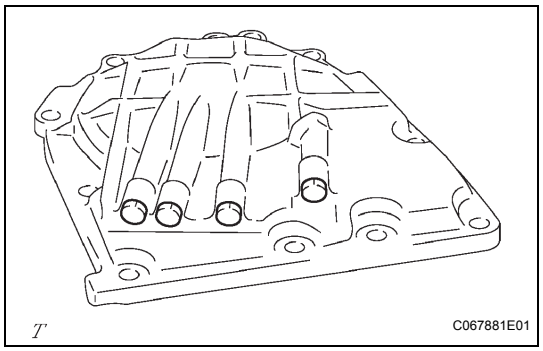
No.	Thickness	No.	Thickness
-	3.0 mm (0.118 in.)	2	3.4 mm (0.134 in.)
1	3.2 mm (0.126 in.)	3	3.6 mm (0.142 in.)

TRANSAXLE REAR COVER

COMPONENTS



AX

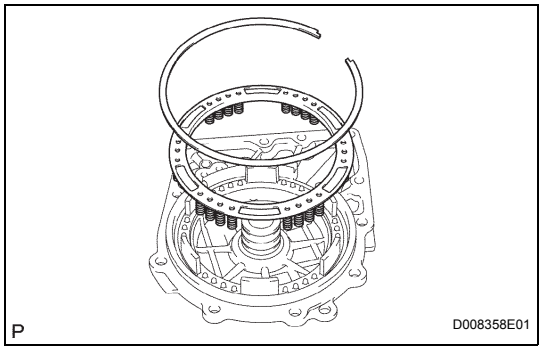


DISASSEMBLY

1. REMOVE TRANSAXLE REAR COVER PLUG

(a) Remove the 4 transaxle rear cover plugs from the transaxle rear cover.

(b) Using a screwdriver, remove the O-ring from the transaxle rear cover plug.



2. REMOVE OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using SST, a press and screwdriver, remove the snap ring.

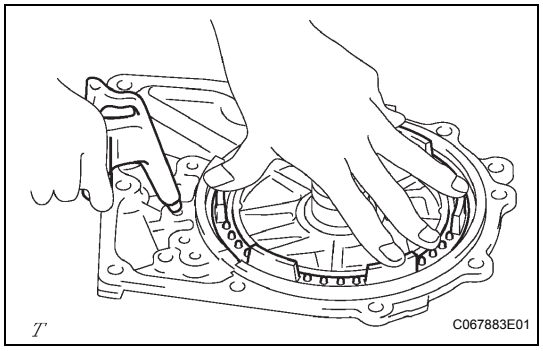
SST 09387-00070

NOTICE:

Stop the press when the overdrive brake piston is lowered to 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove, preventing the overdrive brake piston from being deformed.

(b) Remove the overdrive brake return spring.

3. INSPECT OVERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-222)

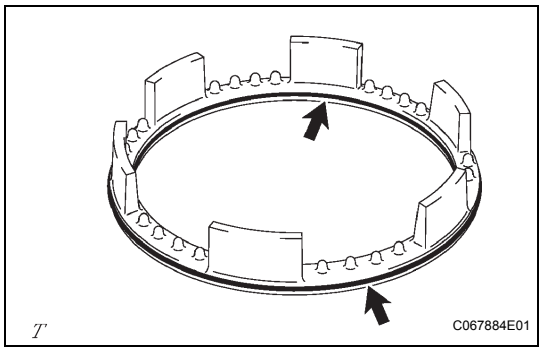


4. REMOVE 2ND COAST AND OVERDRIVE BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle rear cover to remove the overdrive brake piston.

NOTICE:

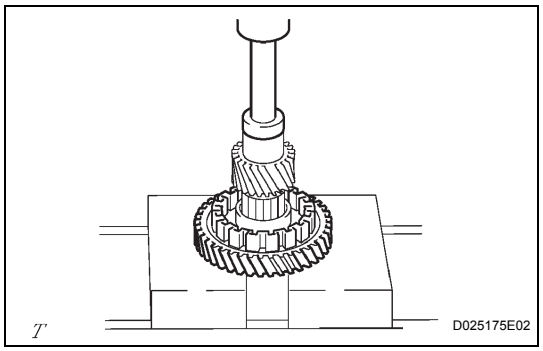
- **Blowing air may cause the piston to jump out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when blowing air.**



5. REMOVE 2ND COAST AND OVERDRIVE O-RING

(a) Using a screwdriver, remove the 2 O-ring from the 2nd coast and overdrive brake piston.

AX



REASSEMBLY

1. INSTALL COUNTER DRIVEN GEAR

(a) Using SST and a press, press in the counter driven gear to the differential drive pinion.

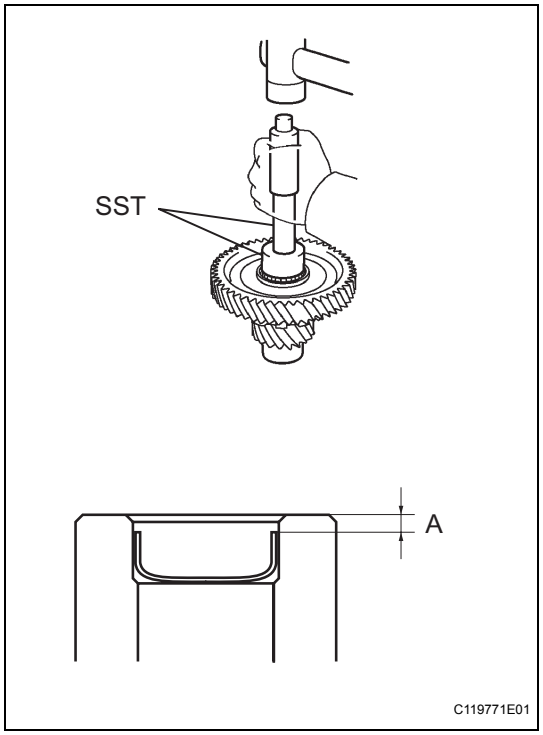
SST 09950-60010 (09951-00350), 09950-70010 (09951-07150)

NOTICE:

When replacing the counter driven gear, replace the counter drive gear in the transaxle case, too.

HINT:

The differential drive pinion should be pressed in until it comes in contact with the counter driven gear.



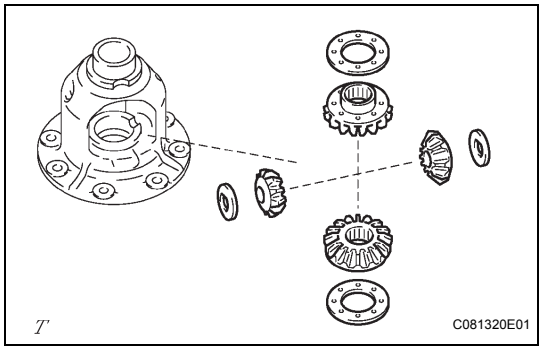
2. INSTALL DIFFERENTIAL DRIVE PINION PLUG

(a) Using SST and a plastic-faced hammer, tap in a new differential drive pinion plug to the differential drive pinion.

SST 09221-25026 (09221-00071)

Standard clearance A:

2.5 to 2.6 mm (0.0984 to 0.1023 in.)



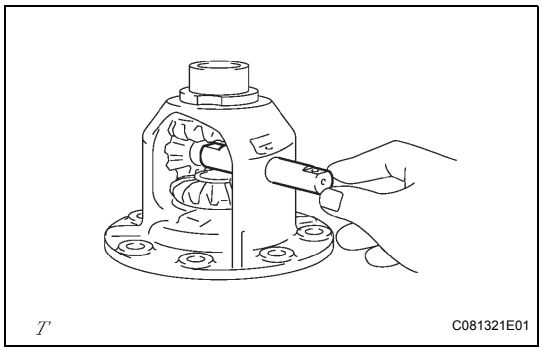
3. INSTALL FRONT DIFFERENTIAL SIDE GEAR

(a) After applying ATF to the 2 front differential side gears, 2 side gear thrust washers, 2 front differential pinions and 2 pinion thrust washers, install them to the front differential case.

HINT:

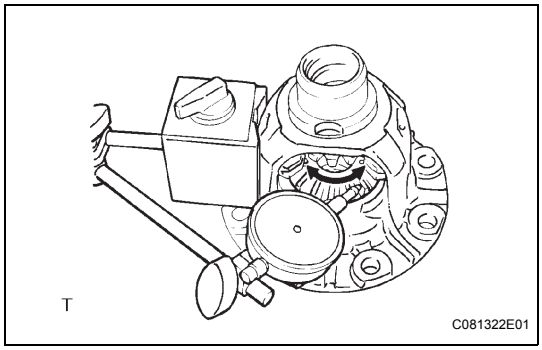
At the time of installation, set the alignment of the front differential pinions perpendicular to that of the side gear and rotate them so that their holes will be aligned with the holes in the differential case.

AX



4. INSTALL FRONT DIFFERENTIAL NO. 1 PINION SHAFT

(a) Install the pinion shaft to align the lock pin holes on the pinion shaft and differential case.



5. INSPECT BACKLASH

(a) Measure the side gear backlash while holding 1 pinion gear toward the case.

Standard backlash:

0.05 to 0.20 mm (0.0020 to 0.0079 in.)

If the backlash is not within the specification, install the correct thrust washer to the side gear.

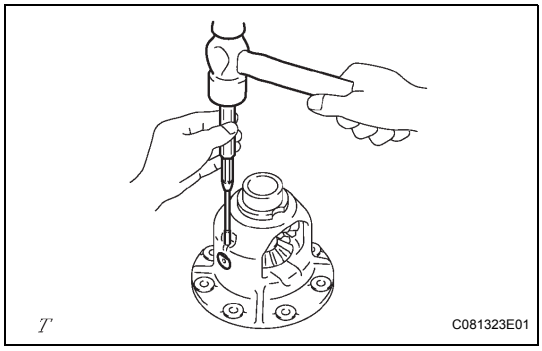
(b) Referring to the table below, select thrust washers which will ensure that the backlash is within the specification for both sides.

Standard thrust washer thickness

Thickness	Thickness
0.95 mm (0.0374 in.)	1.10 mm (0.0433 in.)
1.00 mm (0.0394 in.)	1.15 mm (0.0453 in.)
1.05 mm (0.0413 in.)	1.20 mm (0.0472 in.)

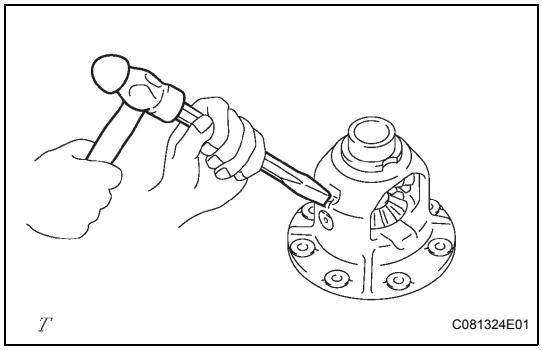
If the backlash is not within the specification, install a thrust washer of a different thickness.

AX

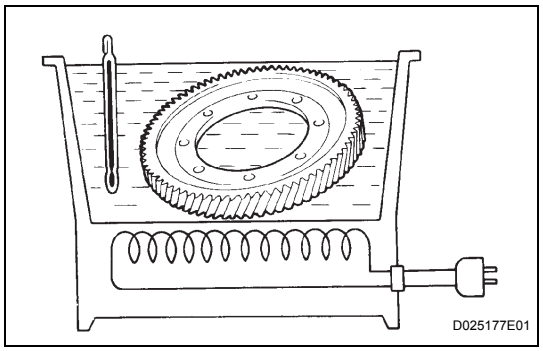


6. INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch and hammer, tap in the pinion shaft straight pin.



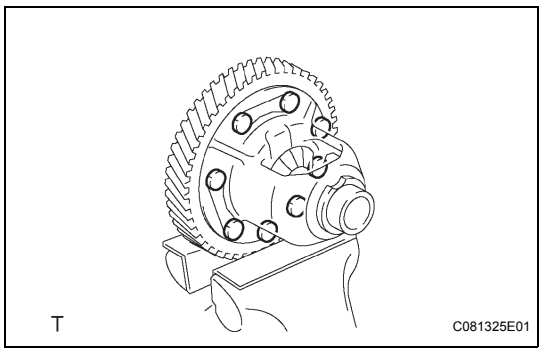
(b) Using a chisel and hammer, stake the differential case.



7. INSTALL FRONT DIFFERENTIAL RING GEAR

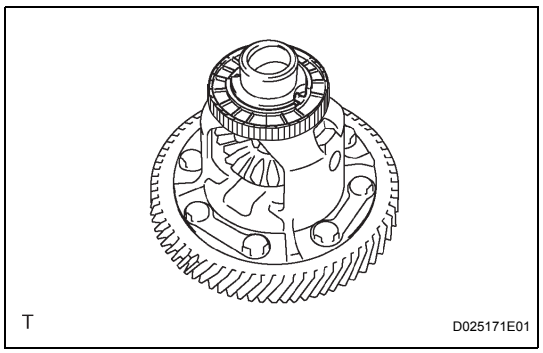
(a) Using ATF and a heater, heat the front differential ring gear to 90 to 110°C (194.0 to 230.0°F).

(b) Clean the contact surface of the front differential case.



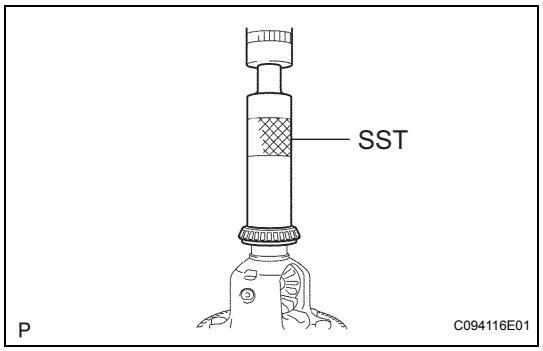
(c) Install the 4 lock plates and 8 bolts.
Torque: 88.2 N*m (899 kgf*cm, 65 ft.*lbf)

(d) Stake the ring gear lock plate.



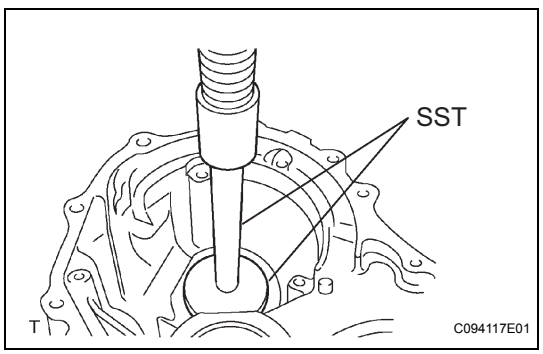
8. INSTALL SPEEDOMETER DRIVE GEAR

(a) Install the speedometer drive gear to the differential case.



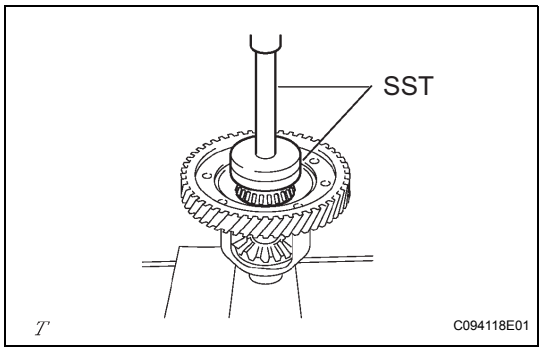
9. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, press in the front differential case front tapered roller bearing to the differential case.
SST 09316-60011 (09316-00011)



(b) Using SST and a press, press in the front differential case front tapered roller bearing to the transaxle housing.
SST 09950-60020 (09951-00750), 09950-70010 (09951-07150)

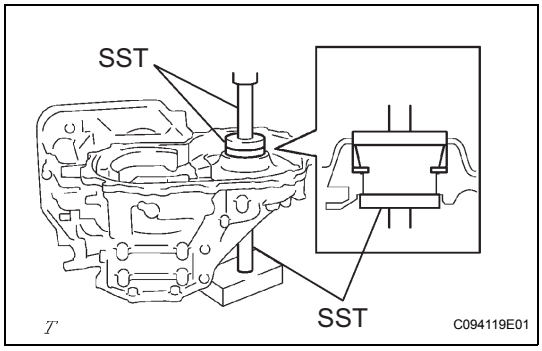
AX



10. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

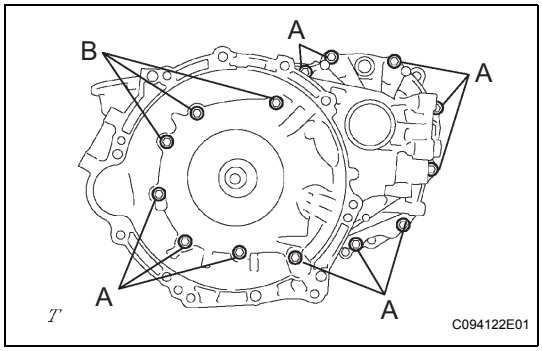
(a) Using SST and a press, press in the front differential case rear tapered roller bearing to the differential case.

SST 09726-40010, 09950-60020 (09951-00790)



(b) Using SST and a press, press in the shim and front differential case rear tapered roller bearing outer race to the transaxle case.

SST 09950-60010 (09951-00650, 09950-60020 (09951-00720), 09950-70010 (09951-07100, 09951-07200)

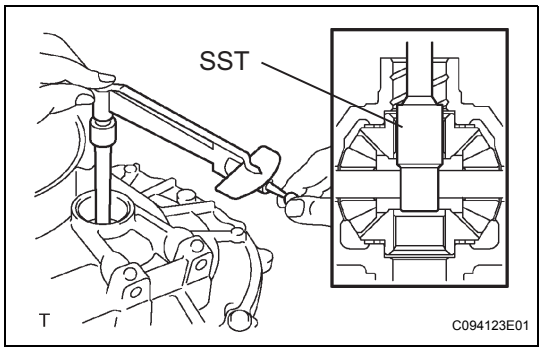


11. ADJUST TAPERED ROLLER BEARING PRELOAD

(a) Coat the front differential case and bearing with ATF, and install them to the transaxle case.

(b) Install the 14 bolts and transaxle housing.

Torque: 29.4 N*m (300 kgf*cm, 22 ft.*lbf) for bolt A
22.1 N*m (225 kgf*cm, 16 ft.*lbf) for bolt B



(c) Using SST and a small torque wrench, measure the preload of the differential gear.

SST 09564-32011

New bearing preload:
0.98 to 1.57 N/m (10.0 to 16.0 kgf*cm, 8.7 to 13.9 in.*lbf)

Used bearing preload:
0.49 to 0.78 N/m (5.0 to 8.0 kgf*cm, 4.3 to 6.9 in.*lbf)

If the preload is not within the specification, remove the differential from the transaxle case. Reselect the transaxle case side adjusting shim according to the following table.

Standard adjusting shim thickness

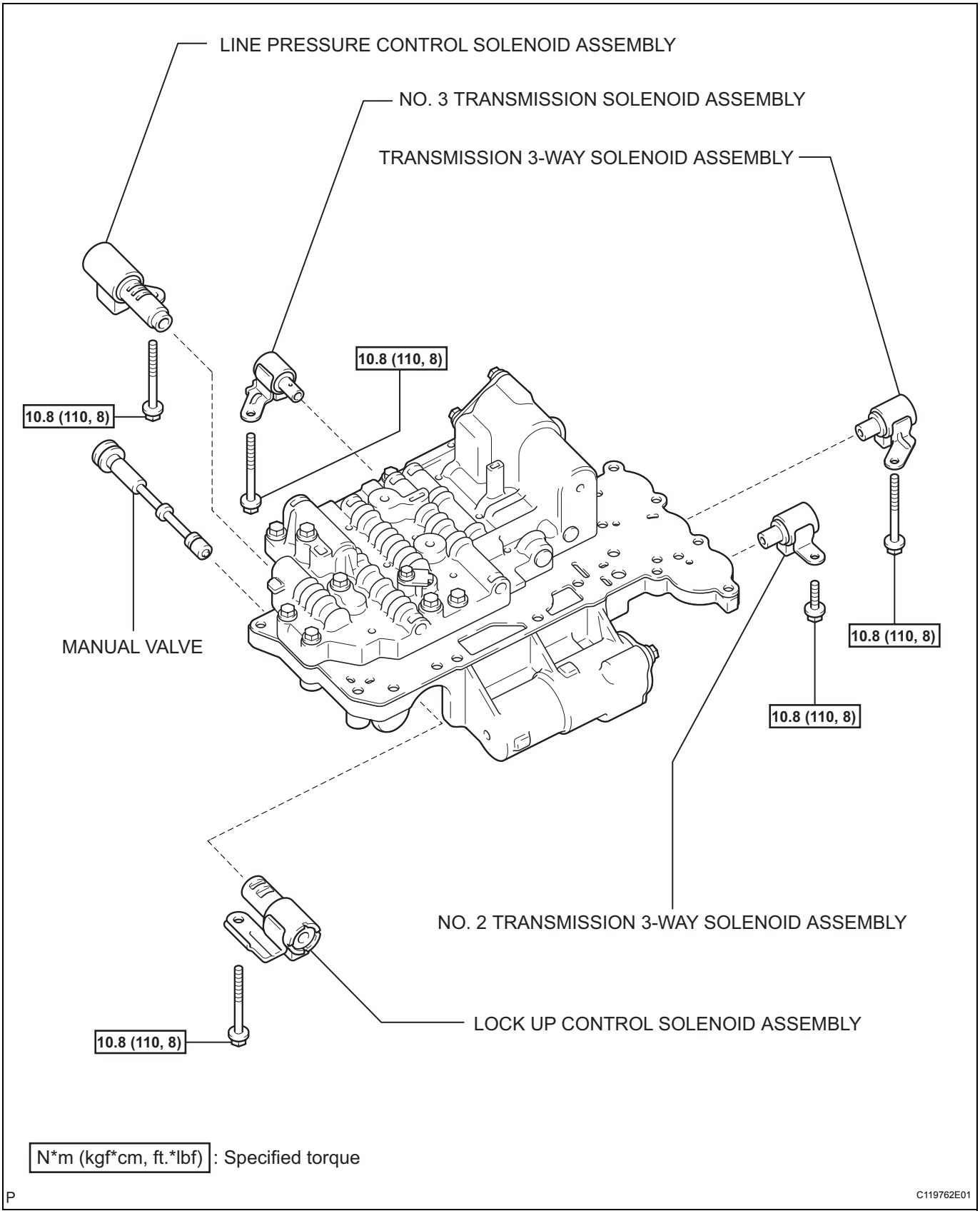
Mark	Thickness	Mark	Thickness
01	1.90 mm (0.0748 in.)	11	2.40 mm (0.0945 in.)
02	1.95 mm (0.0768 in.)	12	2.45 mm (0.0965 in.)
03	2.00 mm (0.0787 in.)	13	2.50 mm (0.0984 in.)

AX

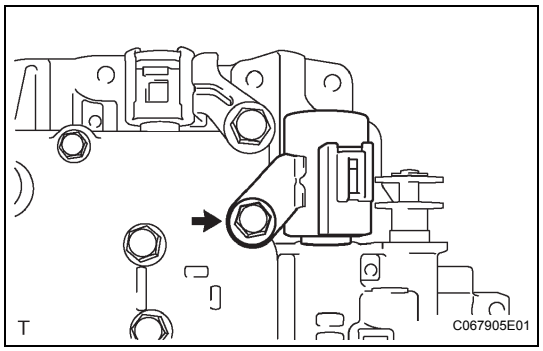
Mark	Thickness	Mark	Thickness
04	2.05 mm (0.0807 in.)	14	2.55 mm (0.1004 in.)
05	2.10 mm (0.0827 in.)	15	2.60 mm (0.1024 in.)
06	2.15 mm (0.0846 in.)	16	2.65 mm (0.1043 in.)
07	2.20 mm (0.0866 in.)	17	2.70 mm (0.1063 in.)
08	2.25 mm (0.0886 in.)	18	2.75 mm (0.1083 in.)
09	2.30 mm (0.0906 in.)	19	2.80 mm (0.1102 in.)
10	2.35 mm (0.0925 in.)	-	-

VALVE BODY

COMPONENTS



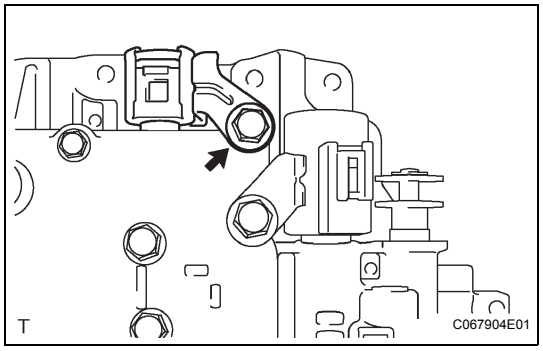
AX



DISASSEMBLY

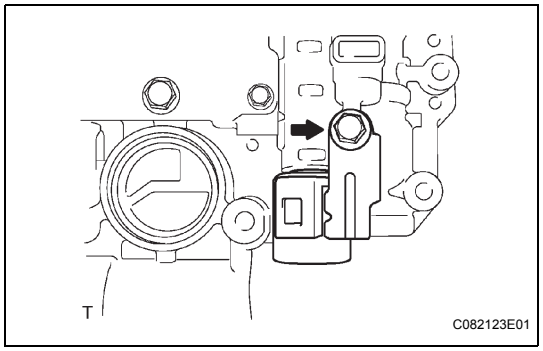
1. REMOVE SHIFT SOLENOID VALVE SLT

(a) Remove the bolt, and pull out the solenoid.



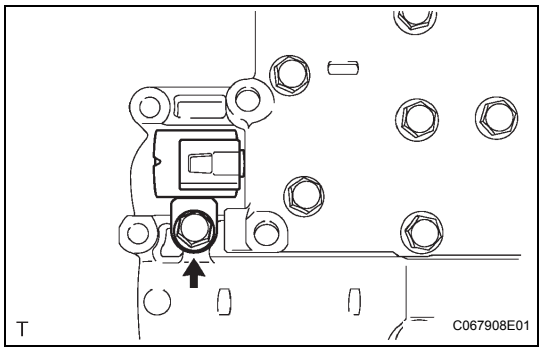
2. REMOVE SHIFT SOLENOID VALVE ST

(a) Remove the bolt, and pull out the solenoid.



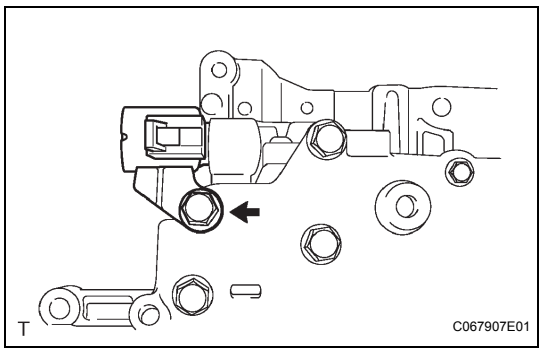
3. REMOVE SHIFT SOLENOID VALVE SL

(a) Remove the bolt, and pull out the solenoid.



4. REMOVE SHIFT SOLENOID VALVE S2

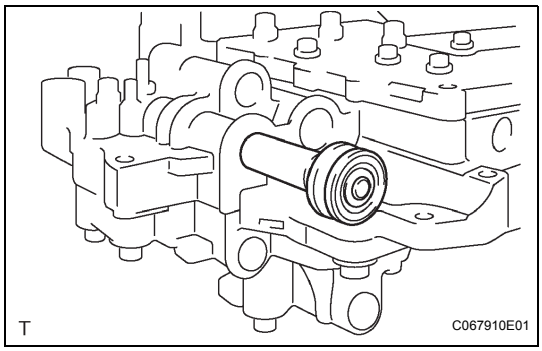
(a) Remove the bolt, and pull out the 3-way solenoid.



5. REMOVE SHIFT SOLENOID VALVE S1

(a) Remove the bolt, and pull out the 3-way solenoid.

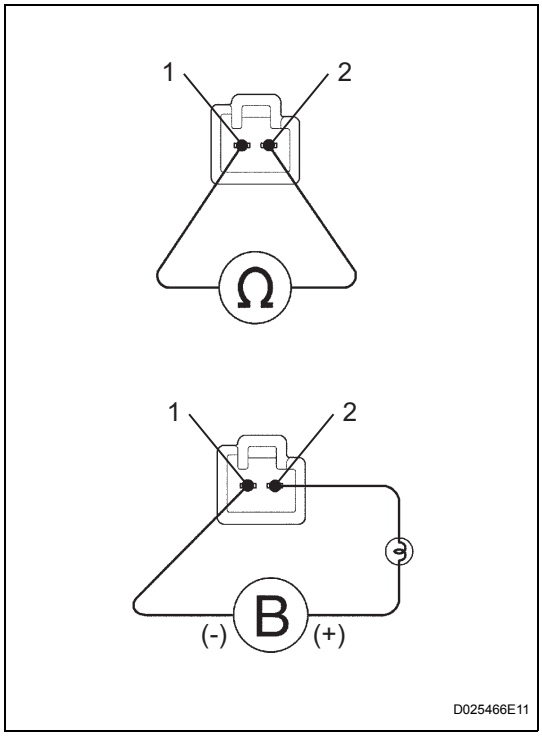
AX



6. REMOVE MANUAL VALVE

(a) Remove the manual valve from the valve body.

INSPECTION

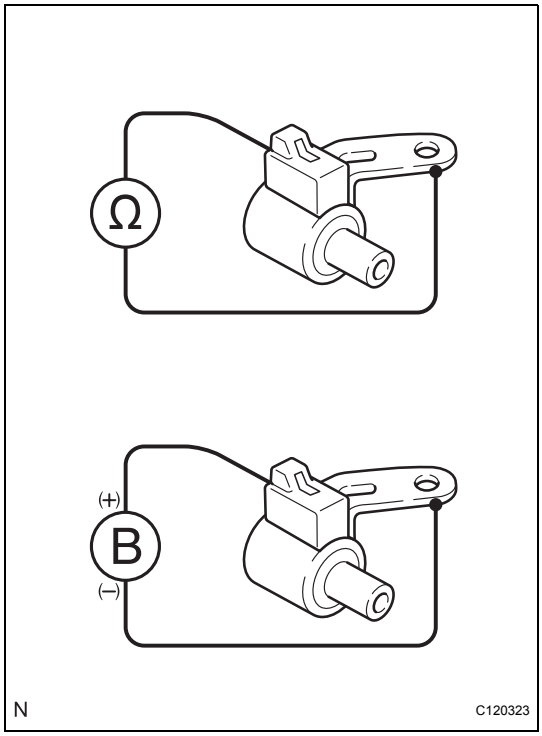


1. INSPECT SHIFT SOLENOID VALVE SLT

(a) Measure the resistance of the solenoid valve.
Standard resistance:
5.0 to 5.6 Ω at 20°C (68°F)

(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, and then check the movement of the valve.

(c) Check the operating noise of terminal 1 of the solenoid valve.



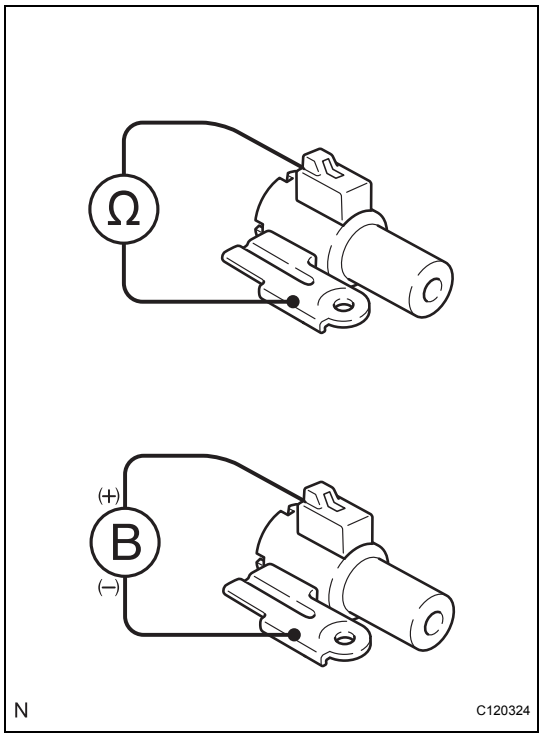
2. INSPECT SHIFT SOLENOID VALVE ST

(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

(c) Check the operating noise of the solenoid valve.

AX

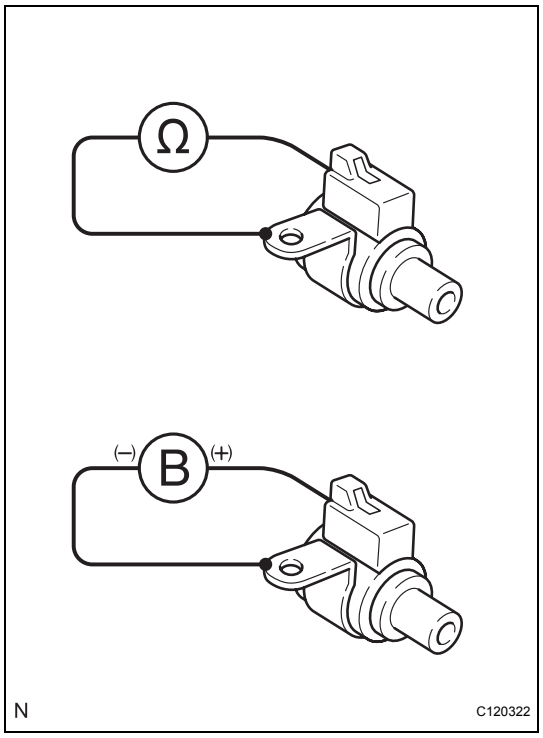


3. INSPECT SHIFT SOLENOID VALVE SL

(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

(c) Check the operating noise of the solenoid valve.



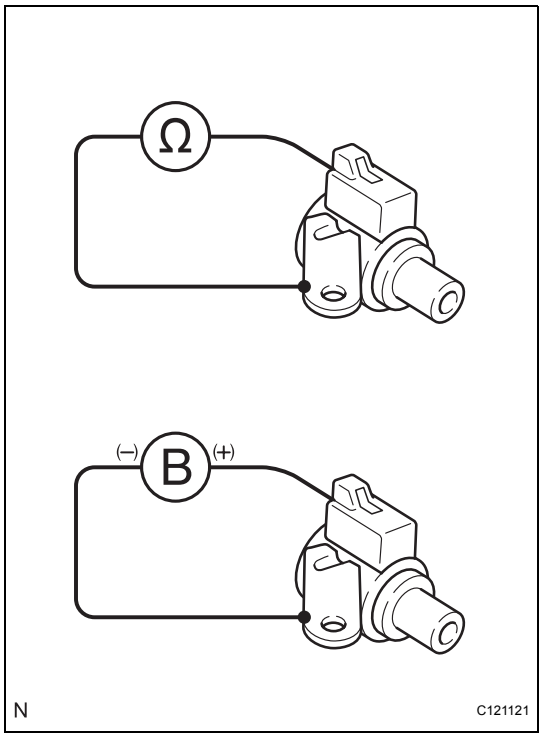
4. INSPECT SHIFT SOLENOID VALVE S2

(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ωat 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

(c) Check the operating noise of the solenoid valve.

AX



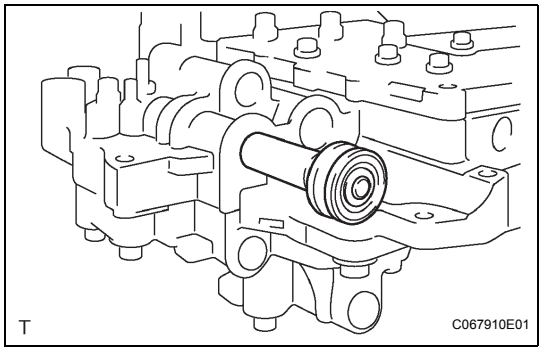
5. INSPECT SHIFT SOLENOID VALVE S1

(a) Measure the resistance of the solenoid valve.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

(b) Connect the battery's positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

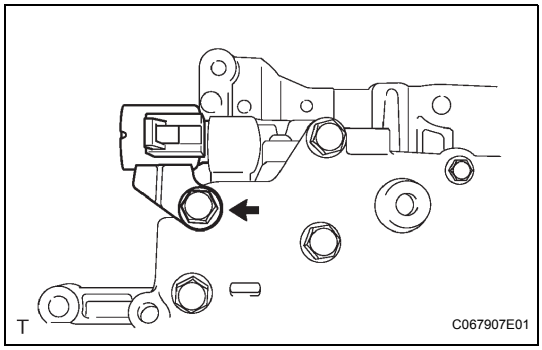
(c) Check the operating noise of the solenoid valve.

REASSEMBLY



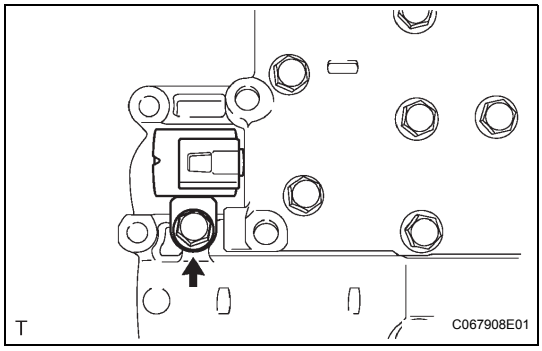
1. INSTALL MANUAL VALVE

(a) Coat the manual valve with ATF and install it to the valve body.



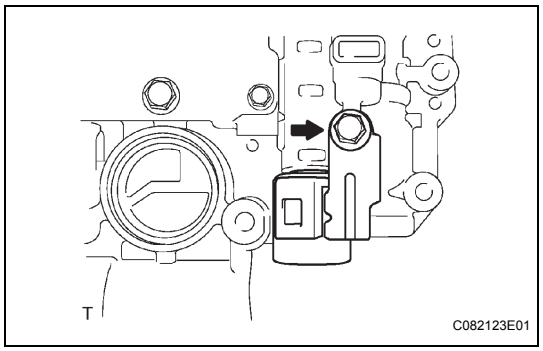
2. INSTALL SHIFT SOLENOID VALVE S1

(a) Install the 3-way solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



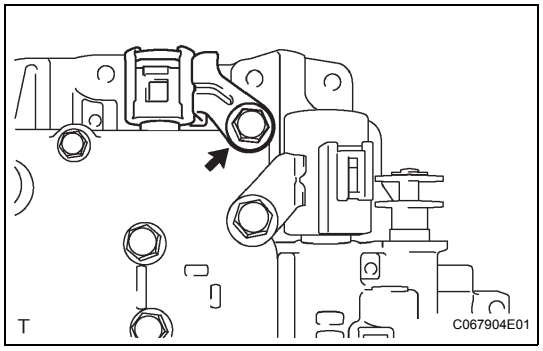
3. INSTALL SHIFT SOLENOID VALVE S2

(a) Install the 3-way solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



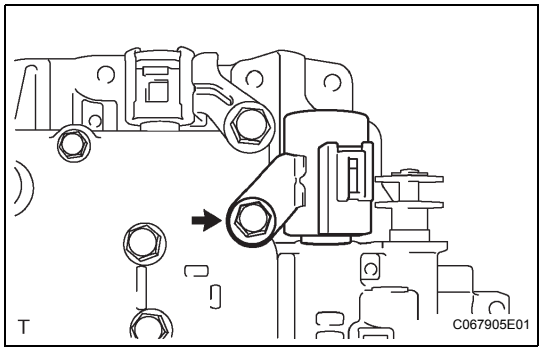
4. INSTALL SHIFT SOLENOID VALVE SL

(a) Install the solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)



5. INSTALL SHIFT SOLENOID VALVE ST

(a) Install the 3-way solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

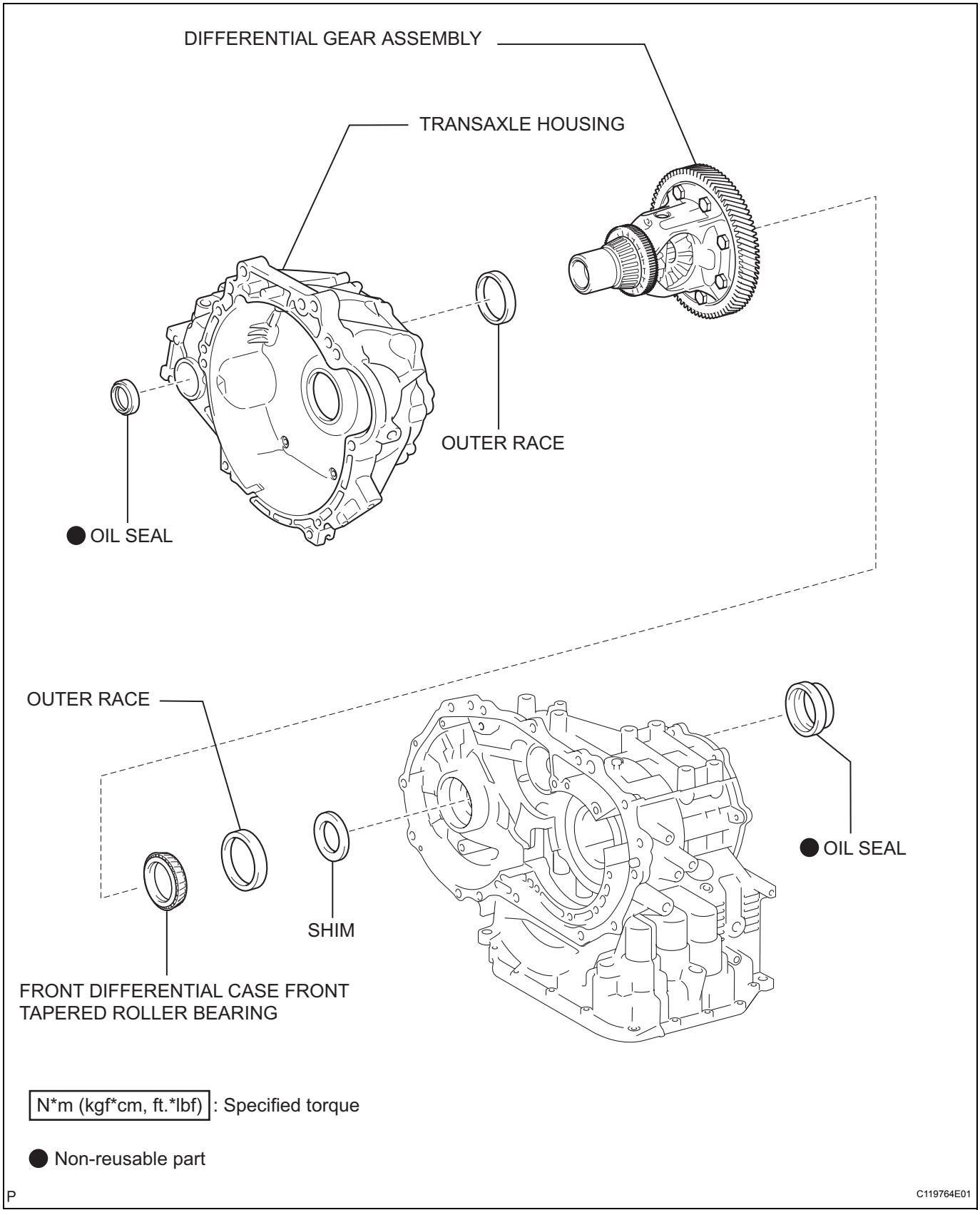


6. INSTALL SHIFT SOLENOID VALVE SLT

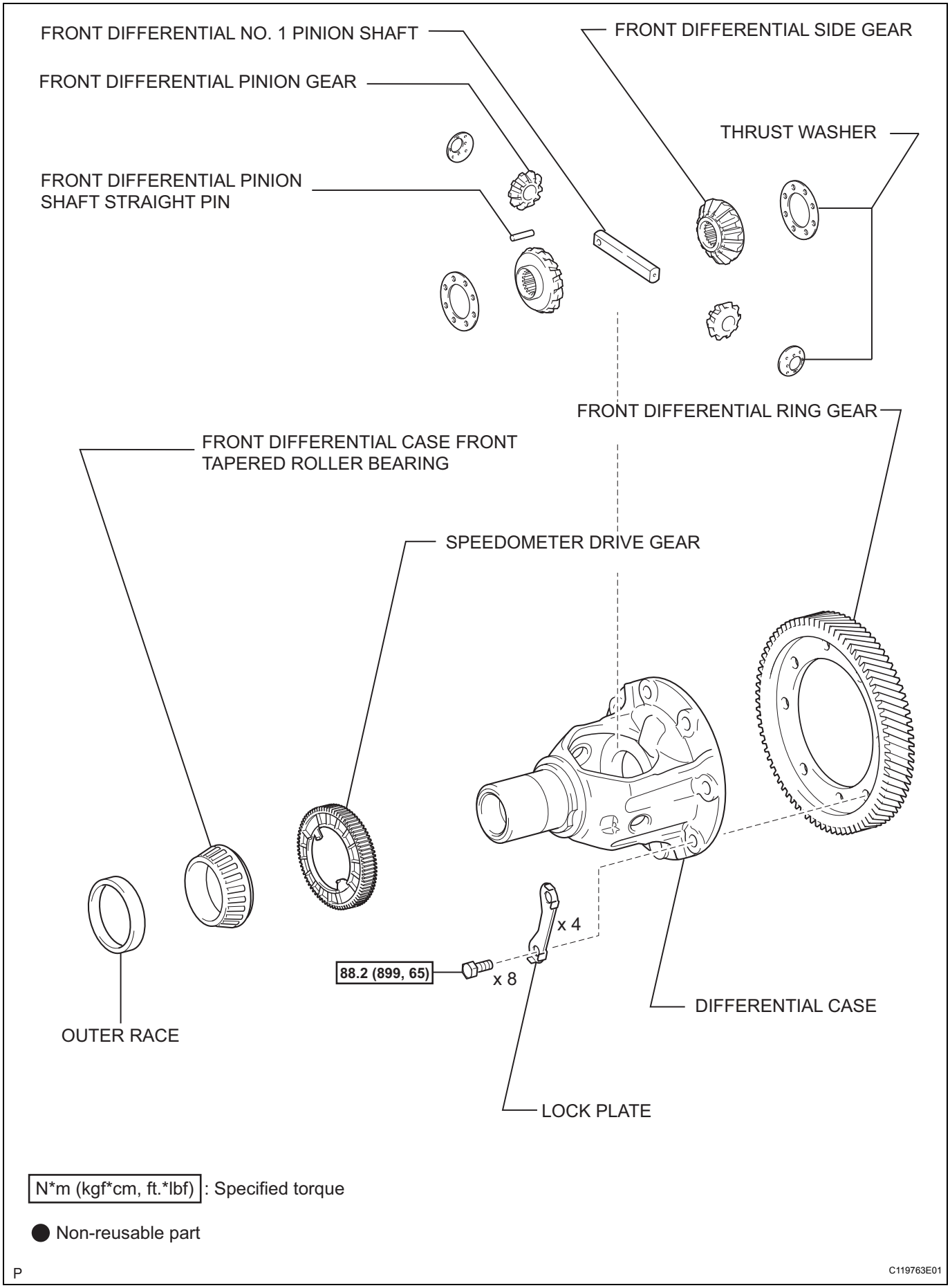
(a) Install the solenoid with the bolt.
Torque: 10.8 N*m (110 kgf*cm, 8 ft.*lbf)

DIFFERENTIAL CASE

COMPONENTS

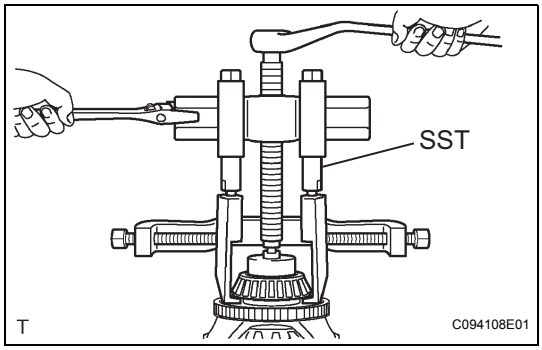


AX


FRONT DIFFERENTIAL NO. 1 PINION SHAFT
FRONT DIFFERENTIAL SIDE GEAR
FRONT DIFFERENTIAL PINION GEAR
THRUST WASHER
FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN
FRONT DIFFERENTIAL RING GEAR
FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING
SPEEDOMETER DRIVE GEAR
x 4
88.2 (899, 65)
x 8
DIFFERENTIAL CASE
OUTER RACE
LOCK PLATE
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P
C119763E01

AX

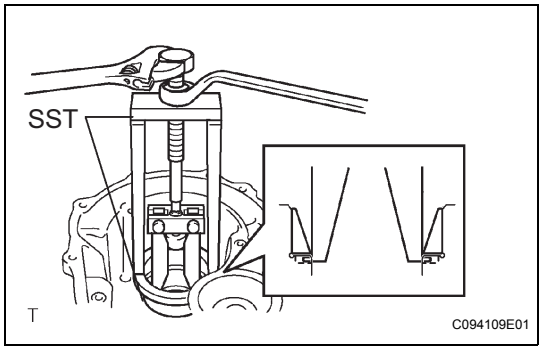
DISASSEMBLY



1. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

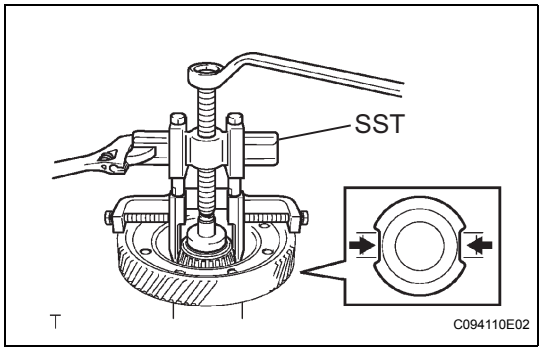
(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.

SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00390)



(b) Using SST, remove the front differential case front tapered roller bearing outer race from the transaxle housing.

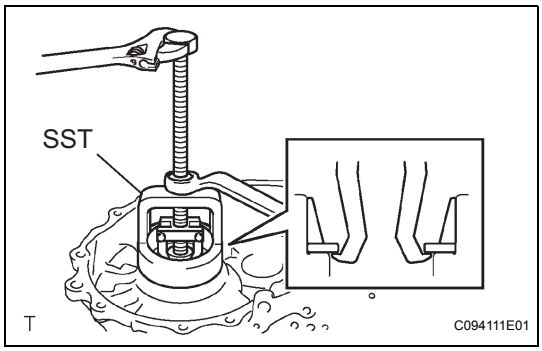
SST 09387-00041 (09387-02010, 09387-02020)



2. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

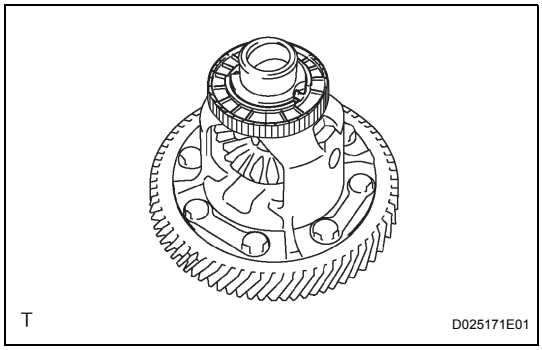
(a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.

SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00430)



(b) Using SST, remove the outer race and shim.

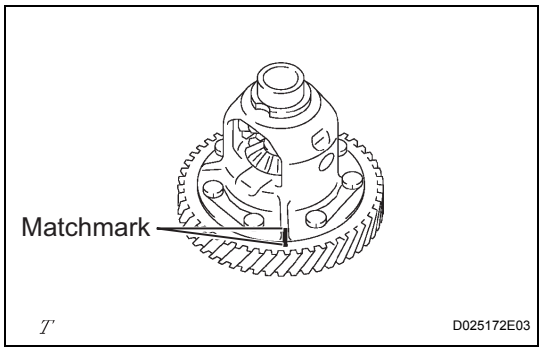
SST 09612-65014 (09612-01010)



3. REMOVE SPEEDOMETER DRIVE GEAR

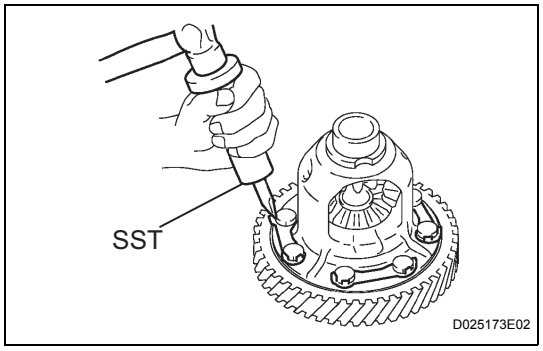
(a) Remove the speedometer drive gear from the differential case.

AX

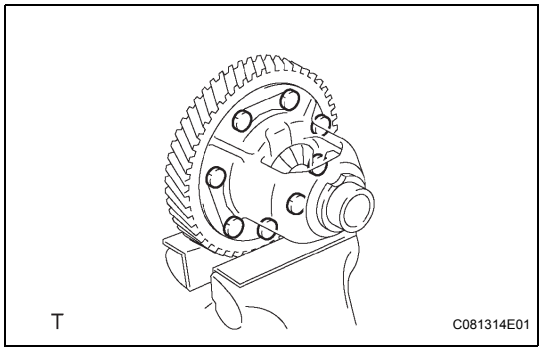


4. REMOVE FRONT DIFFERENTIAL RING GEAR

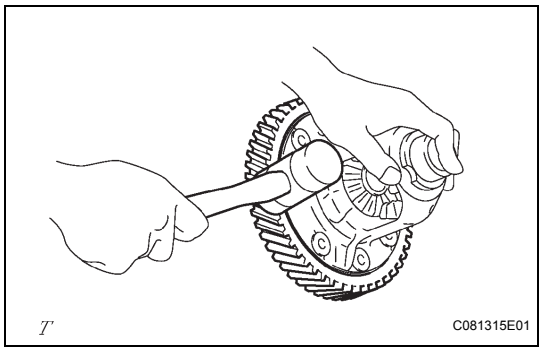
(a) Place matchmarks on the front differential ring gear and differential case.



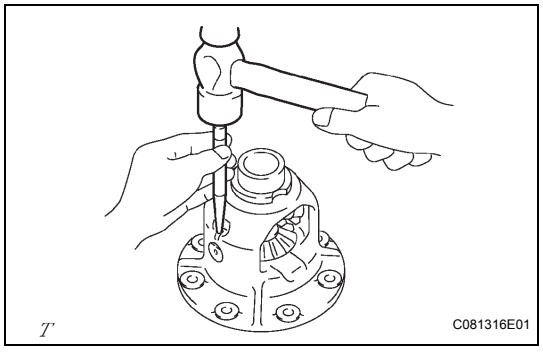
(b) Using SST and a hammer, unstake the lock plate.
SST 09930-00010



(c) Remove the 8 bolts and lock plate.



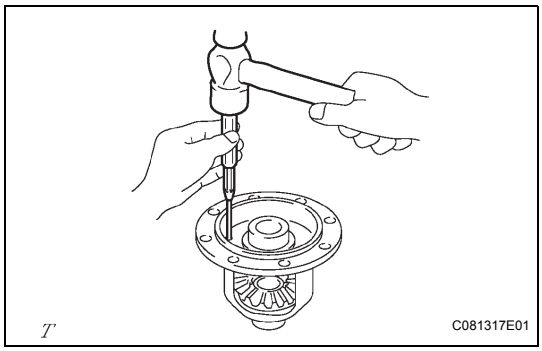
(d) Using a plastic-faced hammer, tap out the front differential ring gear from the differential case.



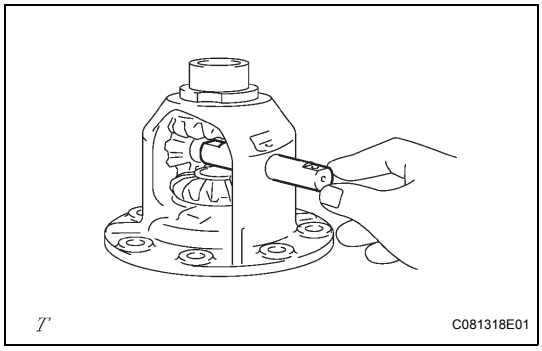
5. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch and hammer, unstake the differential case.

AX

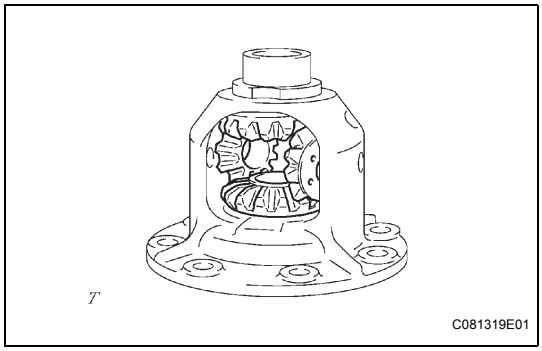


(b) Using a pin punch and hammer, tap out the straight pin.



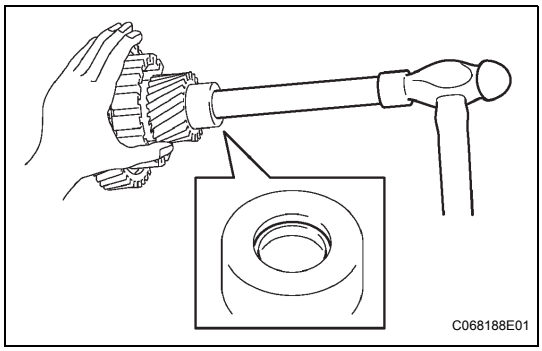
6. REMOVE FRONT DIFFERENTIAL NO. 1 PINION SHAFT

(a) Remove the pinion shaft from the front differential case.



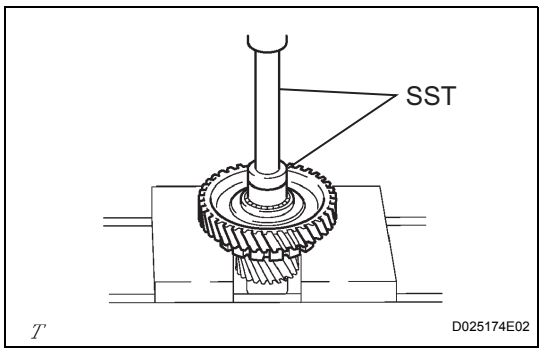
7. REMOVE FRONT DIFFERENTIAL SIDE GEAR

(a) Remove the 2 pinions, 2 thrust washers, 2 side gears and 2 thrust washers from the front differential case.



8. REMOVE DIFFERENTIAL DRIVE PINION PLUG

(a) Using a brass bar and plastic-faced hammer, tap out the differential drive pinion plug.



9. REMOVE COUNTER DRIVEN GEAR

(a) Using SST and a press, press out the counter driven gear from the differential drive pinion.

SST 09950-60010 (09951-00350), 09950-70010 (09951-07150)

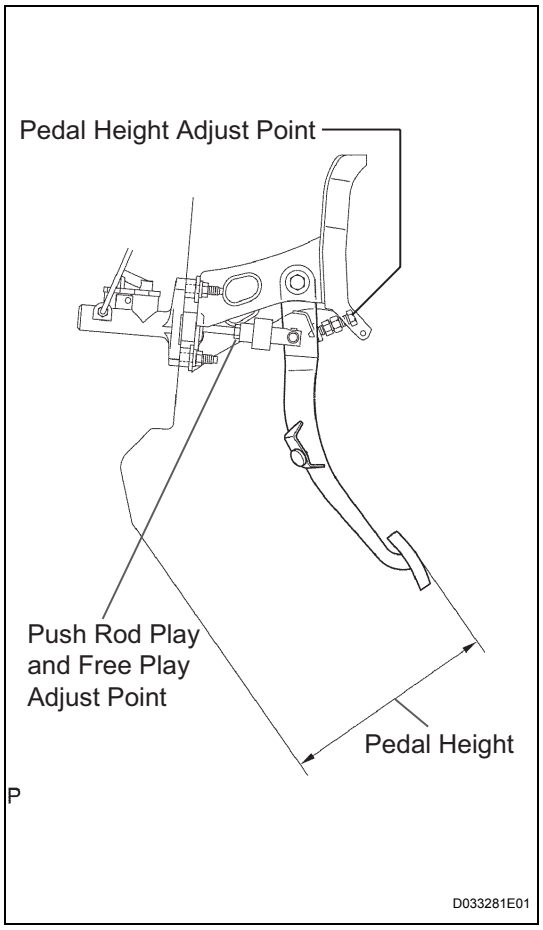
ADJUSTMENT

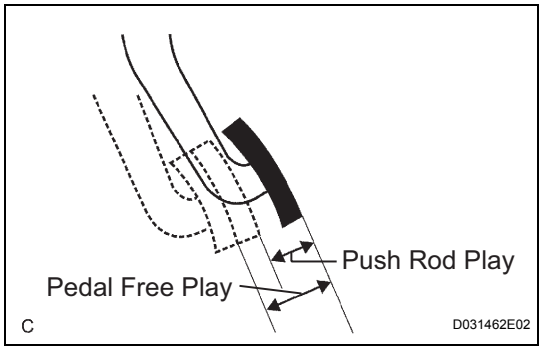
1. INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSEMBLY

(a) Turn over the floor carpet.

(b) Check that the pedal height is correct.
Standard pedal height from dash panel:
134.3 to 144.3 mm (5.287 to 5.681 in.)

(c) Adjust the pedal height.
(1) Loosen the lock nut and turn the stopper bolt until the correct height is obtained.
(2) Tighten the lock nut.
Torque: 18 N*m (186 kgf*cm, 13 ft.*lbf)



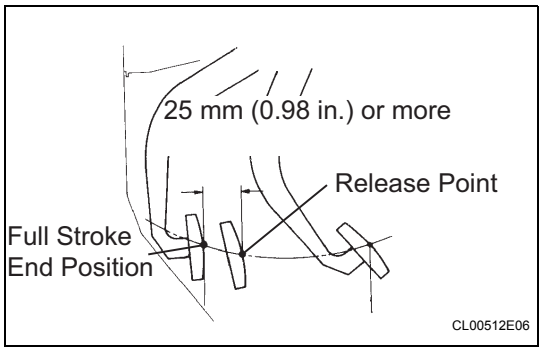


2. INSPECT AND ADJUST PEDAL FREE PLAY AND PUSH ROD PLAY

(a) Check that the pedal free play and push rod play are correct.
(1) Depress the pedal until clutch resistance begins to be felt.
Standard pedal free play:
5.0 to 15.0 mm (0.197 to 0.591 in.)
(2) Gently depress the pedal until the resistance begins to increase a little.
Standard push rod play at pedal top:
1.0 to 5.0 mm (0.039 to 0.197 in.)

(b) Adjust the pedal free play and push rod play.
(1) Loosen the lock nut and turn the push rod until correct free play and push rod play are obtained.
(2) Tighten the lock nut.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)
(3) After adjusting the pedal free play, check the pedal height.

CL



3. INSPECT AND ADJUST CLUTCH RELEASE POINT

(a) Check the clutch release point.

(1) Pull the parking brake lever and install wheel chocks.

(2) Start the engine and run it at idle.

(3) Without depressing the clutch pedal, slowly move the shift lever into reverse until the gears contact.

(4) Gradually depress the clutch pedal and measure the stroke distance from the point that the gear noise stops (release point) up to the full stroke end position.

Standard distance:

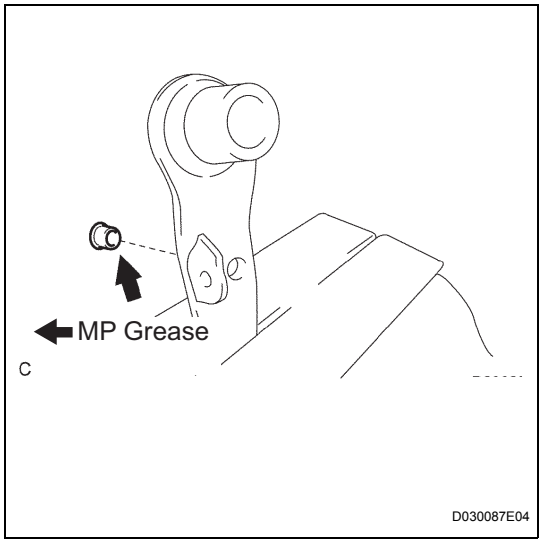
25 mm (0.98 in.) or more

(From pedal stroke end position to release point)

If the distance is not as specified, perform the following operations.

- Check pedal height.
- Check push rod play and pedal free play.
- Bleed air from clutch line.
- Check clutch cover and disc.

REASSEMBLY



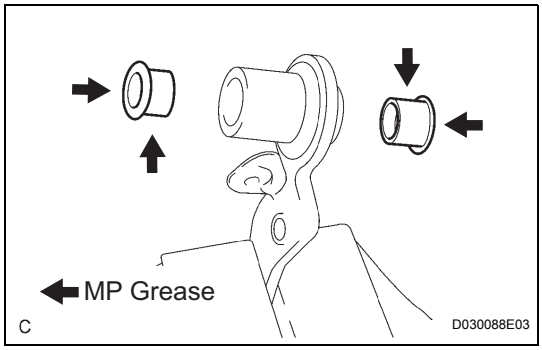
1. INSTALL CLUTCH MASTER CYLINDER PUSH ROD CLEVIS BUSH

(a) Apply MP grease to the inside of a new bush.

(b) Install the bush on the clutch pedal.

HINT:

Install the bush from the left side of the vehicle.



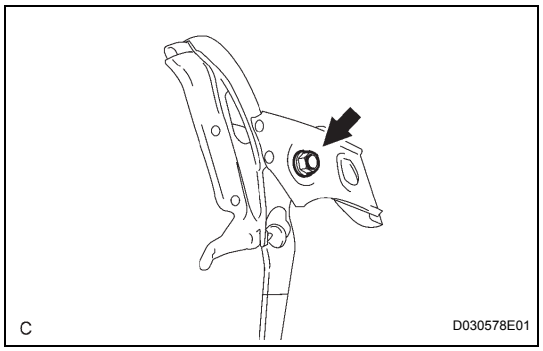
2. INSTALL CLUTCH PEDAL BUSH

(a) Apply MP grease to both sides of 2 new bushes.

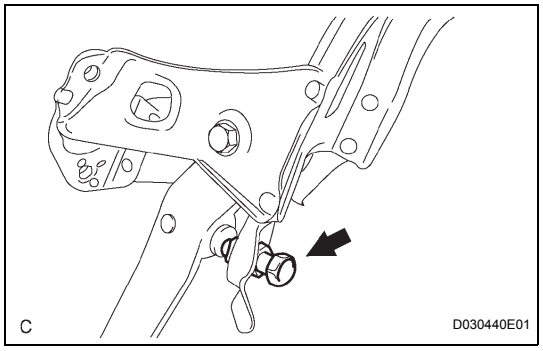
(b) Install the 2 bushes to the clutch pedal.

3. INSTALL CLUTCH PEDAL PAD

CL

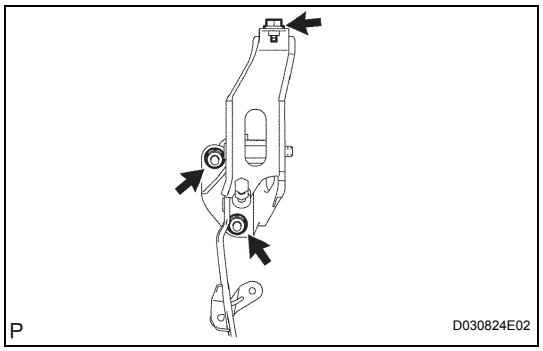


4. **INSTALL CLUTCH PEDAL SUB-ASSEMBLY**
   (a) Install the pedal on the clutch pedal support with the bolt and nut.
   Torque: 37 N*m (375 kgf*cm, 27 ft.*lbf)
   HINT:
   Install the bolt from the left side of the vehicle.

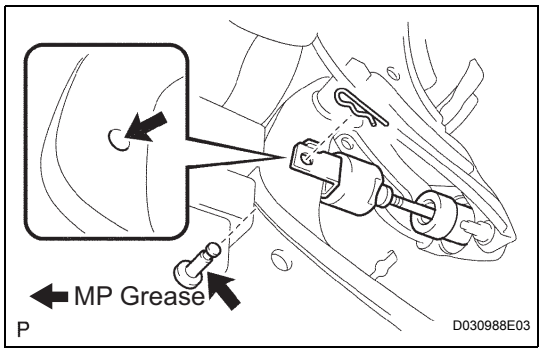


5. **INSTALL CLUTCH PEDAL STOPPER BOLT**
   (a) Install the lock nut on the bolt but do not torque it.
   (b) Install the bolt so that its end touches the clutch pedal cushion.
   HINT:
   Temporarily tighten the lock nut.

INSTALLATION



1. **INSTALL CLUTCH PEDAL SUPPORT SUB-ASSEMBLY**
   (a) Install the support on the vehicle with the 2 nuts and bolt.
   Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



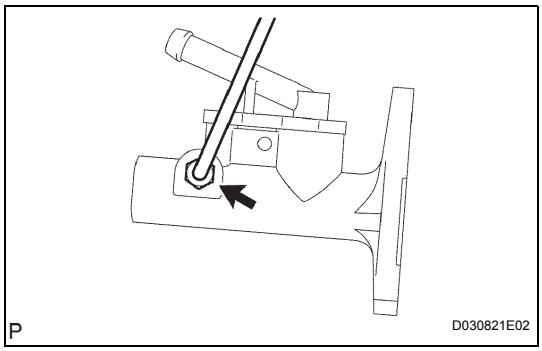
2. **CONNECT CLUTCH MASTER CYLINDER PUSH ROD CLEVIS**
   (a) Apply MP grease to the contact surface of the pin and clevis bush.
   (b) Connect the clevis to the clutch pedal with the pin and clip.
   HINT:
   Install the pin from the left side of the vehicle.
3. **INSTALL CLUTCH PEDAL SPRING**
4. **INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSEMBLY**
   (a) Inspect and adjust the clutch pedal (see page CL-4).

CL

INSTALLATION

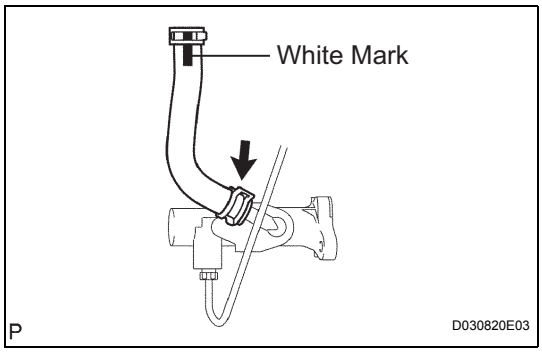
1. INSTALL CLUTCH MASTER CYLINDER ASSEMBLY

(a) Install the clutch master cylinder with the 2 nuts.
Torque: 9.0 N*m (80 kgf*cm, 81 in.*lbf)



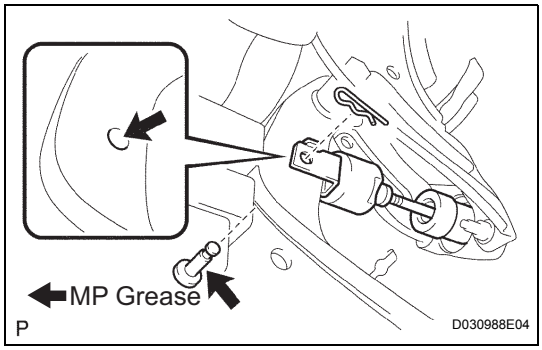
2. CONNECT CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE

(a) Using SST, connect the flexible hose tube.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)



3. CONNECT CLUTCH RESERVOIR TUBE

(a) Connect the clutch reservoir tube to the clutch master cylinder with the clip.
NOTICE:
- **Connect the clutch reservoir tube so that it will not be twisted.**
- **Face the white mark upward.**



4. CONNECT CLUTCH MASTER CYLINDER PUSH ROD CLEVIS

(a) Apply MP grease to the contact surface of the pin and clevis bush.
(b) Connect the clevis to the clutch pedal with the pin and clip.
HINT:
Install the pin from the left side of the vehicle.
(c) Install the clip to the pin.

5. INSTALL CLUTCH PEDAL SPRING

6. INSTALL BRAKE BOOSTER ASSEMBLY

(a) Install the brake booster (see page BR-19).

7. INSTALL BRAKE ACTUATOR ASSEMBLY

(a) Install the brake actuator (see page BC-164).

8. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY

(a) Install the brake master cylinder (see page BR-14).

9. BLEED CLUTCH PIPE LINE

(a) Fill the brake reservoir with brake fluid and bleed the clutch system.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

10. CHECK BRAKE FLUID

HINT:
- Check for leakage in the brake system.
- Check for leakage in the clutch system.

CL

11. **CHECK FLUID LEVEL IN RESERVOIR**

12. **INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSEMBLY**
    (a) Inspect and adjust the clutch pedal (see page CL-4).

DISASSEMBLY

1. REMOVE CLUTCH RELEASE UNION

(a) Remove the union bolt, union and 2 gaskets.

2. REMOVE CLUTCH RELEASE CYLINDER KIT

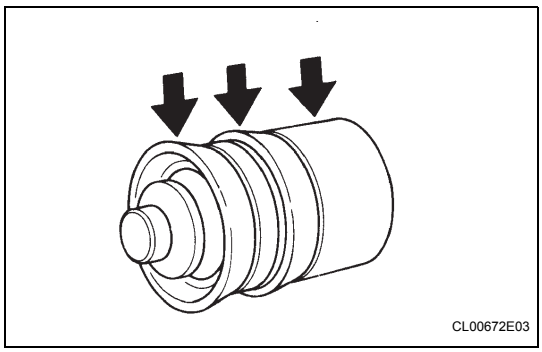
(a) Remove the boot from the cylinder body.
(b) Remove the push rod from the cylinder body.
(c) Remove the piston from the cylinder body.
NOTICE:
Be careful not to damage the inside of the cylinder body.
(d) Remove the spring from the cylinder body.
(e) Remove the bleeder plug cap from the bleeder plug.

3. REMOVE RELEASE CYLINDER BLEEDER PLUG

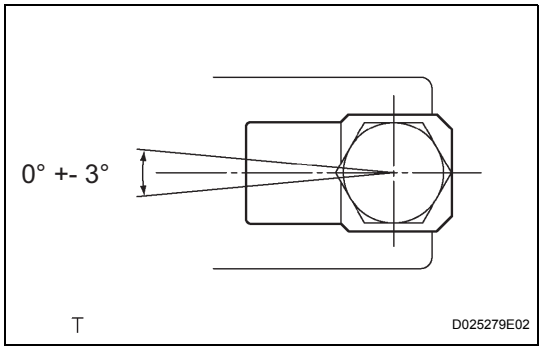
REASSEMBLY

1. INSTALL RELEASE CYLINDER BLEEDER PLUG
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

2. INSTALL CLUTCH RELEASE CYLINDER KIT
(a) Install the bleeder plug cap on the bleeder plug.
(b) Install a new spring on the cylinder body.
(c) Coat the parts with lithium soap base glycol grease to the areas shown in the illustration.
(d) Install the piston on the cylinder body.
NOTICE:
Be careful not to damage the inside of the cylinder body.
(e) Install the push rod on the cylinder body.
(f) Install the boot on the cylinder body.

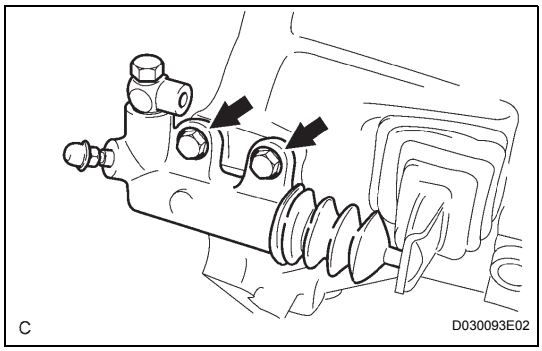


3. INSTALL CLUTCH RELEASE UNION
(a) Install the clutch release union with the union bolt and 2 new gaskets.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)
NOTICE:
Installation angle of the clutch release union should be 0°+- 3° against the body.



INSTALLATION

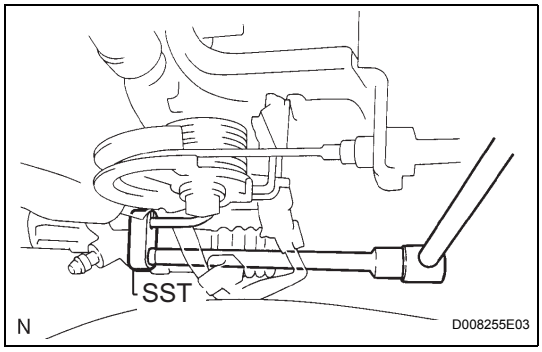
1. INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY
(a) Install the clutch release cylinder with the 2 bolts.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



2. CONNECT CLUTCH RELEASE CYLINDER TO FLEXIBLE HOSE TUBE
(a) Using SST, connect the flexible hose tube.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)

3. BLEED CLUTCH PIPE LINE
(a) Fill the brake reservoir with brake fluid and bleed the clutch system.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

4. CHECK BRAKE FLUID LEAKAGE



CL

CLUTCH SYSTEM

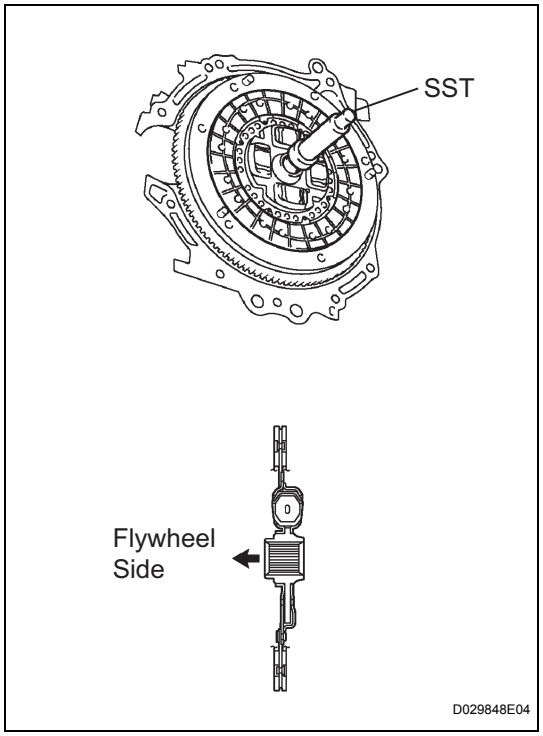
PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help find the cause of the problem. The numbers indicate the likelihood of the possible cause of the problem. Check each part in the order shown. Replace parts as necessary.

Clutch system

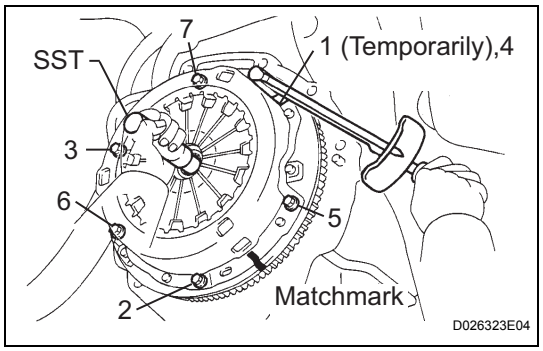
Symptom	Suspected area	See page
Clutch grabs/chatters	1. Engine mounting (Loosen)	-
	2. Clutch disc assembly (Excessive runout)	CL-17
	3. Clutch disc assembly (Oily)	CL-17
	4. Clutch disc assembly (Worn out)	CL-17
	5. Clutch disc torsion rubber (Damaged)	CL-17
	6. Clutch disc assembly (Glazed)	CL-17
	7. Diaphragm spring (Out of tip alignment)	CL-17
Clutch Pedal spongy	1. Clutch Line (Air in line)	-
	2. Master cylinder cup (Damaged)	CL-9
	3. Release cylinder rubber (Damaged)	CL-14
Clutch noisy	1. Clutch release bearing assembly (Worn, dirty, or damaged)	CL-17
	2. Clutch disc torsion rubber (Damaged)	CL-17
Clutch slips	1. Clutch pedal (Free play out of adjustment)	CL-4
	2. Clutch disc assembly (Oily)	CL-17
	3. Clutch disc assembly (Worn out)	CL-17
	4. Diaphragm spring (Damaged)	CL-17
	5. Pressure plate (Distortion)	CL-17
	6. Flywheel sub-assembly (Distortion)	CL-17
Clutch does not disengage	1. Clutch pedal (Free play out of adjustment)	CL-4
	2. Clutch line (Air in line)	-
	3. Master cylinder cup (Damaged)	CL-9
	4. Release cylinder cup (Damaged)	CL-14
	5. Clutch disc assembly (Out of true)	CL-17
	6. Clutch disc assembly (Excessive runout)	CL-17
	7. Clutch disc assembly (Lining broken)	CL-17
	8. Clutch disc assembly (Dirty or burned)	CL-17
	9. Clutch disc assembly (Oily)	CL-17
	10.Clutch disc assembly (Lack of spline grease)	CL-17

INSTALLATION



1. INSTALL CLUTCH DISC ASSEMBLY

(a) Insert SST in the disc, then insert them in the flywheel.
SST 09301-00210
NOTICE:
Take care not to insert the clutch disc in the wrong direction.

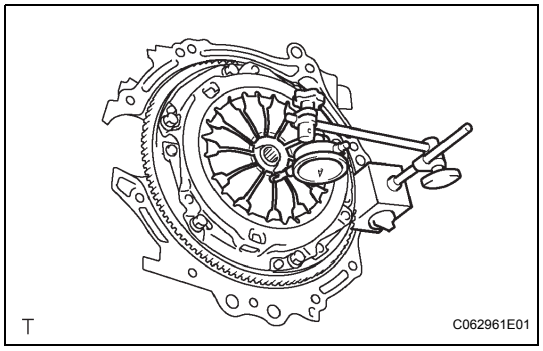


2. INSTALL CLUTCH COVER ASSEMBLY

(a) Align the matchmark on the cover with that on the flywheel.

(b) Following the procedures shown in the illustration, tighten the 6 bolts in order, and start with the bolt located near the knock pin on the top.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
HINT:
- Following the order in the illustration, tighten the bolts one at a time evenly.
- Move SST up and down, right and left lightly after checking that the disc is in the center to tighten the bolts.

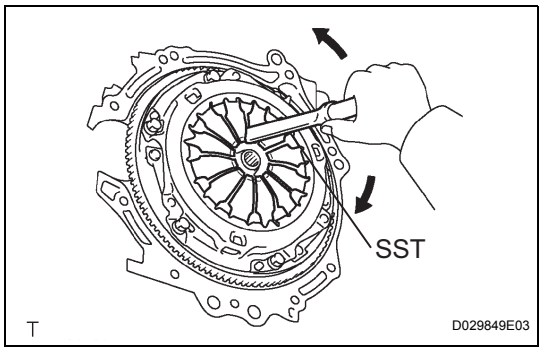
SST 09301-00210



3. INSPECT AND ADJUST CLUTCH COVER ASSEMBLY

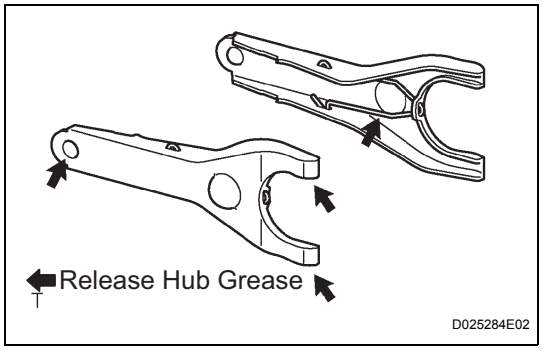
(a) Using a dial indicator with the roller instrument, measure the diaphragm spring tip alignment.
Maximum misalignment:
0.5 mm (0.020 in.)
If the alignment is not greater than the maximum, use SST to adjust the diaphragm spring tip alignment.

CL



SST 09333-00013

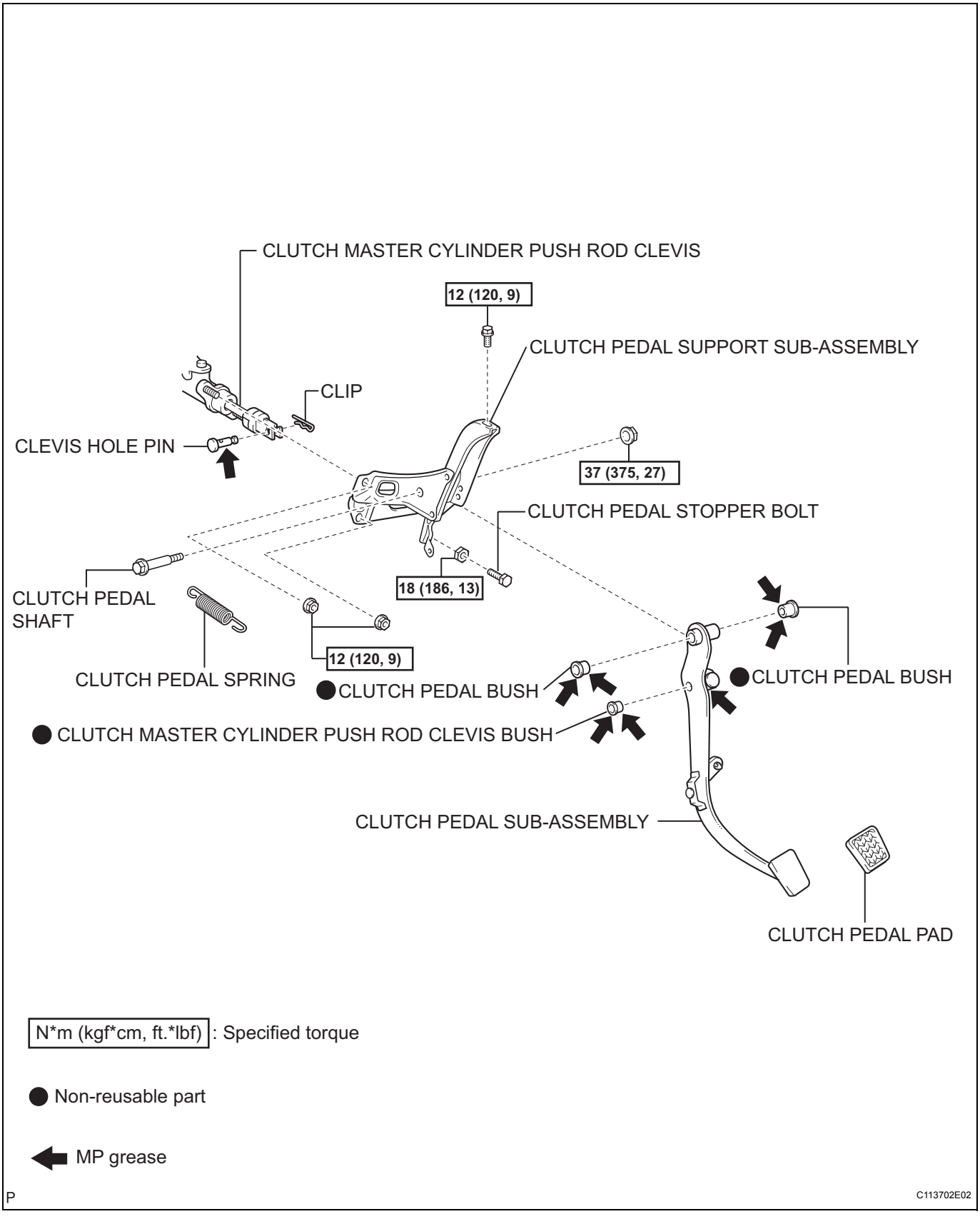
4. **INSTALL RELEASE FORK SUPPORT**
   (a) Install the release fork support on the transaxle.
   Torque: 37 N*m (375 kgf*cm, 27 ft.*lbf)
5. **INSTALL CLUTCH RELEASE FORK BOOT**
6. **INSTALL RELEASE BEARING HUB CLIP**



7. **INSTALL CLUTCH RELEASE FORK SUB-ASSEMBLY**
   (a) Apply release hub grease to the contact surfaces of the release fork and release bearing, fork and push rod, and fork and fork support.
   Release hub grease:
   Part No. 08887-01806, RELEASE HUB GREASE or equivalent
   (b) Install the fork to the release bearing.
8. **INSTALL CLUTCH RELEASE BEARING ASSEMBLY**
   (a) Apply clutch spline grease to the input shaft spline.
   Clutch spline grease:
   Part No. 08887-01706, CLUTCH SPLINE GREASE or equivalent
   (b) Install the bearing with release fork to the transaxle.
   NOTICE:
   After the installation, move the fork forward and backward to check that the release bearing slides smoothly.
9. **INSTALL MANUAL TRANSAXLE ASSEMBLY**

CLUTCH PEDAL

COMPONENTS



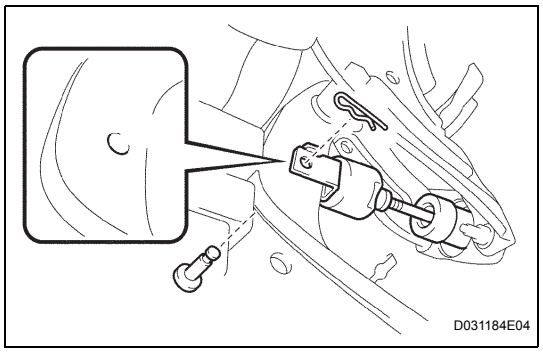
CL

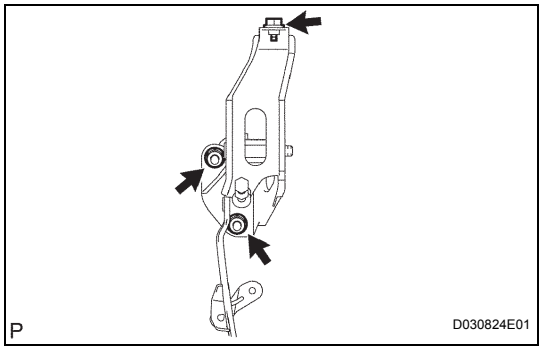
REMOVAL

1. REMOVE CLUTCH PEDAL SPRING

2. DISCONNECT CLUTCH MASTER CYLINDER PUSH ROD CLEVIS

(a) Remove the clip and hole pin and disconnect the push rod clevis from the clutch pedal.





3. REMOVE CLUTCH PEDAL SUPPORT SUB-ASSEMBLY

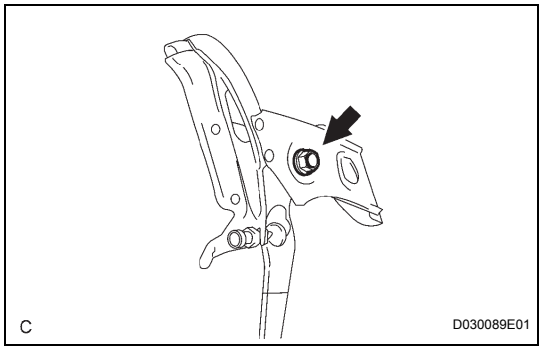
(a) Remove the 2 nuts, bolt and support.

DISASSEMBLY

1. REMOVE CLUTCH PEDAL SUB-ASSEMBLY

(a) Remove the bolt and nut.

(b) Remove the pedal from the clutch pedal support.

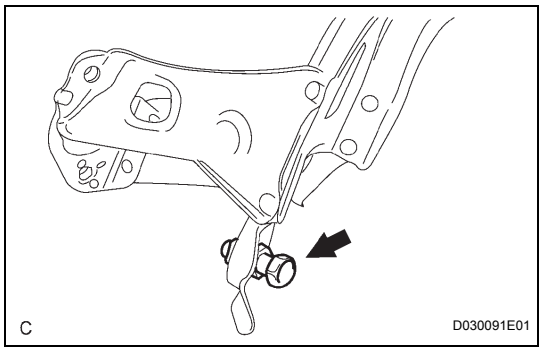


2. REMOVE CLUTCH PEDAL STOPPER BOLT

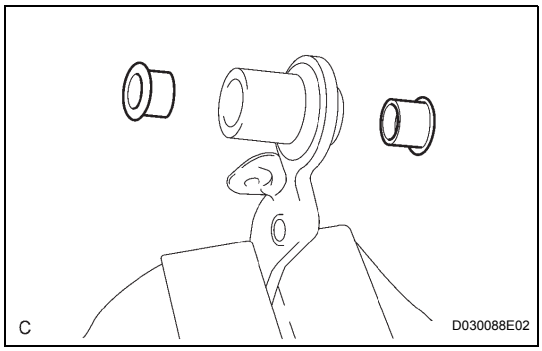
(a) Loosen the lock nut and remove the bolt.

(b) Remove the lock nut from the bolt.

3. REMOVE CLUTCH PEDAL PAD

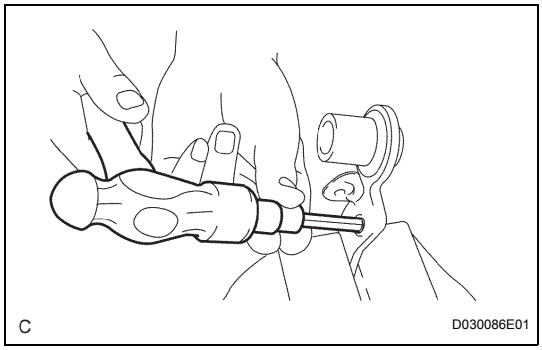


CL



4. REMOVE CLUTCH PEDAL BUSH

(a) Remove the 2 bushes from the clutch pedal.



5. REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS BUSH

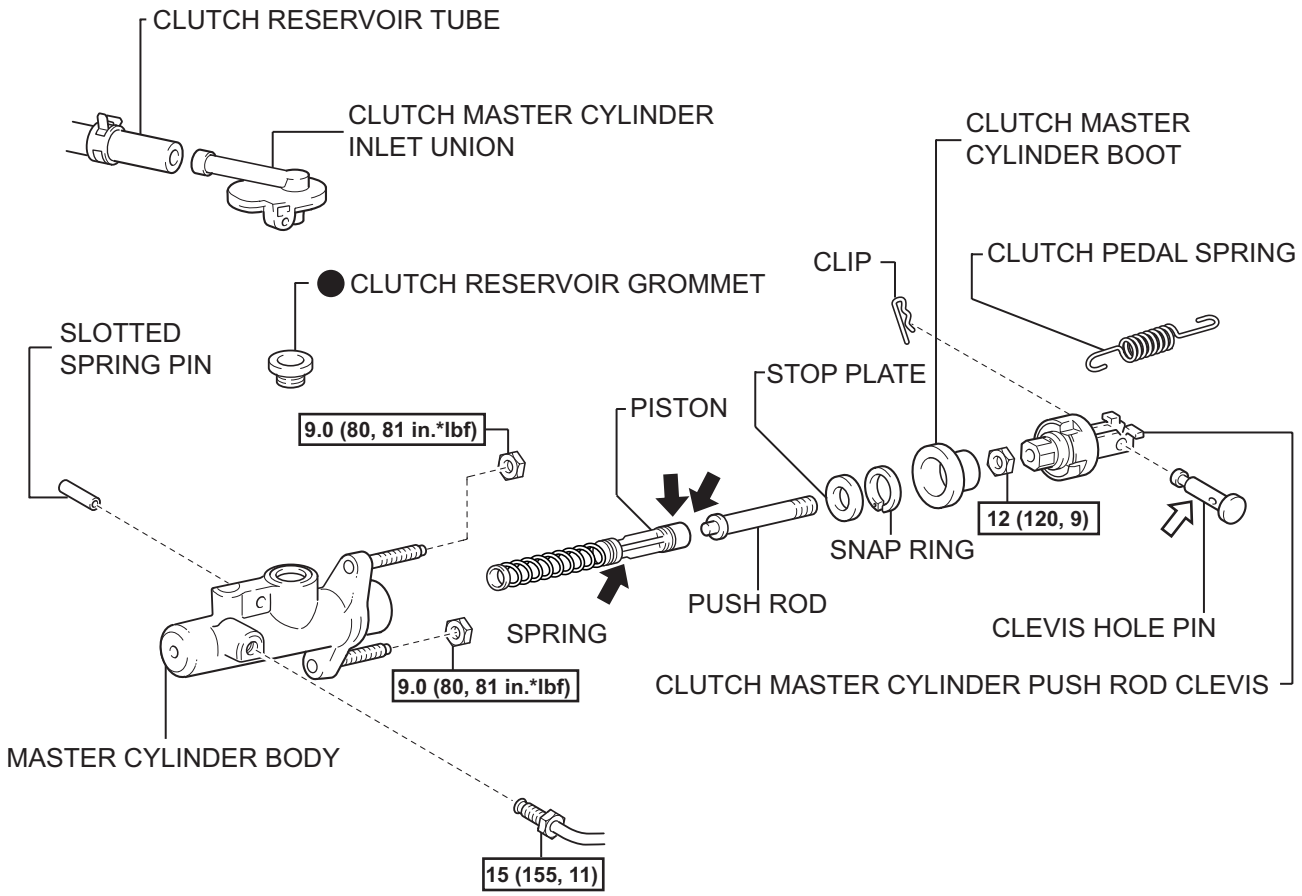
(a) Using an 8 mm hexagon wrench and hammer, tap out the clevis bush from the clutch pedal.

INSTALLATION

1. **INSTALL CLUTCH START SWITCH ASSEMBLY**
   (a) Install the clutch start switch to the bracket with the nut.
   Torque: 6.2 N*m (63 kgf*cm, 55 in.*lbf)
   (b) Install the clutch start switch with the 2 nuts.
   Torque: 6.2 N*m (63 kgf*cm, 55 in.*lbf)
   (c) Connect the clutch start switch connector.
2. **INSPECT CLUTCH START SWITCH ASSEMBLY**
   (a) Inspect the clutch start switch (see page CL-22).

CLUTCH MASTER CYLINDER

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

Lithium soap base glycol grease

MP grease

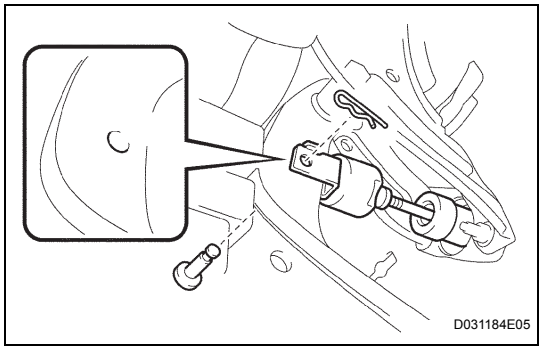
P

C113703E01

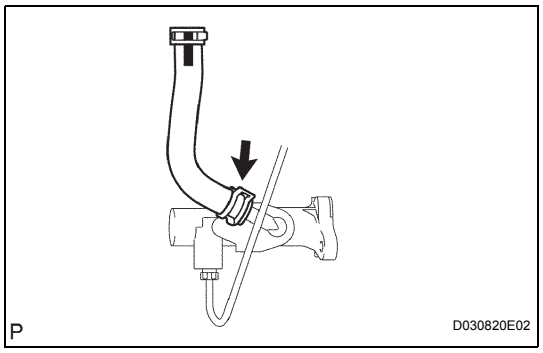
CL

REMOVAL

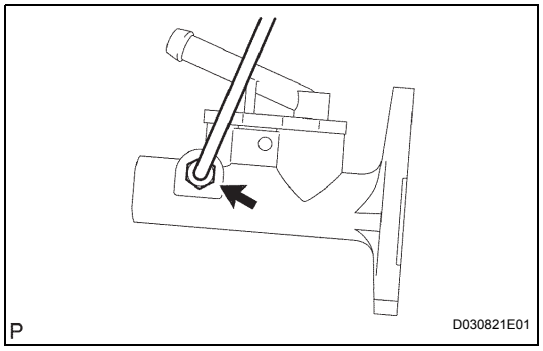
1. **REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY**
   (a) Remove the brake master cylinder (see page BR-18).
2. **REMOVE BRAKE ACTUATOR ASSEMBLY**
   (a) Remove the brake actuator (see page BC-163).
3. **REMOVE BRAKE BOOSTER ASSEMBLY**
   (a) Remove the brake booster (see page BR-18).
4. **REMOVE CLUTCH PEDAL SPRING**
5. **DISCONNECT CLUTCH MASTER CYLINDER PUSH ROD CLEVIS**
   (a) Remove the clip and pin and disconnect the push rod clevis from the clutch pedal.



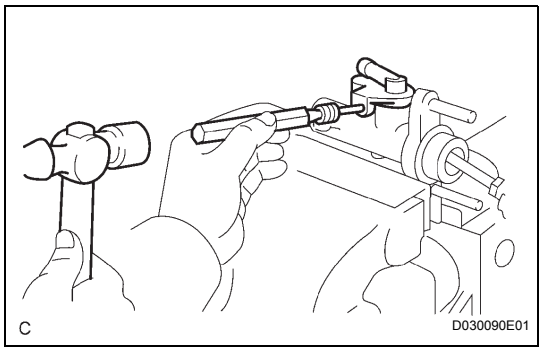
6. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash brake fluid off immediately if it adheres to any painted surface.
7. **DISCONNECT CLUTCH RESERVOIR TUBE**
   (a) Loosen the clip and disconnect the tube from the clutch master cylinder.
   HINT:
   Use a container to catch the fluid.

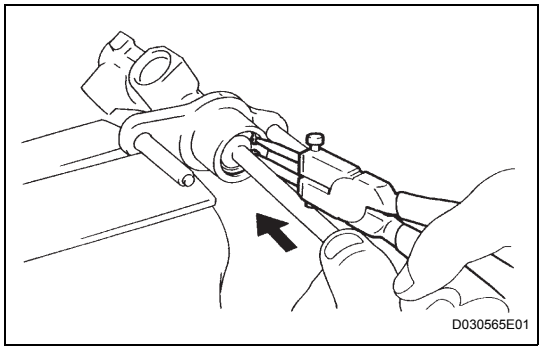


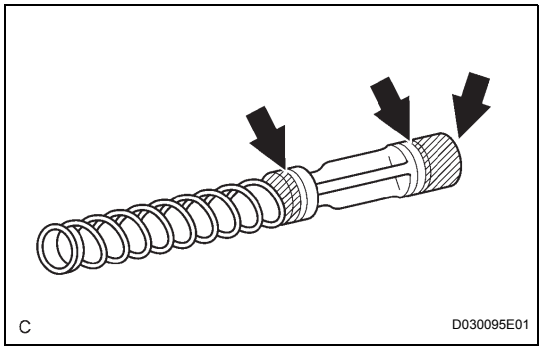
8. **DISCONNECT CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE**
   (a) Using SST, disconnect the flexible hose tube.
   SST 09023-00101
   HINT:
   Use a container to catch the fluid.
9. **REMOVE CLUTCH MASTER CYLINDER ASSEMBLY**
   (a) Remove the 2 nuts and clutch master cylinder.

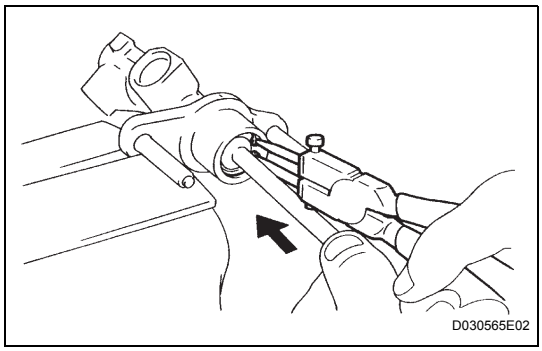


CL









DISASSEMBLY

1. REMOVE CLUTCH MASTER CYLINDER KIT

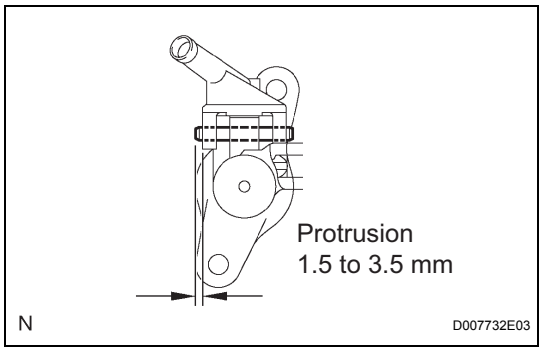
(a) Using a pin punch and hammer, tap out the slotted spring pin.
(b) Remove the inlet union and grommet.
(c) Loosen the lock nut, and remove the push rod clevis.
(d) Remove the lock nut from the push rod.
(e) Remove the boot from the cylinder body.
(f) While pushing the push rod, remove the snap ring with snap ring pliers.
(g) Remove the push rod from the cylinder body.
NOTICE:
The piston may pop up out of the cylinder body. Therefore, slowly remove the push rod from the cylinder body.
(h) Remove the stop plate from the push rod.
(i) Remove the piston with spring from the cylinder body.
NOTICE:
Be careful not to damage the inside of the cylinder body.

REASSEMBLY

1. INSTALL CLUTCH MASTER CYLINDER KIT

(a) Coat the parts shown in the illustration with lithium soap base glycol grease.
(b) Install the piston with spring into the cylinder body.
NOTICE:
Be careful not to damage the inside of the cylinder body.
(c) Install the stop plate to the push rod.
(d) Install the push rod to the cylinder body.
(e) While pushing the push rod, install the snap ring with snap ring pliers.
(f) Install the boot on the cylinder body.
(g) Install the lock nut on the push rod.
(h) Temporarily install the push rod clevis with the lock nut on the push rod.
(i) Install the inlet union and a new grommet.

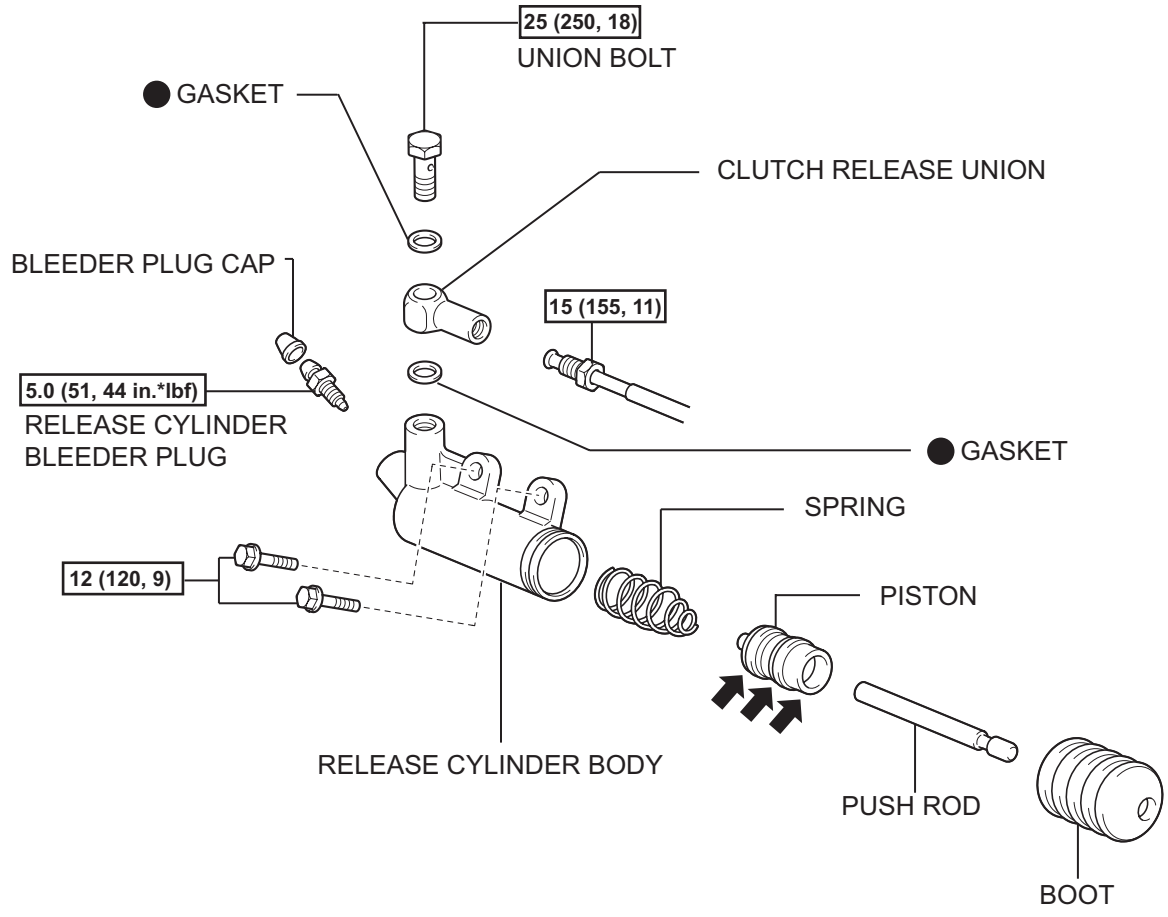
CL



(j) Using a pin punch and hammer, tap in the slotted spring pin.
Standard protrusion:
1.5 to 3.5 mm (0.059 to 0.138 in.)

CLUTCH RELEASE CYLINDER

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

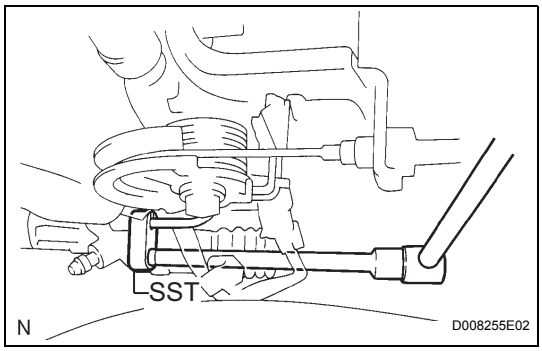
● Non-reusable part

◀ Lithium soap base glycol grease

P

C113704E02

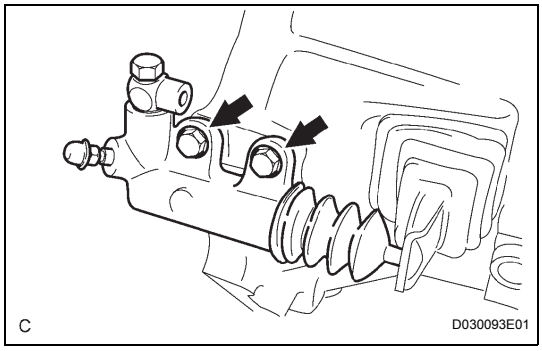
CL



REMOVAL

1. DISCONNECT CLUTCH RELEASE CYLINDER TO FLEXIBLE HOSE TUBE

(a) Using SST, disconnect the tube.
SST 09023-00101
HINT:
Use a container to catch the fluid.

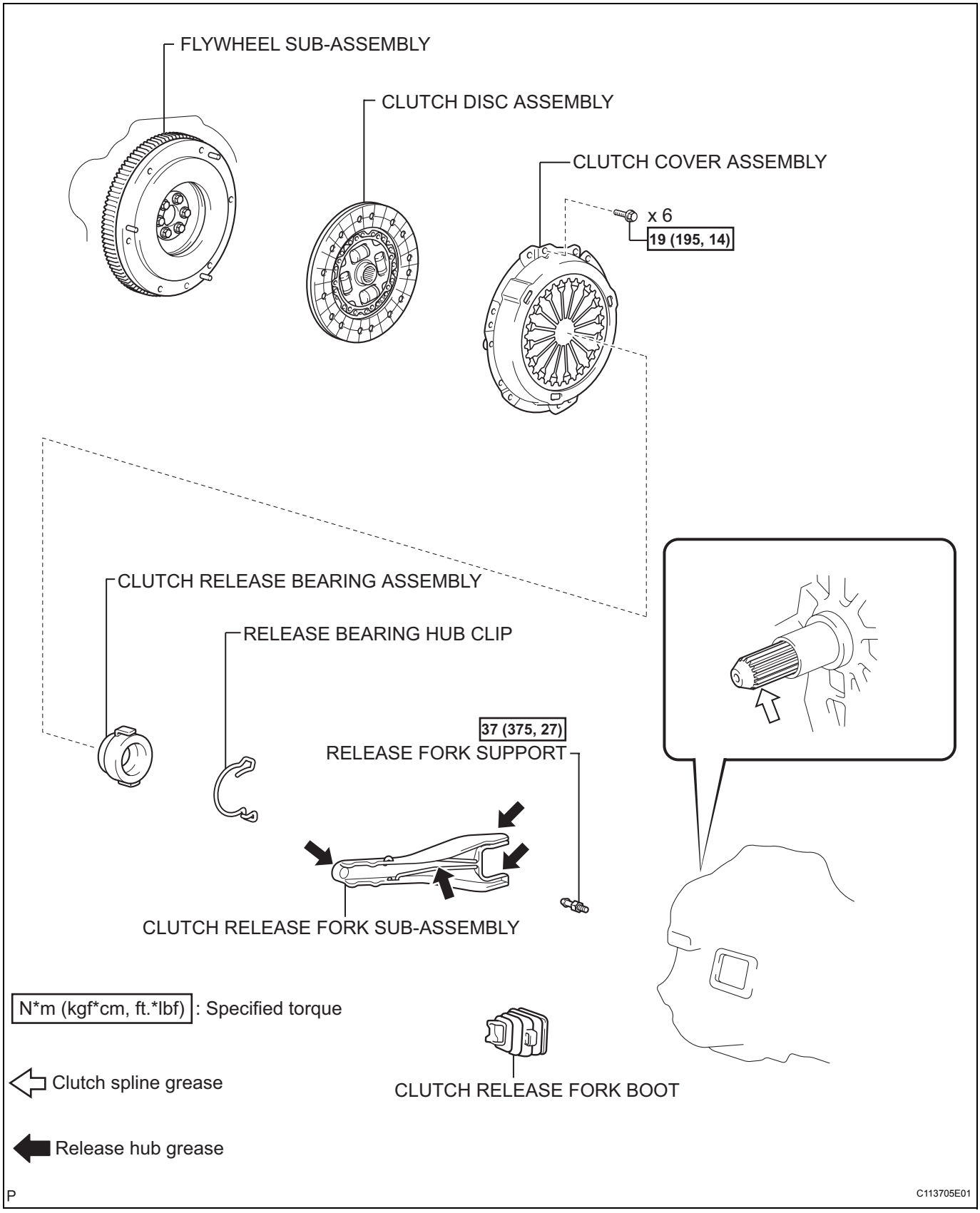


2. REMOVE CLUTCH RELEASE CYLINDER ASSEMBLY

(a) Remove the 2 bolts and clutch release cylinder.

CLUTCH UNIT

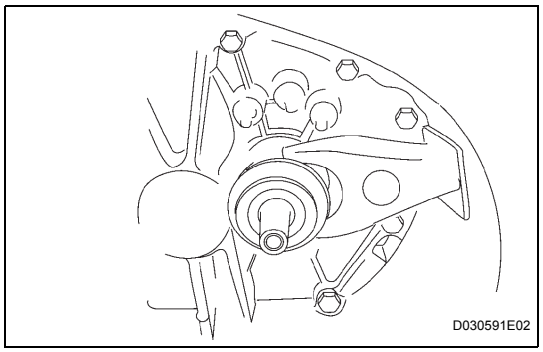
COMPONENTS



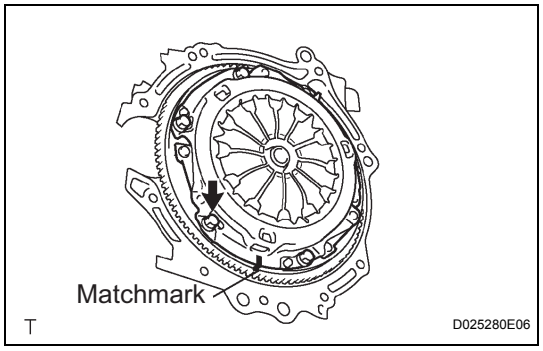
CL

REMOVAL

1. **REMOVE MANUAL TRANSAXLE ASSEMBLY**
2. **REMOVE CLUTCH RELEASE FORK SUB-ASSEMBLY**
   (a) Remove the fork with the clutch release bearing from the transaxle.
3. **REMOVE CLUTCH RELEASE FORK BOOT**
4. **REMOVE CLUTCH RELEASE BEARING ASSEMBLY**
   (a) Remove the bearing from the clutch release fork.
5. **REMOVE RELEASE BEARING HUB CLIP**
6. **REMOVE RELEASE FORK SUPPORT**
   (a) Remove the support and release fork from the transaxle.

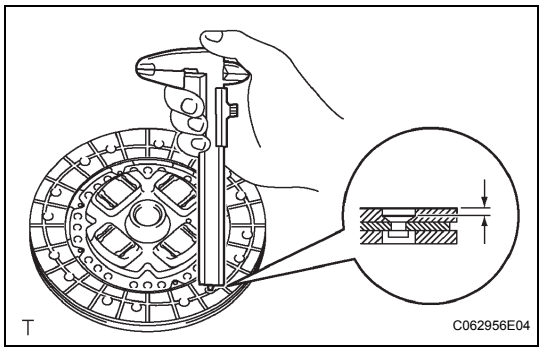


7. **REMOVE CLUTCH COVER ASSEMBLY**
   (a) Place the matchmark on the cover and flywheel.
   (b) Loosen each set bolt one turn at a time until spring tension is released.
   (c) Remove the 6 set bolts and pull off the cover.
   NOTICE:
   Do not drop the clutch disc assembly.
8. **REMOVE CLUTCH DISC ASSEMBLY**

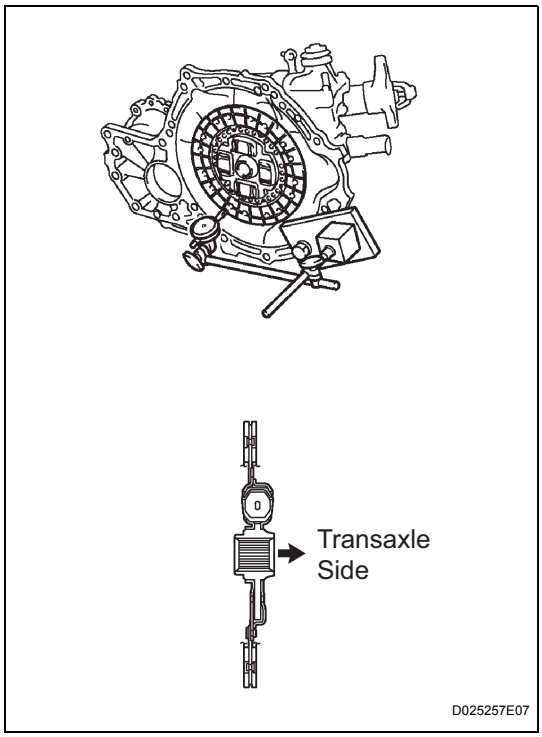


INSPECTION

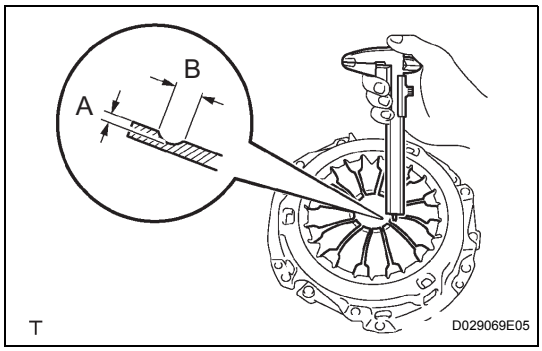
1. **INSPECT CLUTCH DISC ASSEMBLY**
   (a) Using a vernier caliper, measure the rivet head depth.
   Minimum rivet depth:
   0.3 mm (0.012 in.)
   If the depth is less than the minimum, replace the clutch disc assembly.
   (b) Install the disc on the transaxle.
   NOTICE:
   Take care not to insert the clutch disc assembly in the wrong direction.



CL



(c) Using a dial gauge, measure the disc runout.
Maximum runout:
0.8 mm (0.031 in.)
If the runout is greater than the maximum, replace the clutch disc assembly.

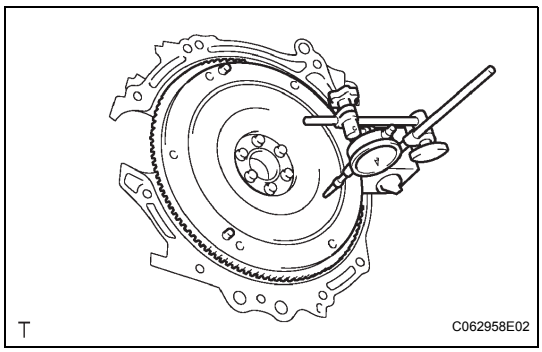


2. INSPECT CLUTCH COVER ASSEMBLY

(a) Using a vernier caliper, measure the diaphragm spring for depth and width of wear.
Maximum wear

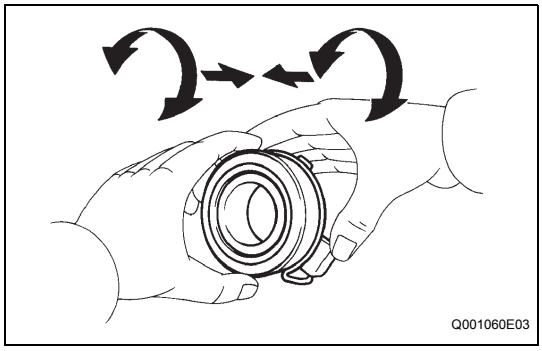
Measurement	Maximum wear
A (Depth)	0.5 mm (0.020 in.)
B (Width)	6.0 mm (0.236 in.)

If the wear is greater than the maximum, replace the clutch cover assembly.



3. INSPECT FLYWHEEL SUB-ASSEMBLY

(a) Using a dial gauge, measure the flywheel runout.
Maximum runout:
0.1 mm (0.004 in.)
If the runout is greater than the maximum, replace the flywheel sub-assembly.



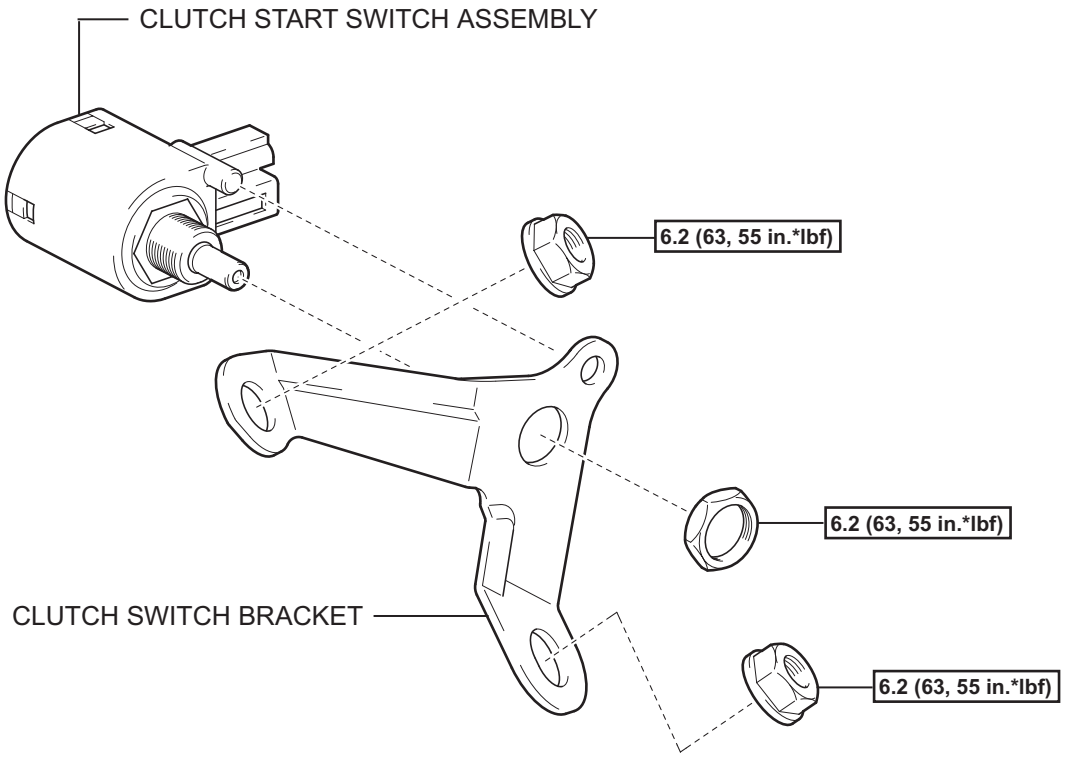
4. INSPECT CLUTCH RELEASE BEARING ASSEMBLY

(a) Check that the bearing moves smoothly without abnormal resistance by turning the sliding parts of the bearing (contact surfaces with the clutch cover) while applying force in the axial direction.
(b) Inspect the bearing for damage or wear.
If necessary, replace the release bearing assembly.

CL

CLUTCH START SWITCH

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

P

C113706E01

CL

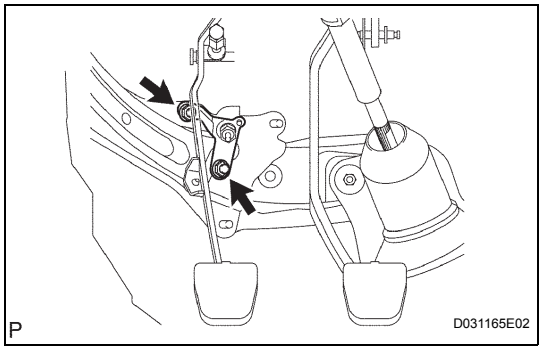
ON-VEHICLE INSPECTION

1. CHECK CLUTCH START SYSTEM

(a) Check that the engine does not start when the clutch pedal is released.

(b) Check that the engine starts when the clutch pedal is fully depressed.
If necessary, replace the clutch start switch assembly.

REMOVAL



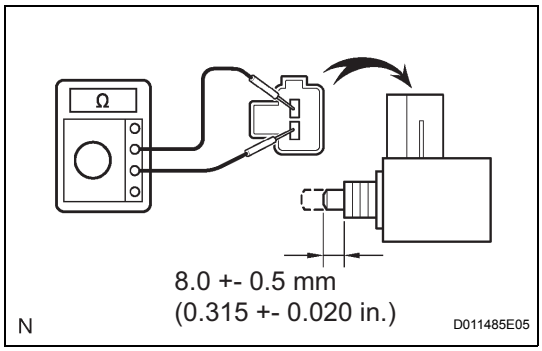
1. REMOVE CLUTCH START SWITCH ASSEMBLY

(a) Disconnect the clutch start switch connector.

(b) Remove the 2 nuts and clutch start switch with the bracket.

(c) Remove the nut and clutch start switch from the bracket.

INSPECTION



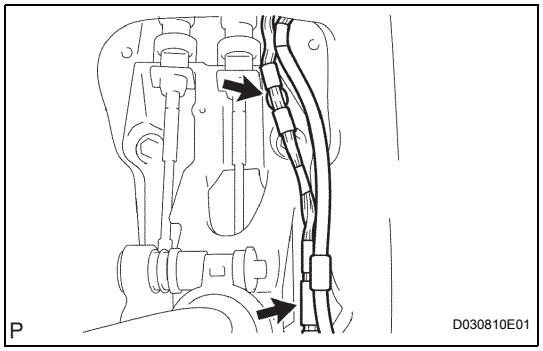
1. INSPECT CLUTCH START SWITCH ASSEMBLY

(a) Measure the resistance between the terminals when the switch is ON and OFF.
Standard resistance

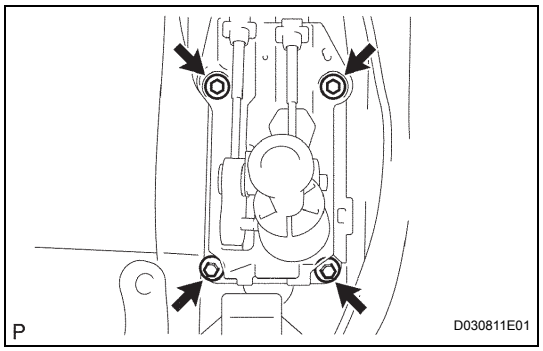
Switch Position	Specified Condition
ON (pushed)	Below 1 Ω
OFF (free)	10 kΩ or higher

REMOVAL

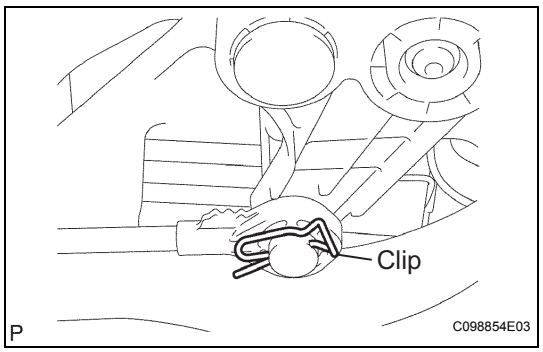
1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
   (a) Remove the shift lever knob (see page IP-26).
2. **REMOVE REAR CONSOLE BOX ASSEMBLY**
   (a) Remove the rear console box (see page IP-26).
3. **REMOVE FLOOR SHIFT LEVER ASSEMBLY**
   (a) Disconnect the wire harness.



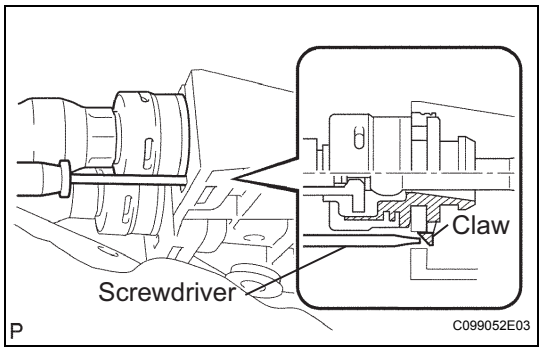
(b) Remove the 4 bolts and disconnect the shift lever.



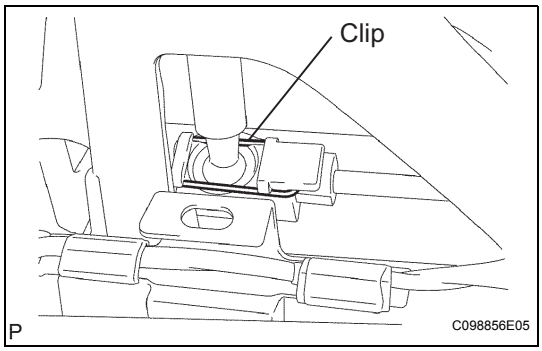
(c) Remove the clip, and disconnect the cable end of the transmission control select cable from the floor shift lever.



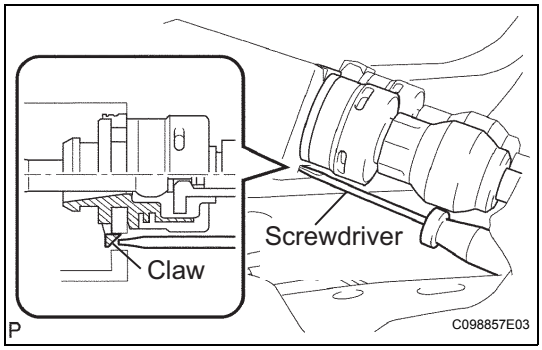
(d) Using a screwdriver, detach the claw.
(e) Disconnect the transmission control select cable from the shift lever retainer.



MX



(f) Remove the clip, and disconnect the cable end of the transmission control shift cable from the floor shift lever.

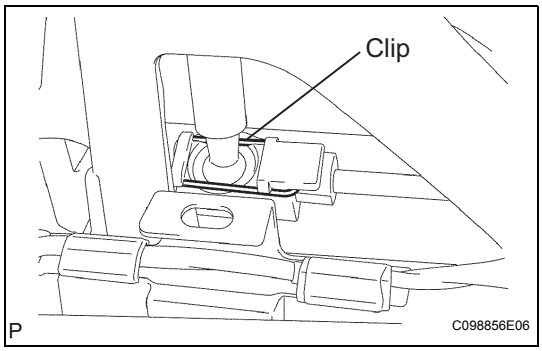


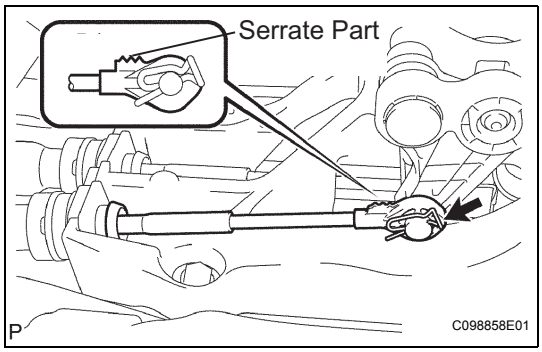
(g) Using a screwdriver, detach the claw.
(h) Disconnect the transmission control shift cable from the shift lever retainer.

INSTALLATION

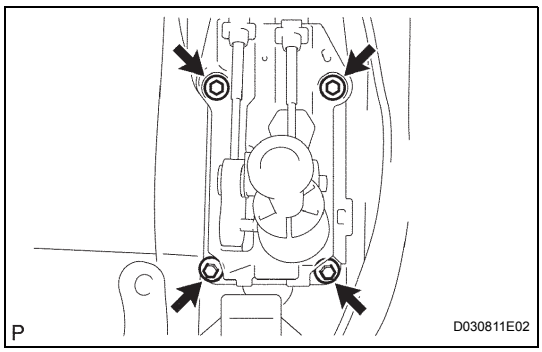
1. INSTALL FLOOR SHIFT LEVER ASSEMBLY

(a) Connect the transmission control shift cable to the shift lever retainer with the clip.
(b) Connect the end of the transmission control shift cable to the floor shift lever.



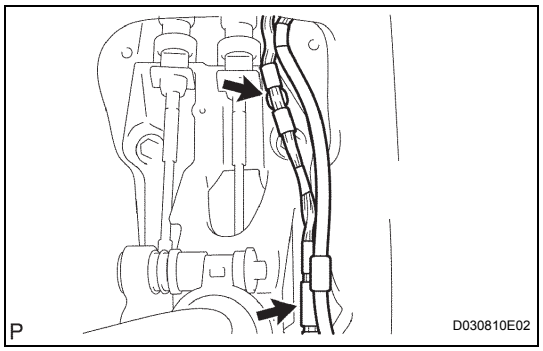


(c) Connect the transmission control select cable to the shift lever retainer.
(d) Connect the end of the transmission control select cable to the floor shift lever with the clip.
NOTICE:
- **The serrated part of the select cable point should face upward when the select cable point is connected.**
- **The clip should be inserted in the direction shown in the illustration.**



(e) Install the shift lever with the 4 bolts.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)

MX



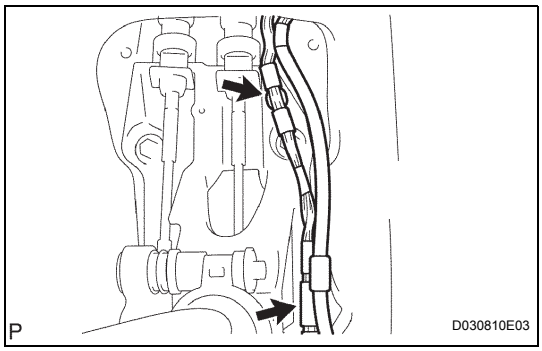
(f) Connect the wire harness.

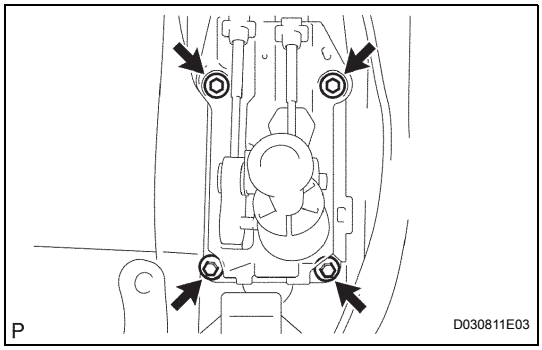
2. **INSTALL REAR CONSOLE BOX ASSEMBLY**
   (a) Install the rear console box (see page IP-27).

3. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY**
   (a) Install the shift lever knob (see page IP-27).

REMOVAL

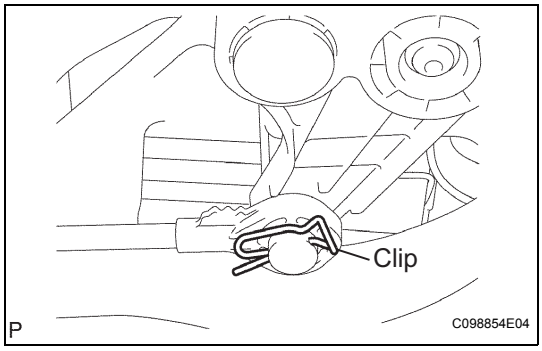
1. **REMOVE FRONT NO. 1 FLOOR HEAT INSULATOR**
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
   (a) Remove the shift lever knob (see page IP-17).
3. **REMOVE REAR CONSOLE BOX ASSEMBLY**
   (a) Remove the rear console box (see page IP-26).
4. **DISCONNECT FLOOR SHIFT LEVER ASSEMBLY**
   (a) Disconnect the wire harness.



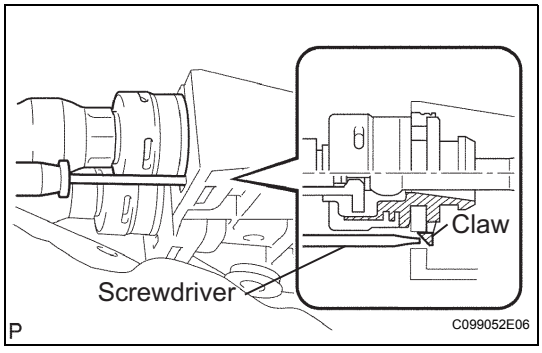


   (b) Remove the 4 bolts and disconnect the floor shift lever.

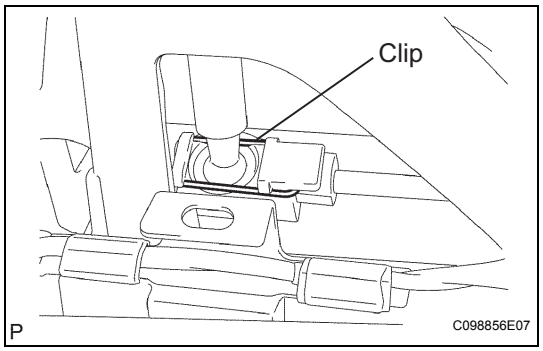
5. **REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the clip, and disconnect the cable end of the transmission control select cable from the floor shift lever.



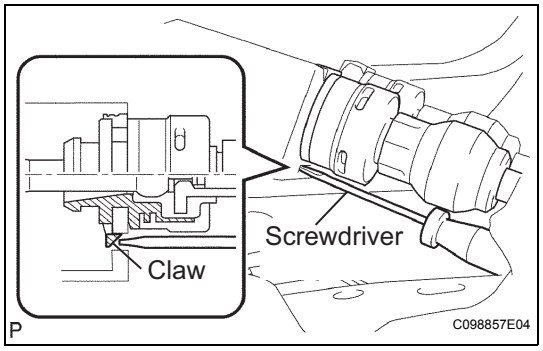
   (b) Using a screwdriver, detach the claw.
   (c) Disconnect the transmission control select cable from the shift lever retainer.



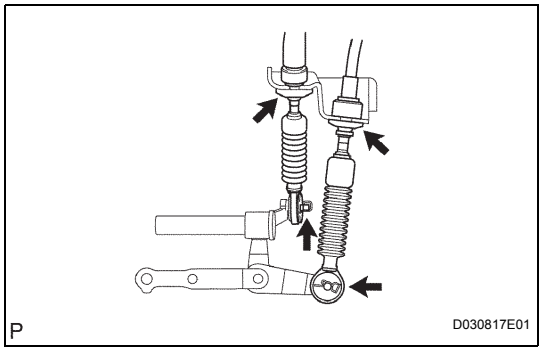
MX



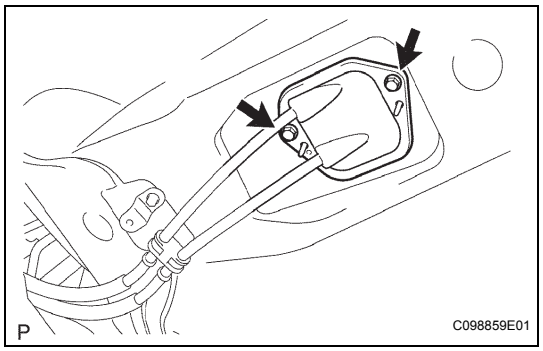
(d) Remove the clip, and disconnect the cable end of the transmission control shift cable from the floor shift lever.



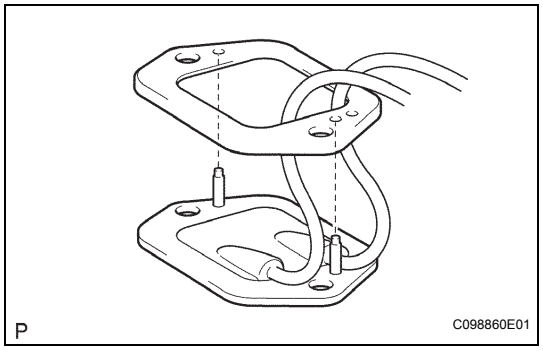
(e) Using a screwdriver, detach the claw.
(f) Disconnect the transmission control shift cable from the shift lever retainer.



(g) Remove the 2 clips and 2 washers, and disconnect the 2 cables from the manual transaxle.
(h) Remove the 2 clips, and disconnect the 2 cables from the control cable bracket.

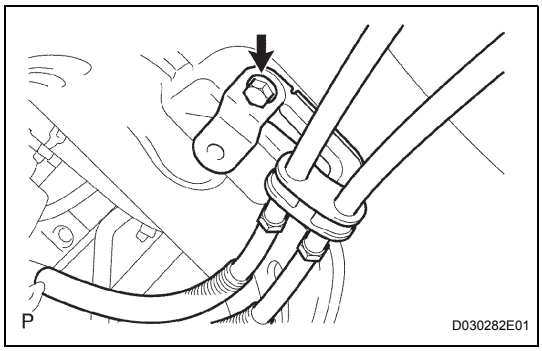


(i) Remove the 2 bolts and retainer from the floor.

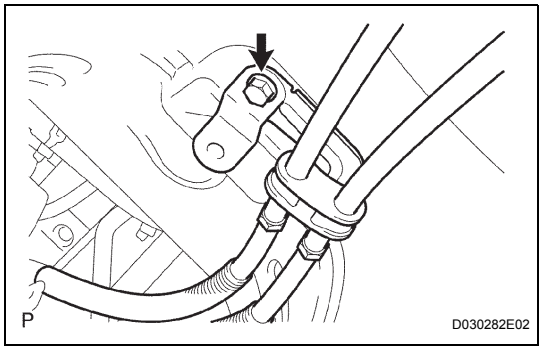


(j) Remove the retainer from the grommet.
(k) Remove the transmission control select cable from the grommet.

MX



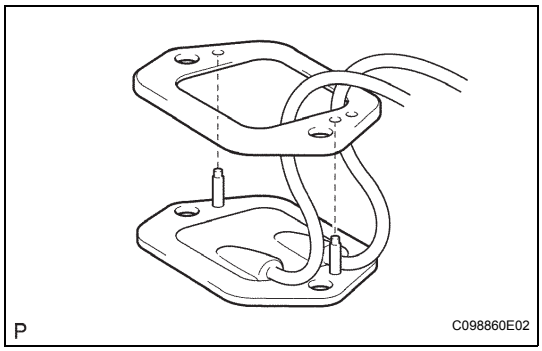
(l) Remove the bolt and clamp.
(m) Pull out the transmission control select cable and transmission control shift cable through the floor hole.



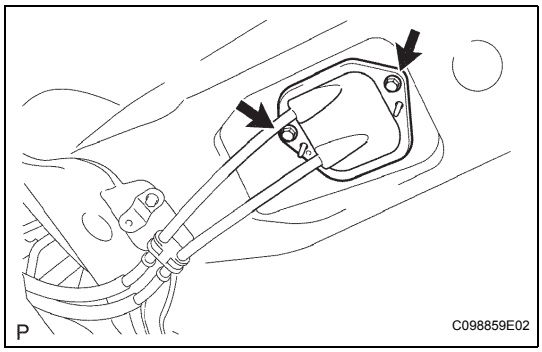
INSTALLATION

1. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

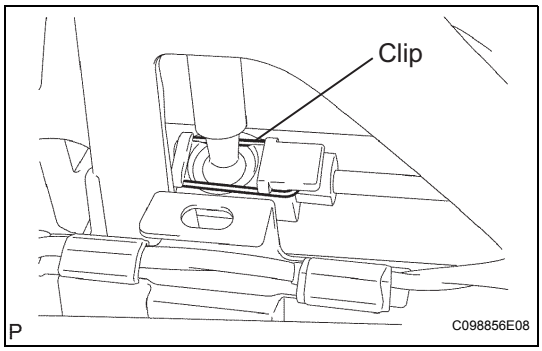
(a) Install the clamp with the bolt.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(b) Insert the transmission control select cable and transmission control shift cable through the floor hole and retainer.
(c) Install the transmission control select cable to the grommet.



(d) Install the retainer on the grommet.
NOTICE:
Fit the projections of the grommet into the holes of the retainer.

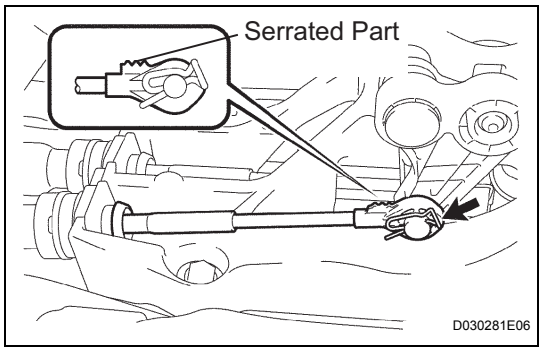


(e) Install the retainer to the floor with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(f) Connect the transmission control cable to the shift lever retainer.

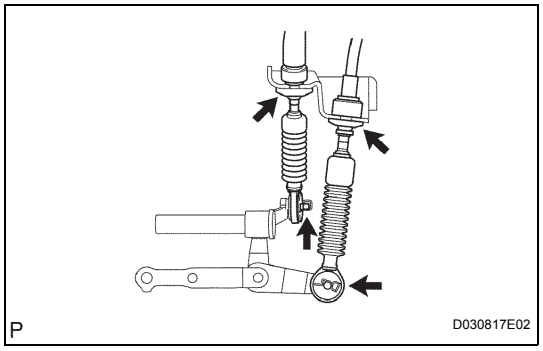


(g) Connect the end of the transmission control shift cable to the floor shift lever with the clip.
(h) Connect the transmission select cable to the shift lever retainer.

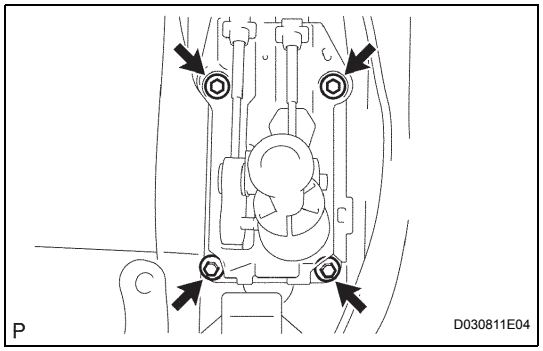
MX



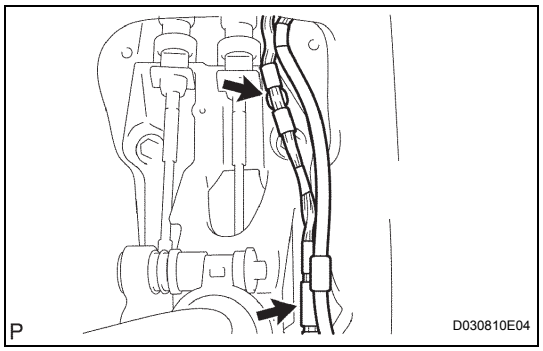
(i) Connect the end of the transmission control select cable to the floor shift lever with the clip.
- The serrated part of the select cable point should face upward when the select cable point is connected.
- The clip should be inserted in the direction shown in the illustration.



(j) Connect the 2 cable ends to the transaxle with the 2 washers and 2 clips.
(k) Install 2 new clips to the control cable bracket.



2. INSTALL FLOOR SHIFT LEVER ASSEMBLY
(a) Install the floor shift lever with the 4 bolts.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



(b) Connect the wire harness.

3. INSTALL REAR CONSOLE BOX ASSEMBLY
(a) Install the rear console box (see page IP-27).

4. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY
(a) Install the shift lever knob (see page IP-22).

5. INSTALL FRONT NO.1 FLOOR HEAT INSULATOR
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

MANUAL TRANSAXLE SYSTEM

PROBLEM SYMPTOMS TABLE

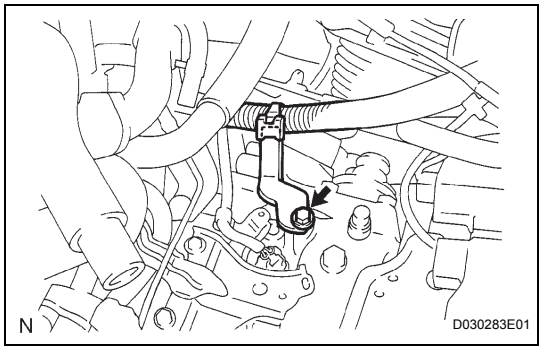
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Manual transaxle system

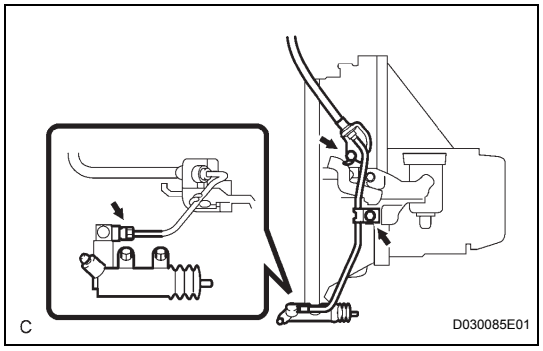
Symptom	Suspected area	See page
Noise	1. Oil (Level low)	MX-2
	2. Oil (Wrong)	MX-2
	3. Input gear (Worn or damaged)	MX-68
	4. Output gear (Worn or damage)	MX-78
	5. Input gear bearing (Worn or damage)	MX-68
	6. Output gear bearing (Worn or damage)	MX-78
Oil leakage	1. Oil (Level too high)	MX-2
	2. Gasket (Damaged)	MX-20
	3. Oil seal (Worn or damaged)	MX-3
	4. O-Ring (Worn or damaged)	MX-20
Hard to shaft or will not shift	1. Control cable (Faulty)	MX-12
	2. Input synchronizer ring (Worn or damaged)	MX-68
	3. Output synchronizer ring (Worn or damaged)	MX-78
	4. Input shift key spring (Damaged)	MX-68
	5. Output shift key spring (Damaged)	MX-78
Jumps out of gear	1. Locking ball spring (Damage)	MX-20
	2. Shift fork (Worn)	MX-20
	3. Input gear (Worn or damaged)	MX-68
	4. Output gear (Worn or damaged)	MX-78
	5. Input bearing (Worn or damaged)	MX-68
	6. Output bearing (Worn or damaged)	MX-78

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT WHEEL**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **DRAIN TRANSAXLE OIL**
   (a) Remove the filler plug and gasket.
   (b) Remove the drain plug and gasket, and drain the manual transaxle oil.
   (c) Install a new gasket and the drain plug.
6. **REMOVE ENGINE HOOD SUB-ASSEMBLY**
7. **REMOVE COWL TOP PANEL OUTER (See page SP-11)**
8. **REMOVE NO. 2 CYLINDER HEAD COVER**
9. **REMOVE AIR CLEANER ASSEMBLY**
10. **REMOVE BATTERY**
11. **DISCONNECT WIRE HARNESS**
    (a) Remove the bolt and disconnect the wire harness clamp.

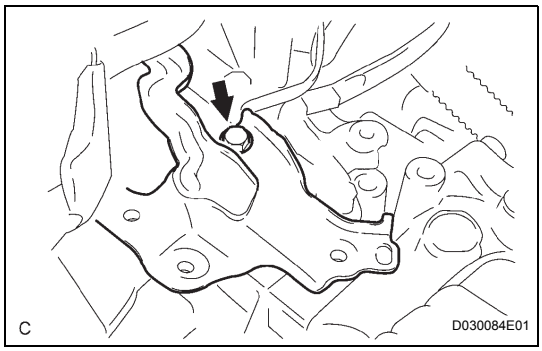


12. **DISCONNECT CONNECTOR**
    (a) Disconnect the back-up light switch connector.



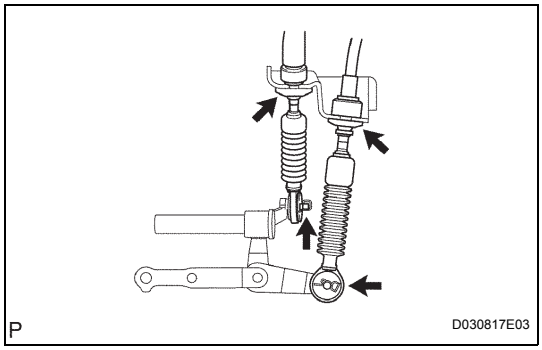
13. **DISCONNECT CLUTCH RELEASE CYLINDER TO FLEXIBLE HOSE TUBE**
    (a) Using SST, disconnect the flexible hose tube from the clutch release cylinder.
    SST 09023-00101
    HINT:
    Use a container to catch the fluid.
    (b) Remove the 2 bolts and disconnect the flexible hose tube.

MX



14. REMOVE AIR CLEANER BRACKET

(a) Remove the bolt and air cleaner bracket.



15. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Remove the 2 clips and 2 washers, and disconnect the 2 cables from the transaxle.

(b) Remove the 2 clips, and disconnect the 2 cables from the control cable bracket.

16. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

(a) Remove the front drive shaft (see page DS-4).

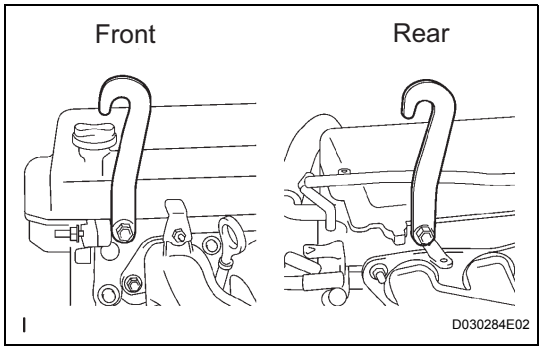
17. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

Remove the RH side by the same procedures as the LH side.

18. REMOVE FRONT FLOOR PANEL BRACE (See page EX-3)

19. REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-3)



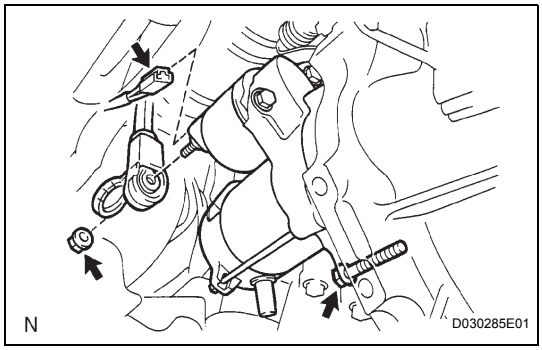
20. SUSPEND ENGINE ASSEMBLY

(a) Install the 2 hangers in the correct direction.

(b) Attach the engine chain hoist to the hangers.

Engine hanger:
Parts No. 12281-21010
Bolt:
Parts No. 91642-81025
Torque: 40 N*m (408 kgf*cm, 29 ft.*lbf)
CAUTION:
Do not attempt to hang the engine by hooking the chain to any other part.

21. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY (See page PS-21)



22. REMOVE STARTER ASSEMBLY

(a) Remove the flywheel housing side cover.

(b) Remove the nut and disconnect the starter wire.

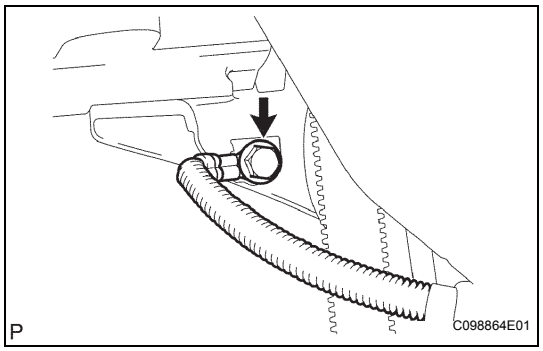
(c) Disconnect the connector.

(d) Remove the 2 bolts and starter.

23. SUPPORT MANUAL TRANSAXLE ASSEMBLY

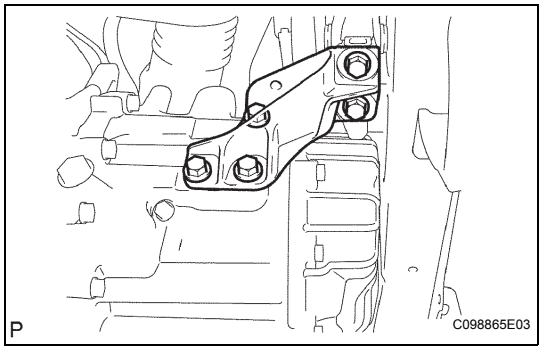
(a) Support the transaxle with a transmission jack.

MX



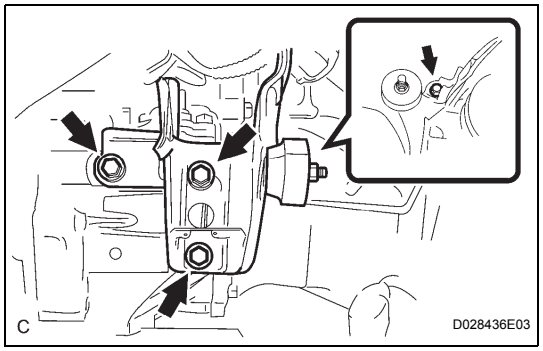
24. REMOVE ENGINE MOUNTING BRACKET LH

(a) Remove the bolt and disconnect the ground cable.



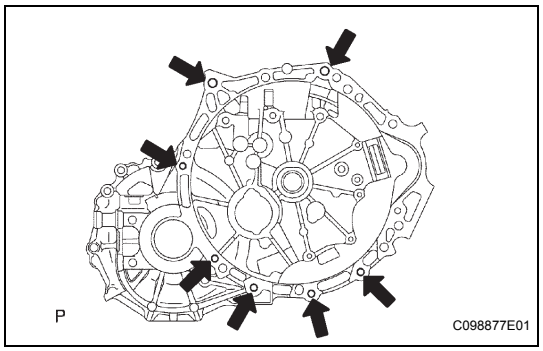
(b) Remove the 2 bolts, and disconnect the engine mounting bracket LH from the engine mounting insulator LH.

(c) Remove the 3 bolts and engine mounting bracket LH from the transaxle.



25. REMOVE REAR ENGINE MOUNTING BRACKET

(a) Remove the 4 bolts and rear engine mounting bracket from the transaxle.

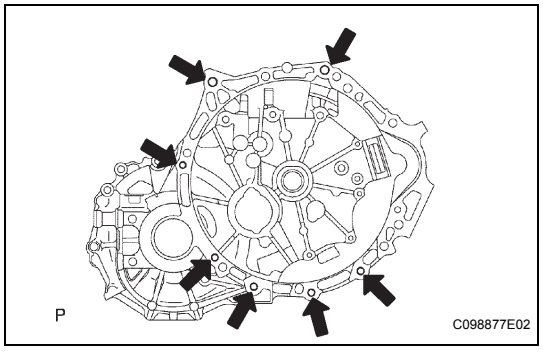


26. REMOVE MANUAL TRANSAXLE ASSEMBLY

(a) Remove the 7 bolts and transaxle from the engine.

MX

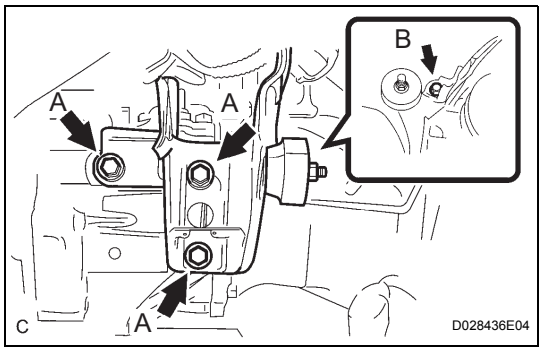
INSTALLATION



1. INSTALL MANUAL TRANSAXLE ASSEMBLY

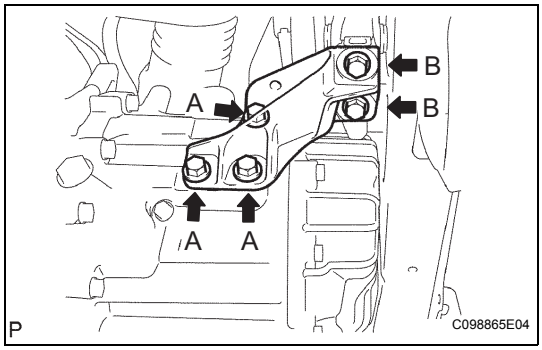
(a) Align the input shaft with the clutch disc and install the transaxle to the engine.

(b) Install the 7 bolts.
Torque: 33 N*m (340 kgf*cm, 24 ft.*lbf)



2. INSTALL REAR ENGINE MOUNTING BRACKET

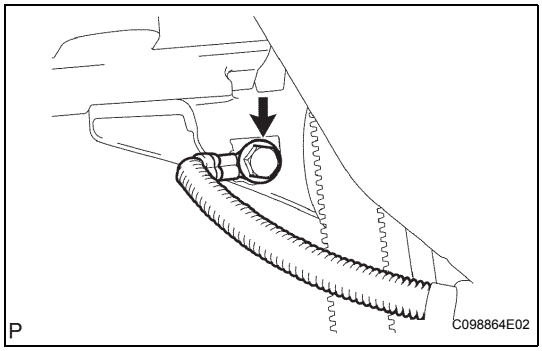
(a) Install the rear engine mounting bracket to the transaxle with the 4 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf) for bolt A
18 N*m (180 kgf*cm, 13 ft.*lbf) for bolt B



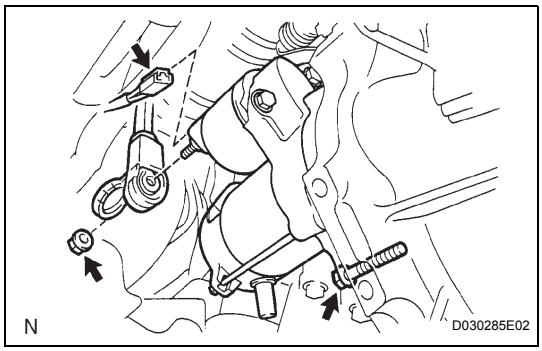
3. INSTALL ENGINE MOUNTING BRACKET LH

(a) Install the engine mounting bracket LH to the transaxle with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf) for bolt A

(b) Connect the engine mounting bracket LH to the engine mounting insulator with the 2 bolts.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf) for bolt B



(c) Install the ground cable to the engine mounting bracket with the bolt.
Torque: 26 N*m (260 kgf*cm, 19 ft.*lbf)



4. INSTALL STARTER ASSEMBLY

(a) Install the starter with the 2 bolts.
Torque: 37 N*m (380 kgf*cm, 27 ft.*lbf)

(b) Connect the starter connector.

(c) Install the wire with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

(d) Install the flywheel housing side cover.

5. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY (See page PS-32)

6. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

(a) Install the front drive shaft (see page DS-13).

7. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

HINT:
Install the RH side by the same procedures as the LH side.

8. INSTALL FRONT AXLE ASSEMBLY LH

(a) Install the front axle (see page DS-13).

MX

9. INSTALL FRONT AXLE ASSEMBLY RH

HINT:

Install the RH side by the same procedures as the LH side.

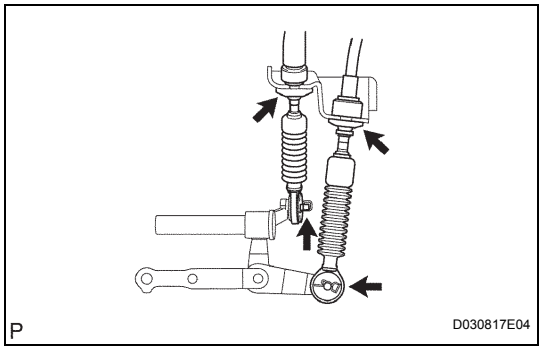
10. INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-5)

11. INSTALL FRONT FLOOR PANEL BRACE (See page EX-7)

12. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

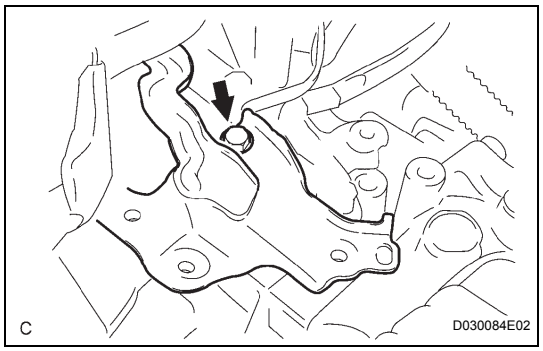
(a) Connect the 2 cable ends to the transaxle with the 2 washers and 2 clips.

(b) Install 2 new clips to the control cable bracket.



13. INSTALL AIR CLEANER BRACKET

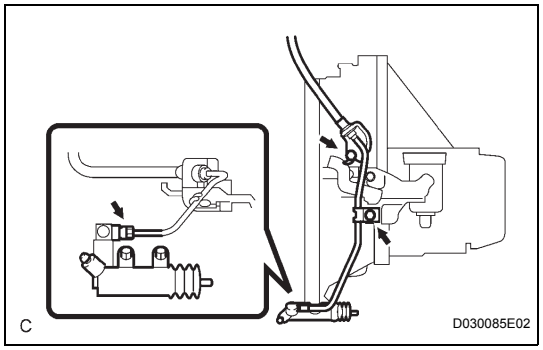
(a) Install the air cleaner bracket with the bolt.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)



14. CONNECT CLUTCH RELEASE CYLINDER TO FLEXIBLE HOSE TUBE

(a) Using SST, connect the flexible hose tube.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)

(b) Connect the flexible hose tube with the 2 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)

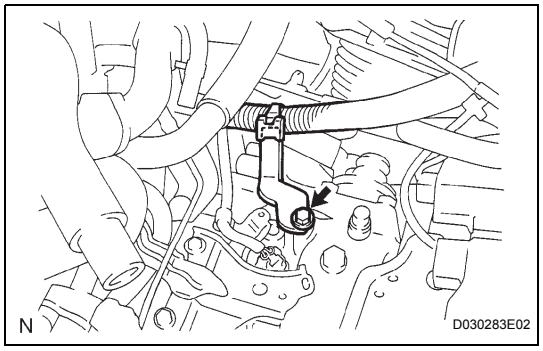


15. CONNECT CONNECTOR

(a) Connect the back-up light switch connector.

16. CONNECT WIRE HARNESS

(a) Connect the wire harness clamp with the bolt.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



17. INSTALL BATTERY

18. INSTALL AIR CLEANER ASSEMBLY

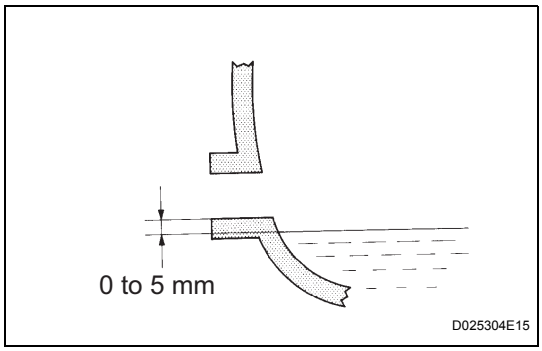
19. INSTALL NO. 2 CYLINDER HEAD COVER
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)

20. INSTALL COWL TOP PANEL OUTER (See page SP-14)

21. INSTALL HOOD SUB-ASSEMBLY (See page ED-1)

MX

22. **INSPECT HOOD SUB-ASSEMBLY (See page ED-1)**
23. **ADJUST HOOD SUB-ASSEMBLY (See page ED-1)**
24. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
25. **ADD TRANSAXLE OIL (See page MX-4)**
26. **INSPECT AND ADJUST TRANSAXLE OIL (See page MX-2)**
27. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
28. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
29. **INSTALL ENGINE UNDER COVER RH**
30. **INSTALL ENGINE UNDER COVER LH**
31. **INSPECT FRONT WHEEL ALIGNMENT**
    (a) Inspect the front wheel alignment (see page SP-2).
32. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) Check the ABS speed sensor signal (see page RS-34).
33. **CHECK FOR EXHAUST GAS LEAKS**



MANUAL TRANSAXLE OIL

ON-VEHICLE INSPECTION

1. INSPECT TRANSAXLE OIL

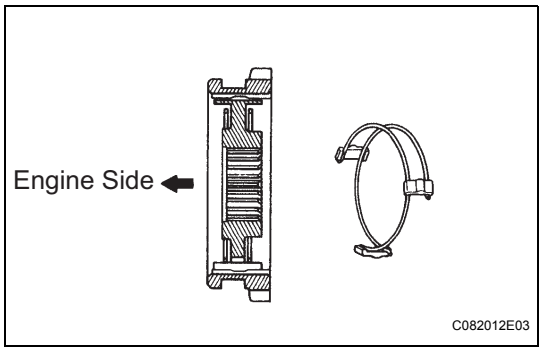
(a) Stop the vehicle on a level surface.

(b) Remove the filler plug and gasket.

(c) Check that the oil level is between 0 to 5 mm (0 to 0.20 in.) from the bottom lip of the filler plug opening.
If the result is not as specified, add transaxle oil.
Oil grade:
API GL-4 or GL-5
Viscosity:
SAE 75W- 90
Standard capacity:
1.9 liters (2.0 US qts, 1.7 Imp. qts)
NOTICE:
- **Too much or too little oil will lead to transaxle problems.**
- **After adjusting the oil level, drive the vehicle and check the oil level again.**

(d) Check for oil leakage when the oil level is low.
If leakage is found, repair the area necessary to stop the leak. Replace damaged parts as necessary.

(e) Install a new gasket and the filler plug.
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)



REASSEMBLY

1. INSTALL REVERSE GEAR

(a) Coat the reverse gear with gear oil, and install it to the No. 1 transmission clutch hub.

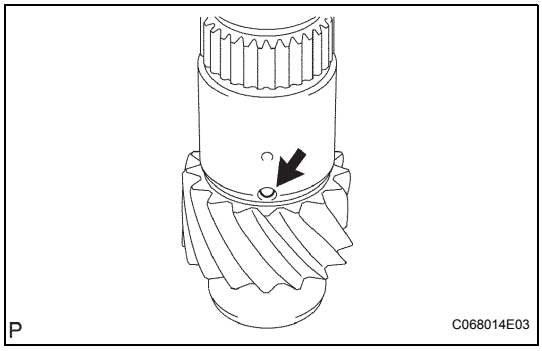
NOTICE:

Be sure to set the reverse gear and transmission clutch hub No.1 in the correct orientation.

(b) Install the 2 No. 1 synchromesh shifting key springs and 3 No. 1 synchromesh shifting keys to the No. 1 transmission clutch hub.

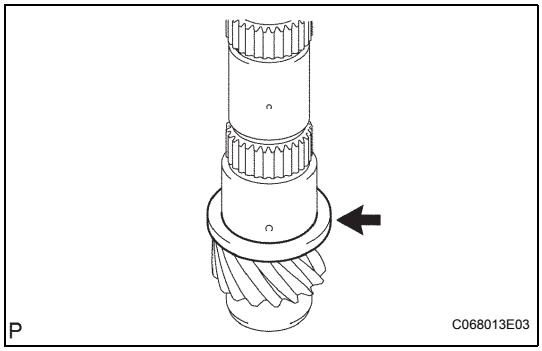
NOTICE:

Do not set both openings of the shifting key springs in the same position.



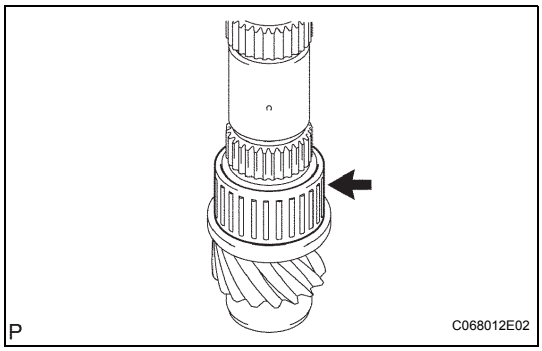
2. INSTALL 1ST GEAR THRUST WASHER BALL

(a) Coat the 1st gear thrust washer ball with MP grease, and install it to the output shaft.



3. INSTALL 1ST GEAR THRUST WASHER

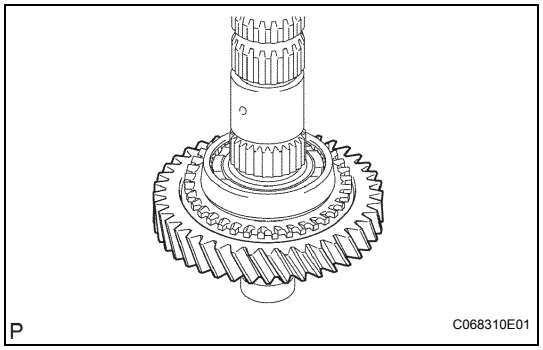
(a) Coat the 1st gear thrust washer with gear oil, and install it to the output shaft.



4. INSTALL 1ST GEAR NEEDLE ROLLER BEARING

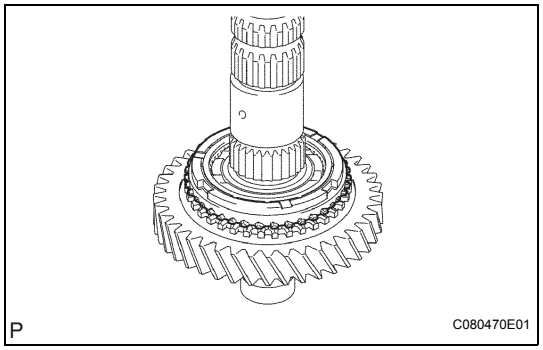
(a) Coat the 1st gear needle roller bearing with gear oil, and install it to the output shaft.

MX



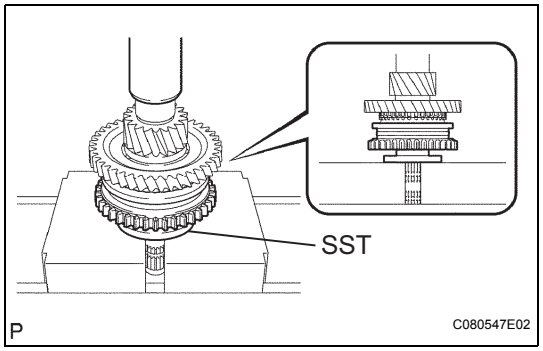
5. INSTALL 1ST GEAR

(a) Coat the 1st gear with gear oil, and install it to the output shaft.



6. INSTALL NO. 1 SYNCHRONIZER RING (for 1st Gear)

(a) Coat the No. 1 synchronizer ring with gear oil, and install it to the 1st gear.



7. INSTALL NO. 1 TRANSMISSION CLUTCH HUB

(a) Using SST and a press, press in the No. 1 transmission clutch hub to the output shaft.

SST 09316-60011 (09316-00031)

HINT:

- The 1st gear can be turned.
- While checking that the 1st gear thrust washer pin or ball is inserted into the groove of the 1st gear thrust washer, press and fit the No. 1 clutch hub.

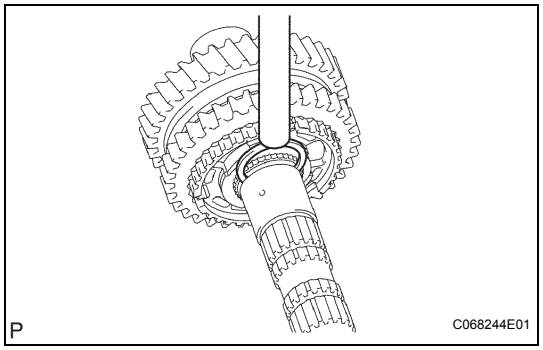
(b) Select a snap ring that will allow minimum axial play.

Standard clearance:

0.1 mm (0.004 in.) or less

Standard snap ring thickness

Mark	Thickness mm (in.)
A	2.50 (0.0984)
B	2.56 (0.1008)
C	2.62 (0.1031)
D	2.68 (0.1055)
E	2.74 (0.1079)
F	2.80 (0.1102)

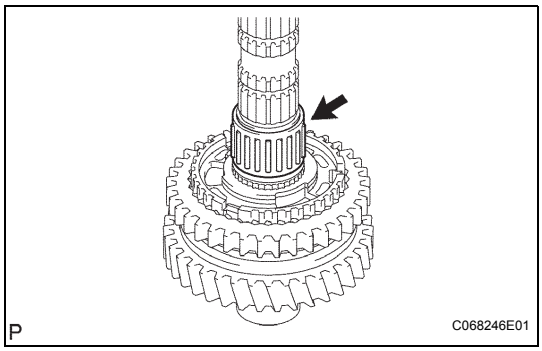


(c) Using a brass bar and hammer, tap in the snap ring to the output shaft.

NOTICE:

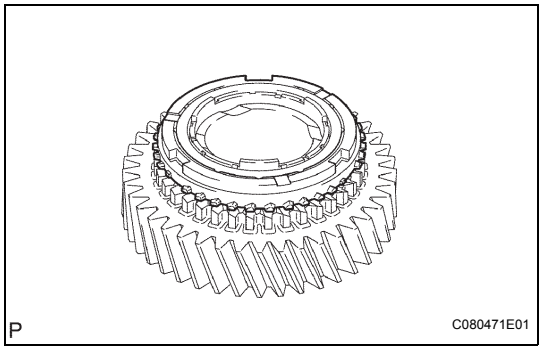
Take care not to damage the journal surface of the output shaft.

MX



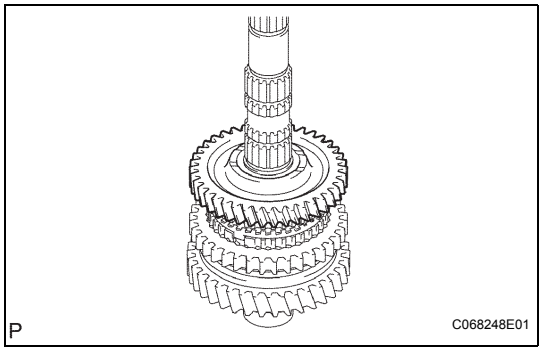
8. INSTALL 2ND GEAR NEEDLE ROLLER BEARING

(a) Coat the 2nd gear needle roller bearing and 2nd gear bearing spacer with gear oil, and install them to the output shaft.



9. INSTALL NO. 1 SYNCHRONIZER RING

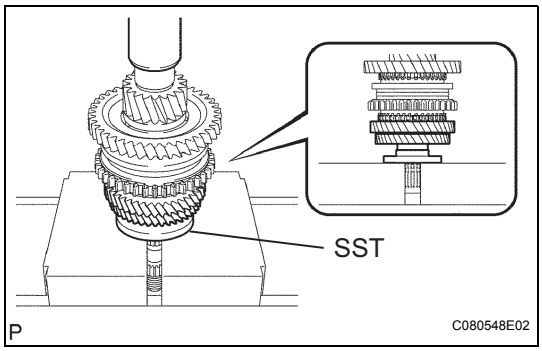
(a) Coat the No. 1 synchronizer ring with gear oil, and install it to the 2nd gear.



10. INSTALL 2ND GEAR

(a) Coat the 2nd gear with gear oil, and install it to the output shaft.

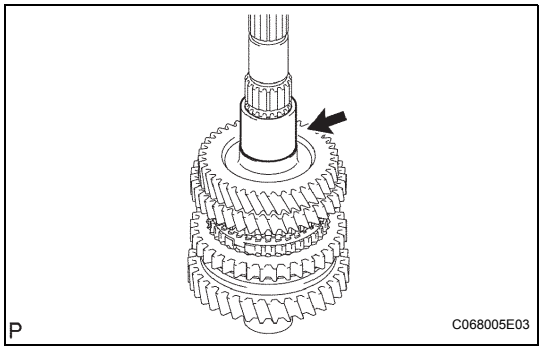
MX



11. INSTALL 3RD DRIVEN GEAR

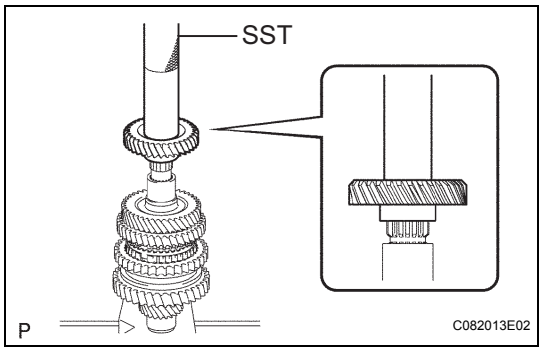
(a) Using SST and a press, press in the 3rd driven gear to the output shaft.

SST 09950-00020



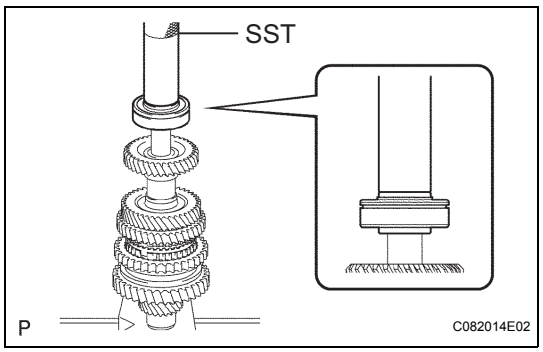
12. INSTALL OUTPUT GEAR SPACER

(a) Install the output gear spacer to the output shaft.



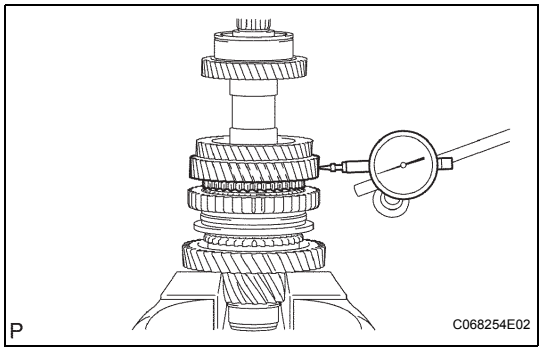
13. INSTALL 4TH DRIVEN GEAR

(a) Using SST and a press, press in the 4th driven gear to the output shaft.
SST 09612-22011



14. INSTALL INPUT SHAFT REAR RADIAL BALL BEARING

(a) Using SST and a press, press in the output shaft rear bearing to the output shaft.
SST 09612-22011



15. INSPECT 2ND GEAR RADIAL CLEARANCE

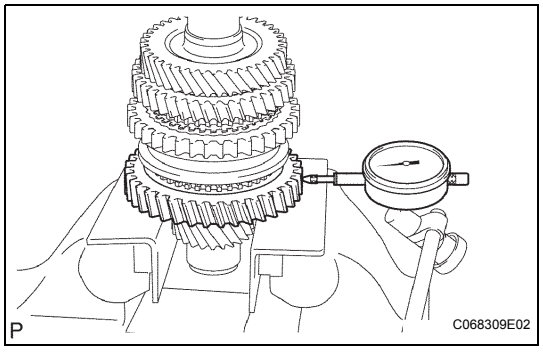
(a) Using a dial indicator, measure the radial clearance.
Standard clearance

Item	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

Maximum clearance

Item	Specified Condition
KOYO made	0.058 mm (0.0023 in.)
NSK made	0.056 mm (0.0022 in.)

If the clearance is greater than the maximum, replace the 2nd gear or needle roller bearing.



16. INSPECT 1ST GEAR RADIAL CLEARANCE

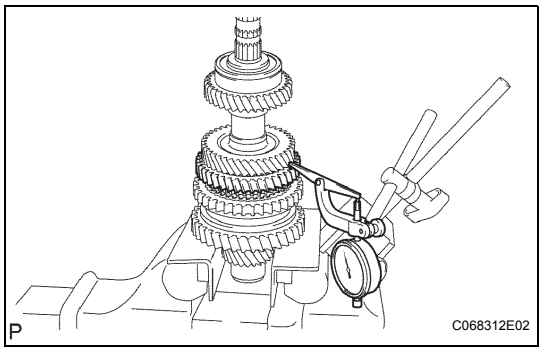
(a) Using a dial indicator, measure the radial clearance.
Standard clearance

Item	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

Maximum clearance

Item	Specified Condition
KOYO made	0.058 mm (0.0023 in.)
NSK made	0.056 mm (0.0022 in.)

If the clearance is greater than the maximum, replace the 1st gear or needle roller bearing.



17. INSPECT 2ND GEAR THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance.

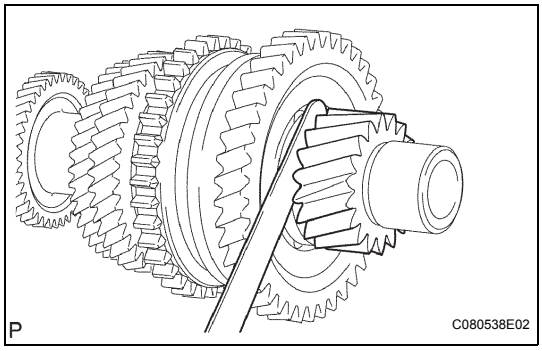
Standard clearance:

0.10 to 0.45 mm (0.0039 to 0.0177 in.)

Maximum clearance:

0.45 mm (0.0177 in.)

If the clearance is greater than the maximum, replace the 2nd gear or 2nd gear bearing spacer.



18. INSPECT 1ST GEAR THRUST CLEARANCE

(a) Using a feeler gauge, measure the 1st gear thrust clearance.

Standard clearance:

0.10 to 0.40 mm (0.0039 to 0.0157 in.)

Maximum clearance:

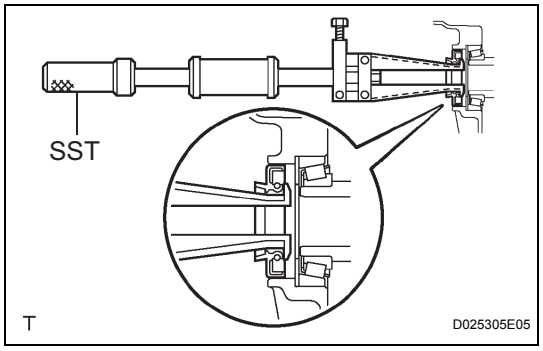
0.40 mm (0.0157 in.)

If the clearance is greater than the maximum, replace the 1st gear, 1st gear thrust washer or No. 1 transmission clutch hub.

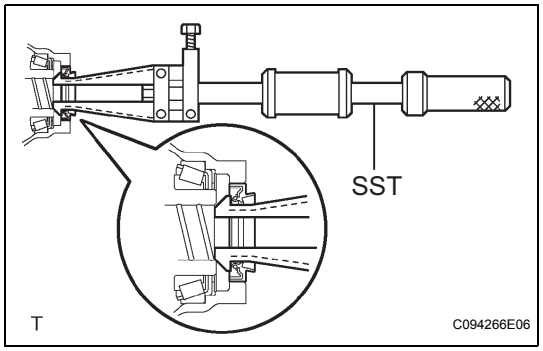
DIFFERENTIAL OIL SEAL

REPLACEMENT

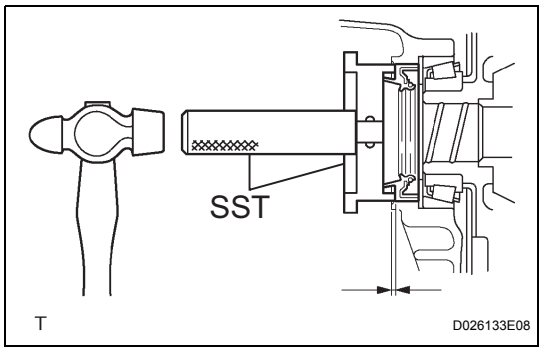
1. **DRAIN MANUAL TRANSAXLE OIL**
   (a) Remove the filler plug and gasket.
   (b) Remove the drain plug and gasket, and drain the manual transaxle oil.
   (c) Install a new gasket and the drain plug.
   Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)
2. **REMOVE FRONT WHEEL**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH**
   (a) Remove the front drive shaft (see page DS-4).
6. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH**
   HINT:
   Install the RH side by the same procedures as the LH side.
7. **REMOVE TRANSMISSION CASE OIL SEAL**
   (a) Using SST, tap out the oil seal.
   SST 09308-00010



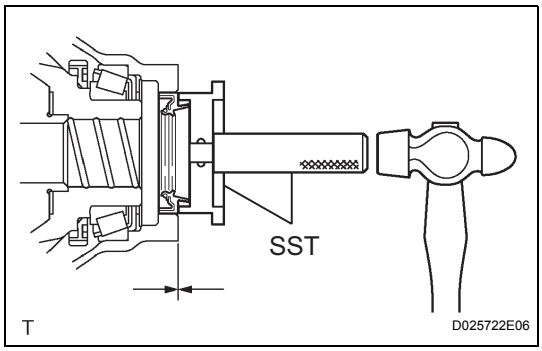
8. **REMOVE TRANSAXLE CASE OIL SEAL**
   (a) Using SST, tap out the oil seal.
   SST 09308-00010



9. **INSTALL TRANSMISSION CASE OIL SEAL**
   (a) Coat the lip of a new oil seal with MP grease.
   (b) Using SST and a hammer, tap in the new oil seal.
   SST 09726-36010, 09950-70010 (09951-07200)
   Standard depth:
   2.4 +-0.3 mm (0.095 +-0.012 in.)
   NOTICE:
   Be careful not to damage the lip of the oil seal.



MX



10. INSTALL FRONT TRANSAXLE CASE OIL SEAL

(a) Coat the lip of a new oil seal with MP grease.

(b) Using SST and a hammer, tap in the new oil seal.

SST 09710-20011 (09710-06071), 09950-70010 (09951-07200)

Standard depth:

1.9 +-0.3 mm (0.075 +-0.012 in.)

NOTICE:

Be careful not to damage the lip of the oil seal.

11. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

(a) Install the front drive shaft (see page DS-13).

12. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

Install the RH side by the same procedures as the LH side.

13. INSTALL FRONT AXLE ASSEMBLY LH

(a) Install the front axle (see page AH-9).

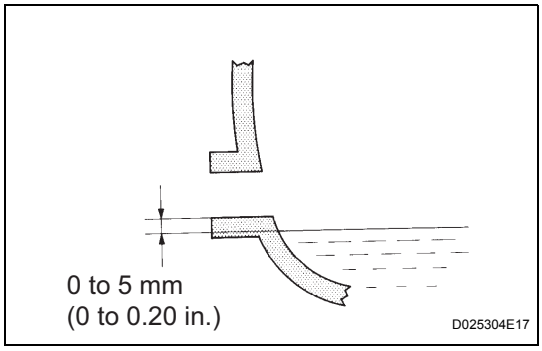
14. INSTALL FRONT AXLE ASSEMBLY RH

HINT:

Install the RH side by the same procedures as the LH side.

15. INSTALL FRONT WHEEL

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



16. ADD MANUAL TRANSAXLE OIL

Oil grade:

API GL-4 or GL-5

Viscosity:

SAE 75W-90

Standard capacity:

1.9 liters (2.0 US qts, 1.7 Imp. qts)

Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

17. CHECK MANUAL TRANSAXLE OIL (See page MX-2)

18. CHECK FRONT WHEEL ALIGNMENT

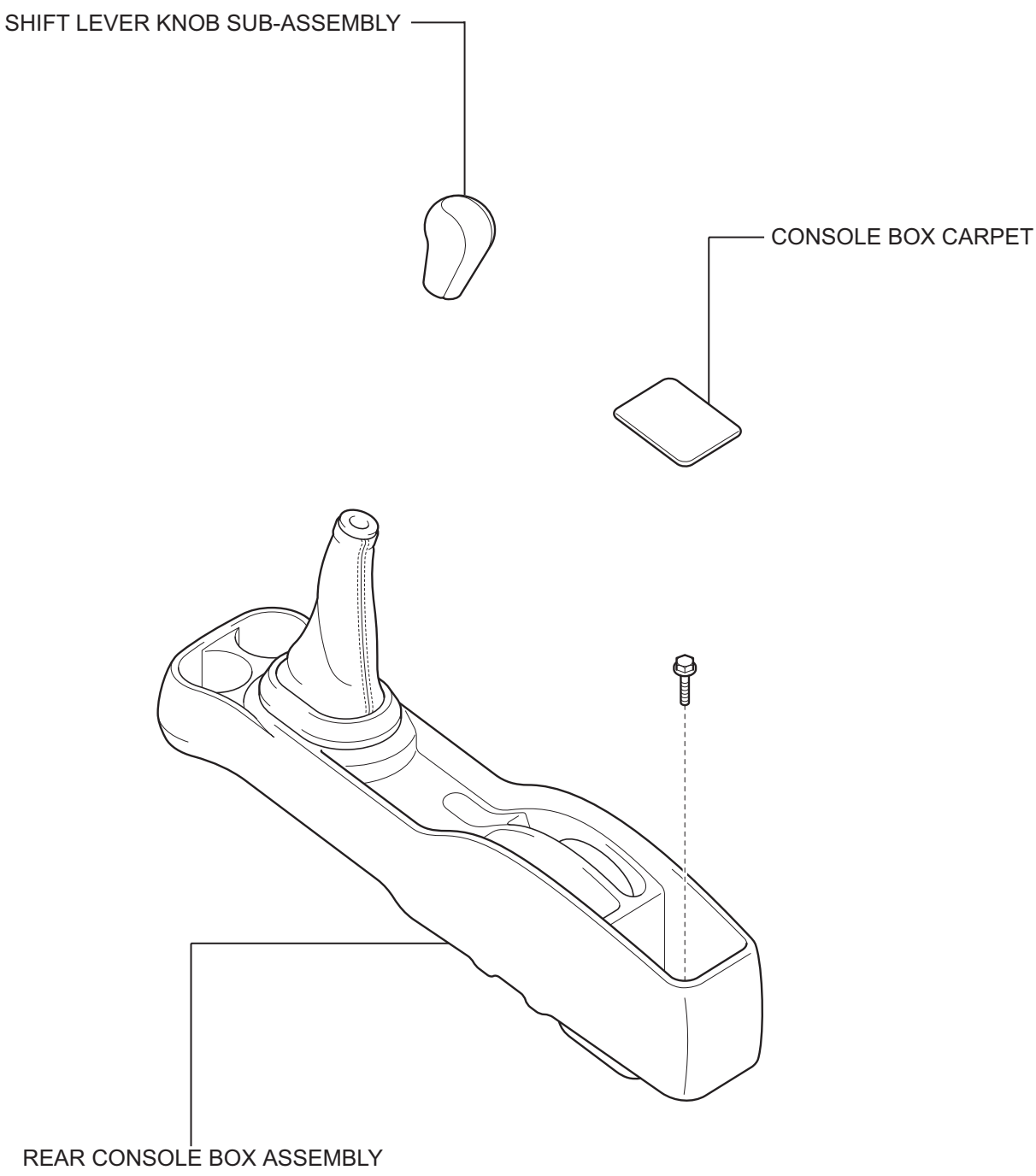
(a) Check the front wheel alignment (see page SP-2).

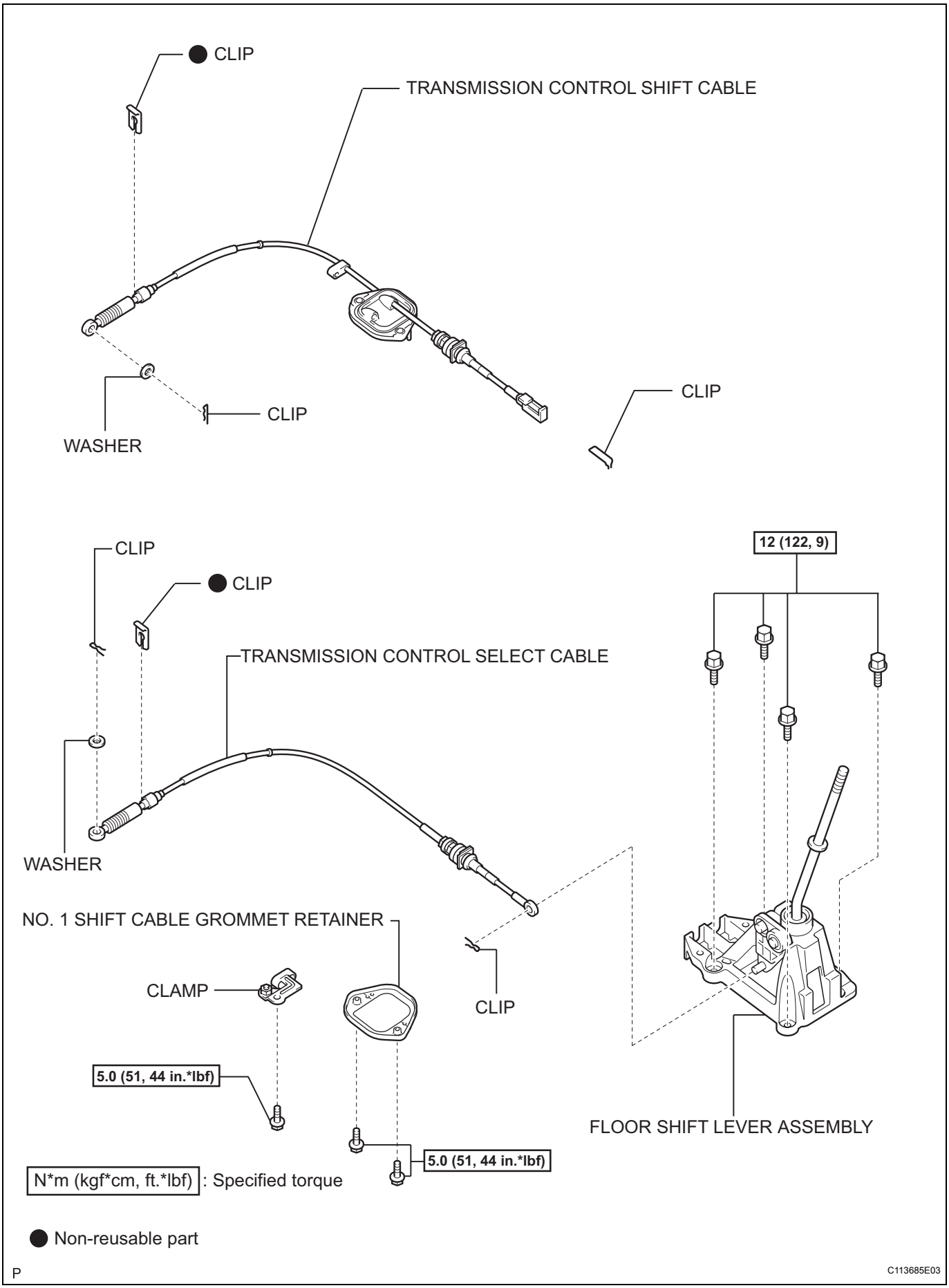
19. CHECK ABS SPEED SENSOR SIGNAL

RS-34

FLOOR SHIFT LEVER ASSEMBLY

COMPONENTS





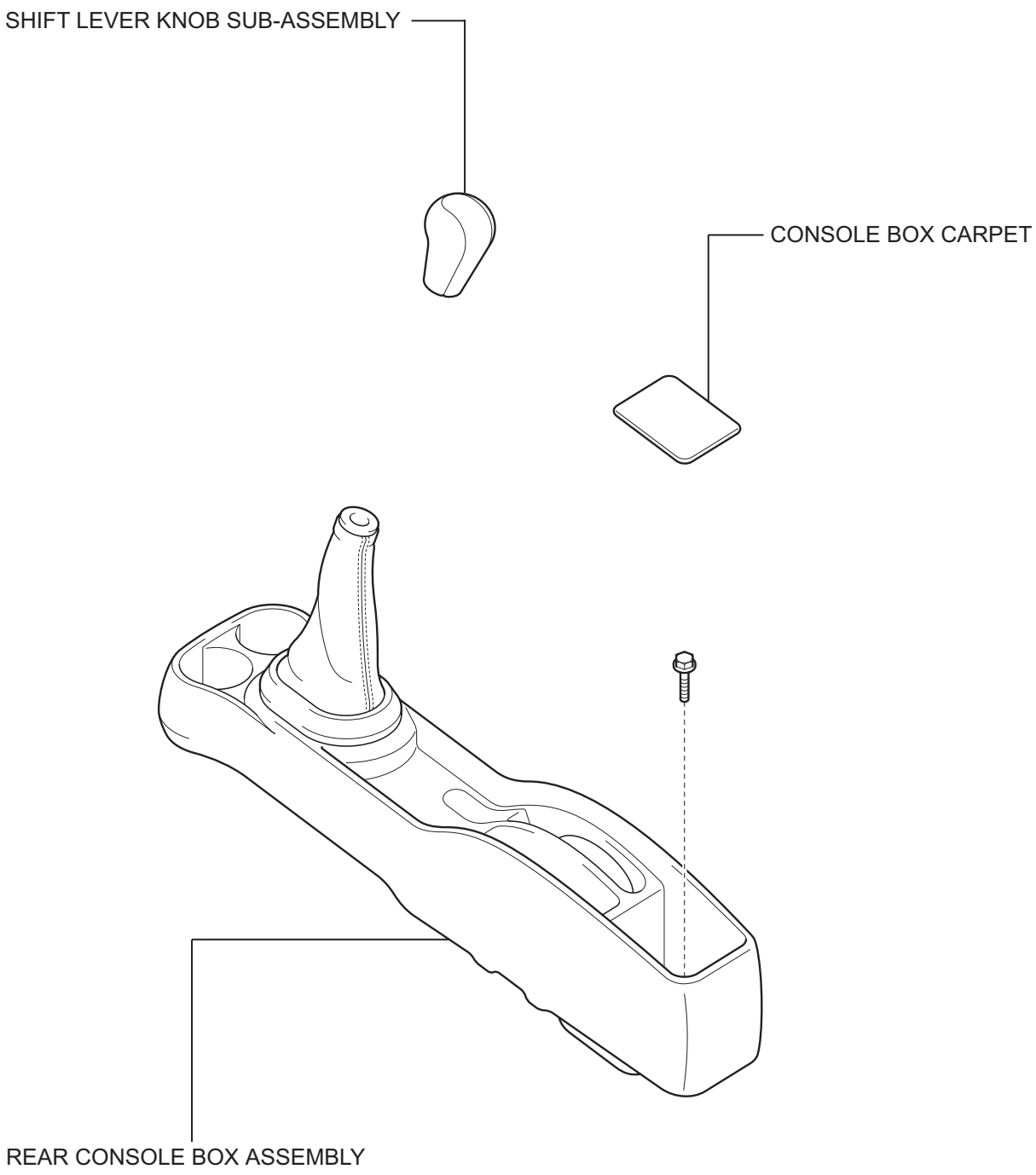
MX

P

C113685E03

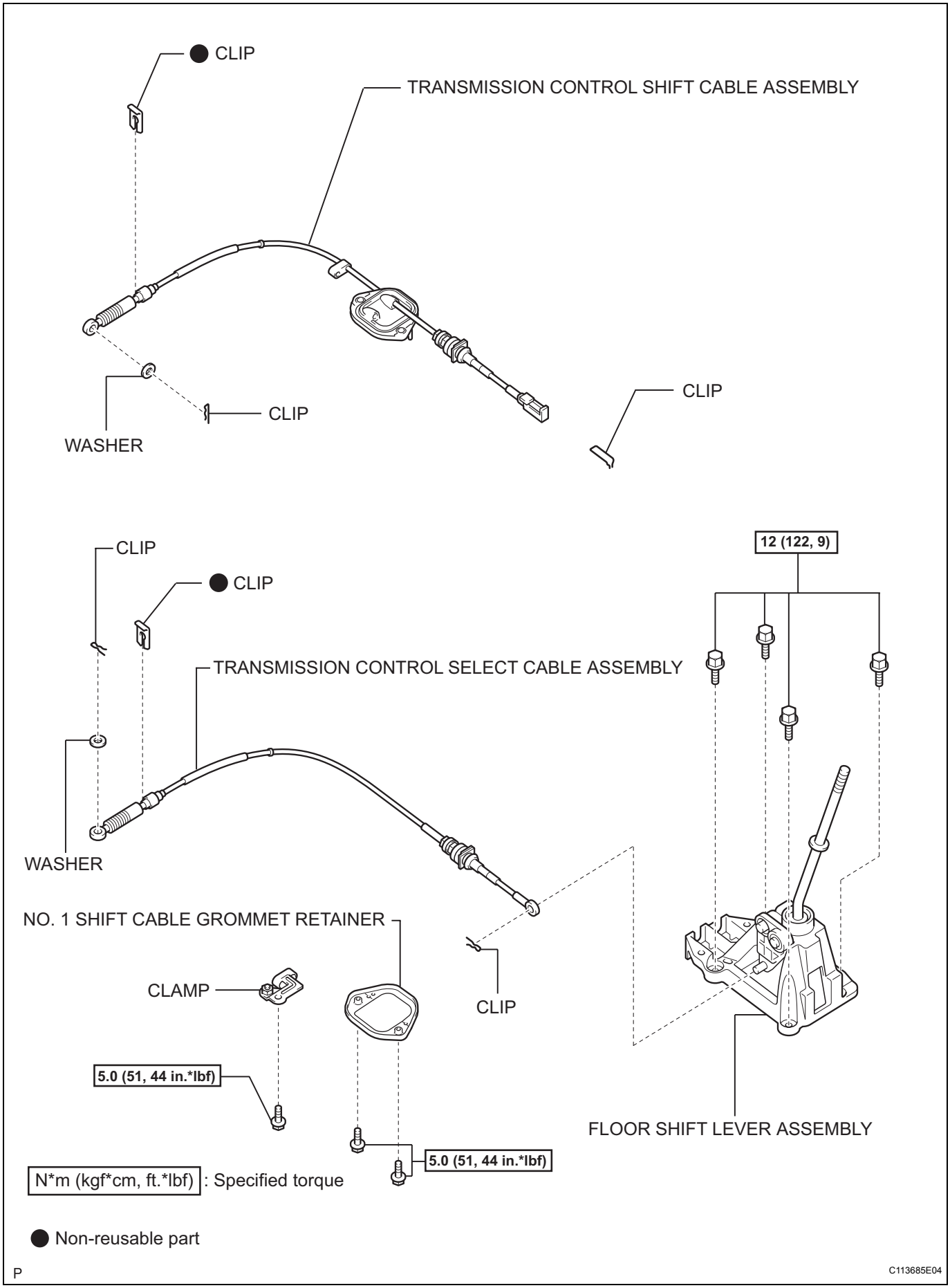
TRANSMISSION CONTROL CABLE

COMPONENTS



P

C113684E02



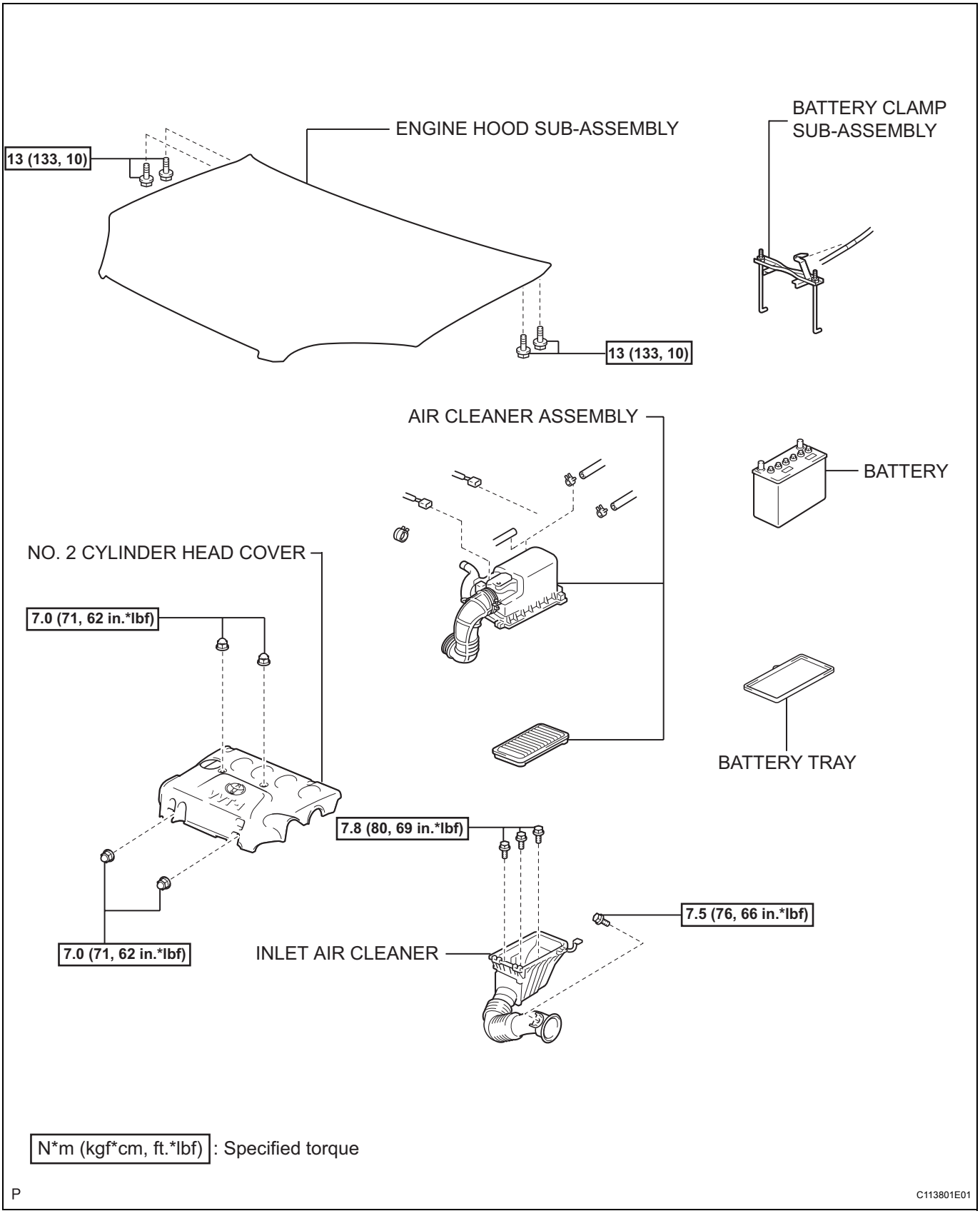
MX

P

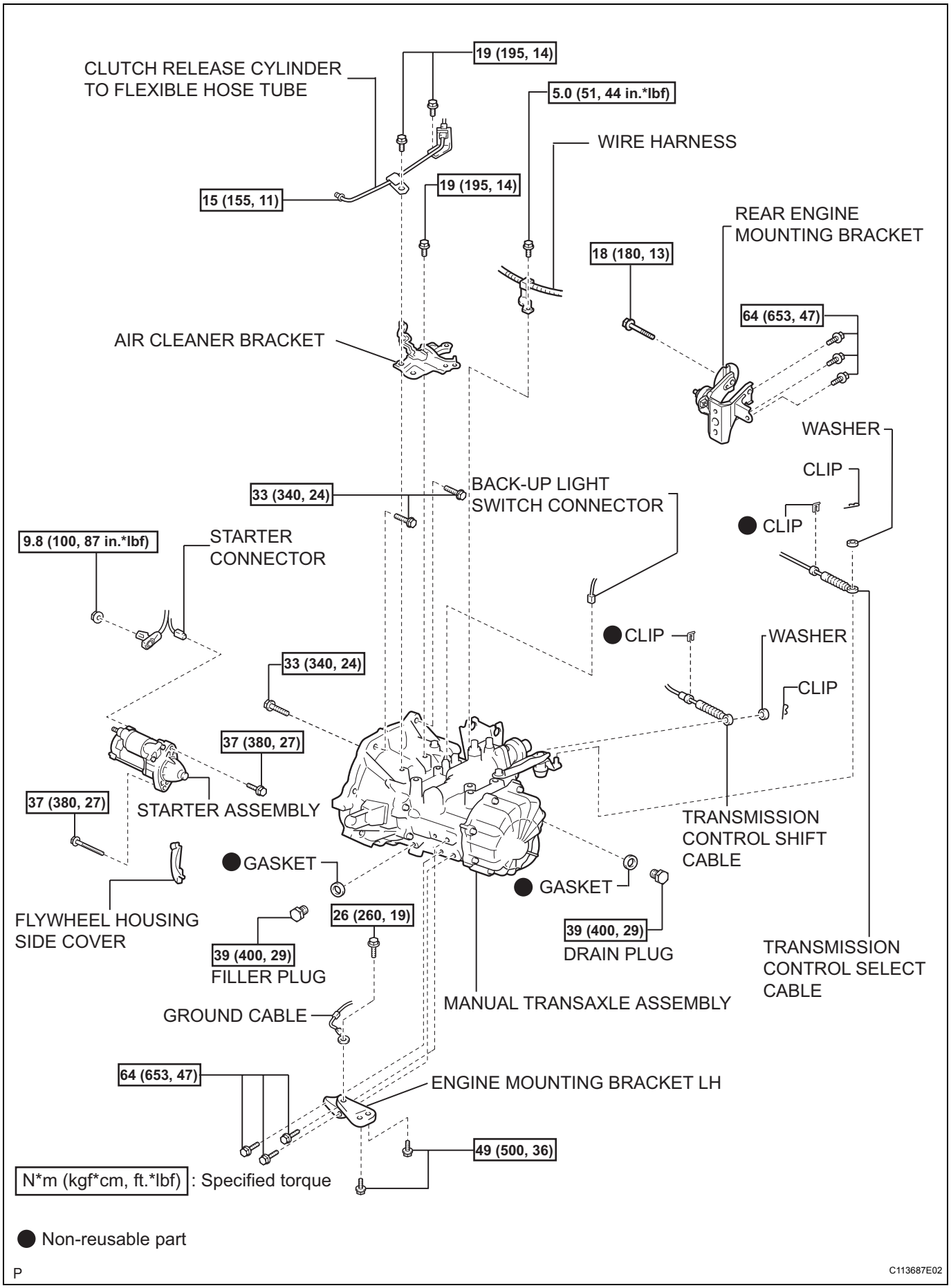
C113685E04

MANUAL TRANSAXLE ASSEMBLY

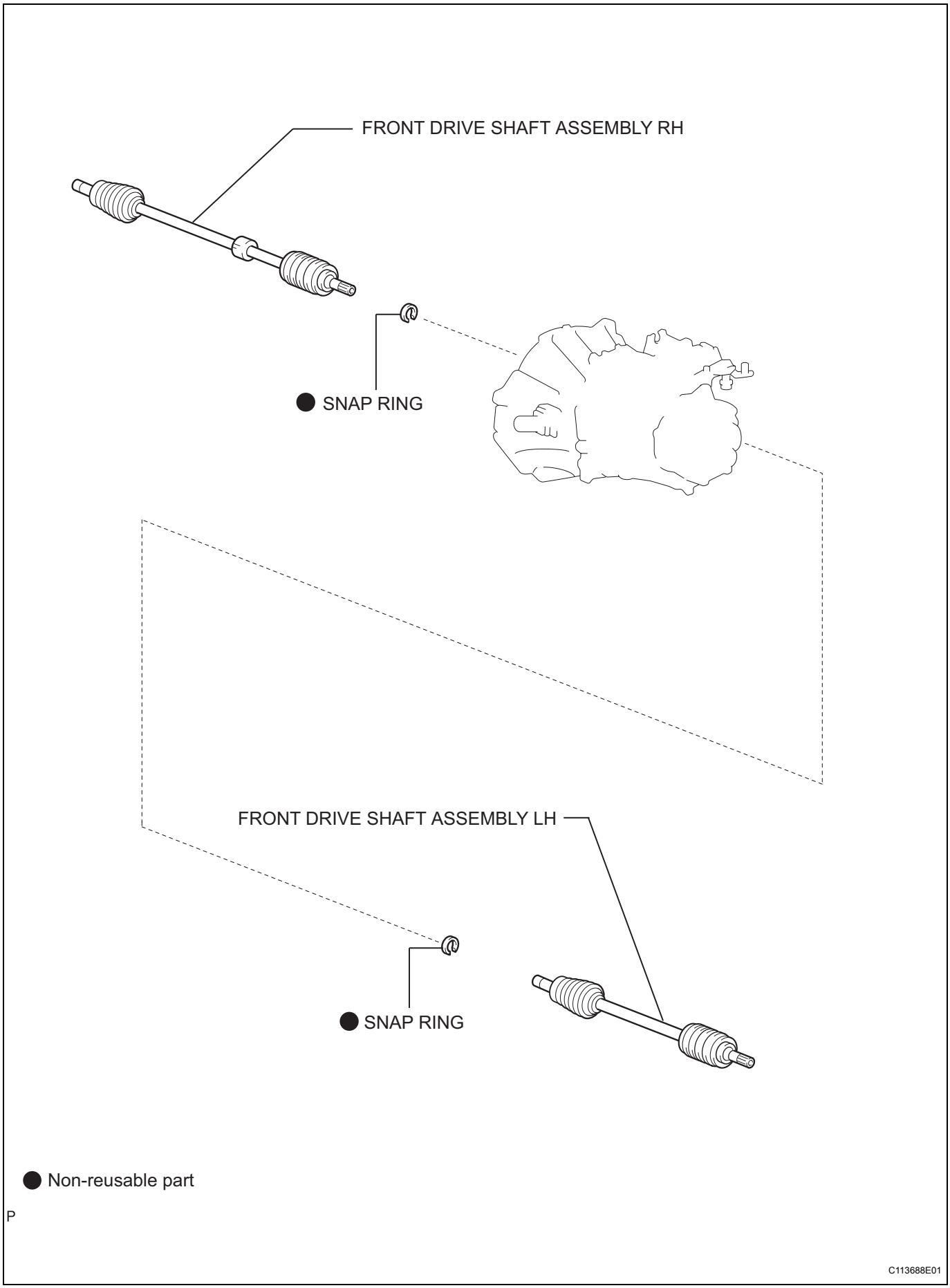
COMPONENTS



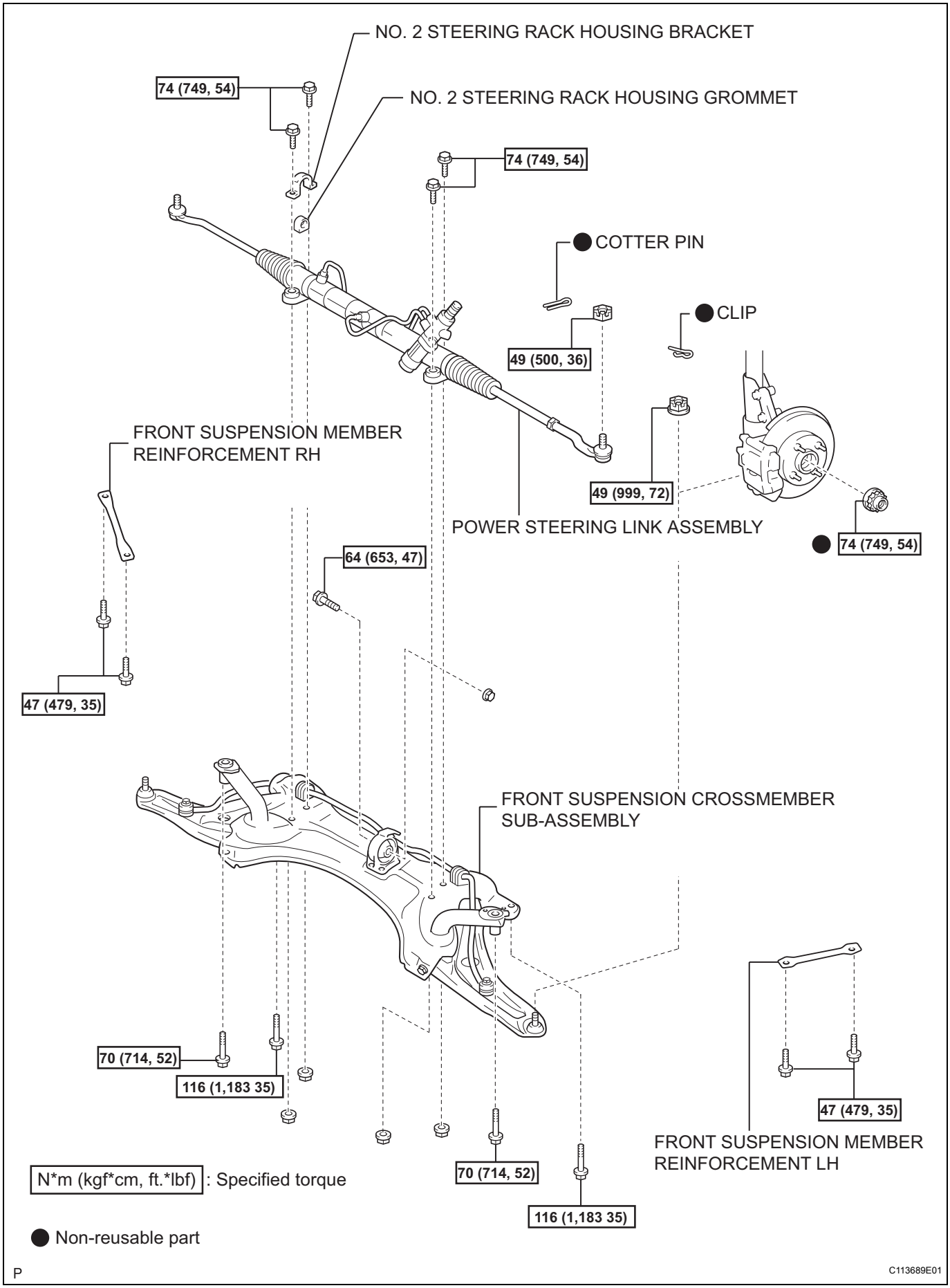
MX


CLUTCH RELEASE CYLINDER TO FLEXIBLE HOSE TUBE
19 (195, 14)
5.0 (51, 44 in.*lbf)
WIRE HARNESS
15 (155, 11)
19 (195, 14)
REAR ENGINE MOUNTING BRACKET
18 (180, 13)
64 (653, 47)
AIR CLEANER BRACKET
WASHER
CLIP
33 (340, 24)
BACK-UP LIGHT SWITCH CONNECTOR
CLIP
9.8 (100, 87 in.*lbf)
STARTER CONNECTOR
CLIP
WASHER
33 (340, 24)
CLIP
37 (380, 27)
37 (380, 27)
STARTER ASSEMBLY
TRANSMISSION CONTROL SHIFT CABLE
GASKET
GASKET
FLYWHEEL HOUSING SIDE COVER
26 (260, 19)
39 (400, 29)
DRAIN PLUG
39 (400, 29)
FILLER PLUG
TRANSMISSION CONTROL SELECT CABLE
MANUAL TRANSAXLE ASSEMBLY
GROUND CABLE
64 (653, 47)
ENGINE MOUNTING BRACKET LH
49 (500, 36)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P
C113687E02

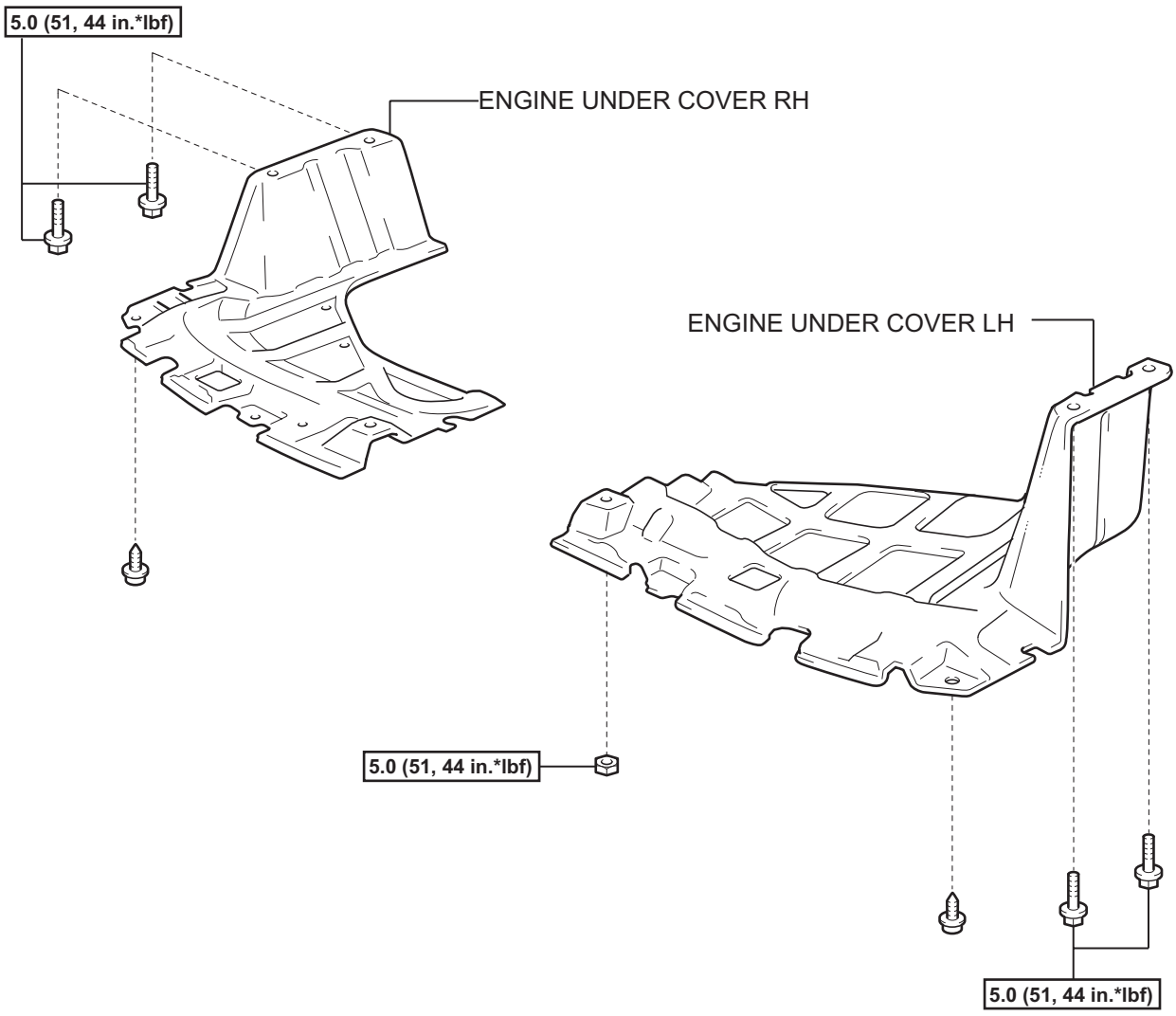
MX


FRONT DRIVE SHAFT ASSEMBLY RH
SNAP RING
FRONT DRIVE SHAFT ASSEMBLY LH
SNAP RING
Non-reusable part
C113688E01

P


NO. 2 STEERING RACK HOUSING BRACKET
74 (749, 54)
NO. 2 STEERING RACK HOUSING GROMMET
74 (749, 54)
COTTER PIN
CLIP
49 (500, 36)
FRONT SUSPENSION MEMBER REINFORCEMENT RH
49 (999, 72)
POWER STEERING LINK ASSEMBLY
74 (749, 54)
64 (653, 47)
47 (479, 35)
FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY
70 (714, 52)
116 (1,183 35)
47 (479, 35)
FRONT SUSPENSION MEMBER REINFORCEMENT LH
70 (714, 52)
116 (1,183 35)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P
C113689E01

MX



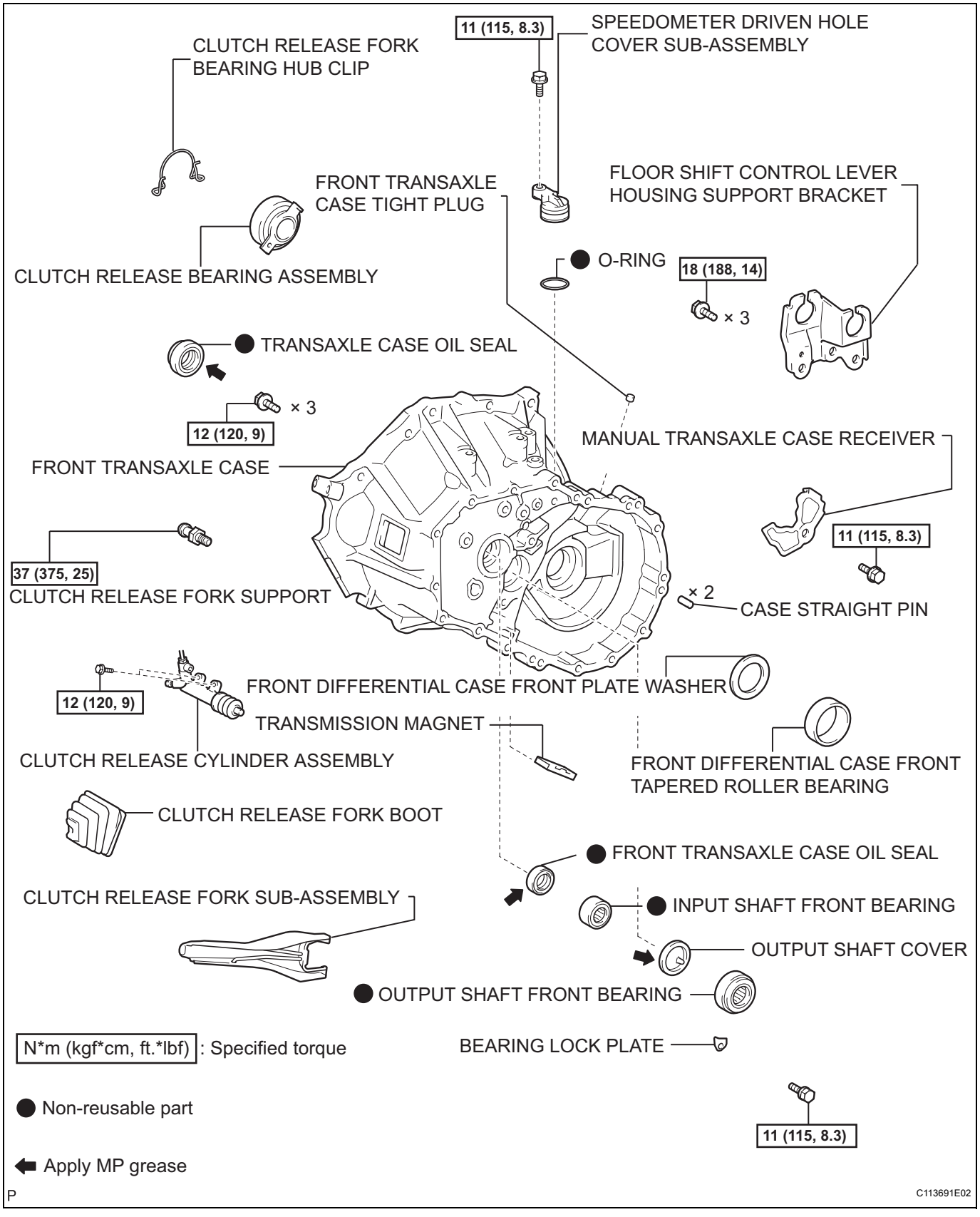
MX

N*m (kgf*cm, ft.*lbf) : Specified torque

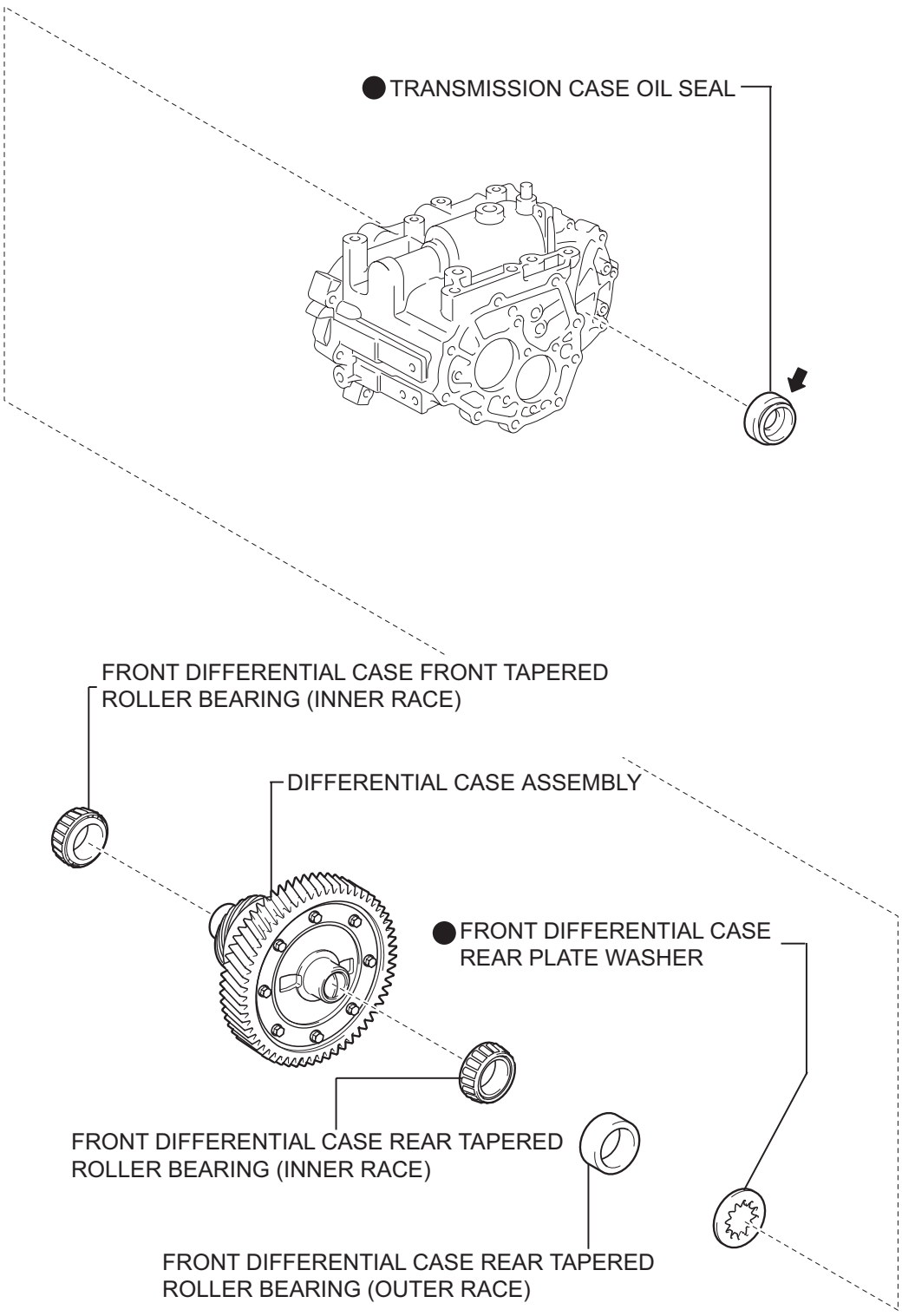
C113797E01

MANUAL TRANSAXLE UNIT

COMPONENTS



MX

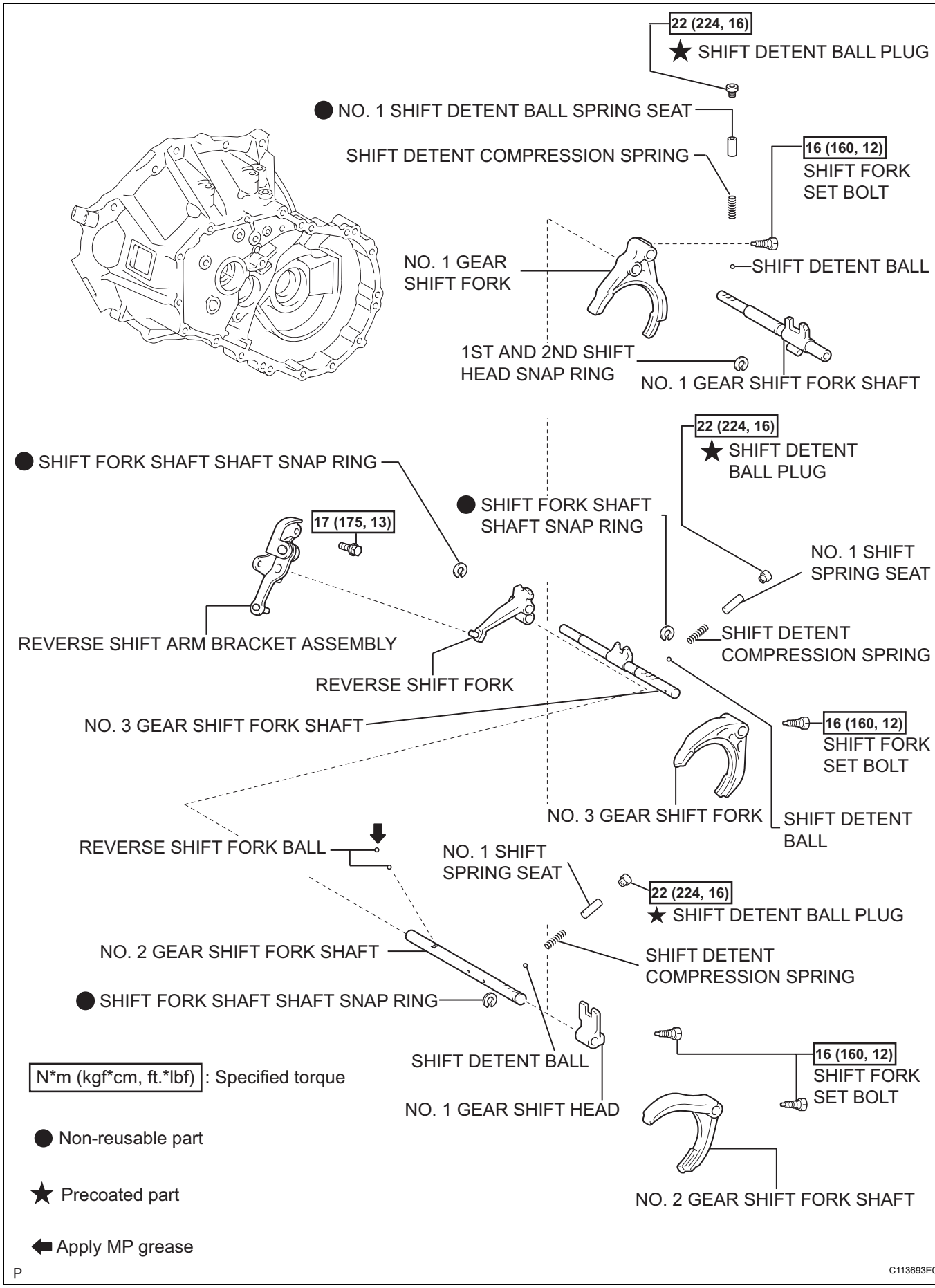


● Non-reusable part

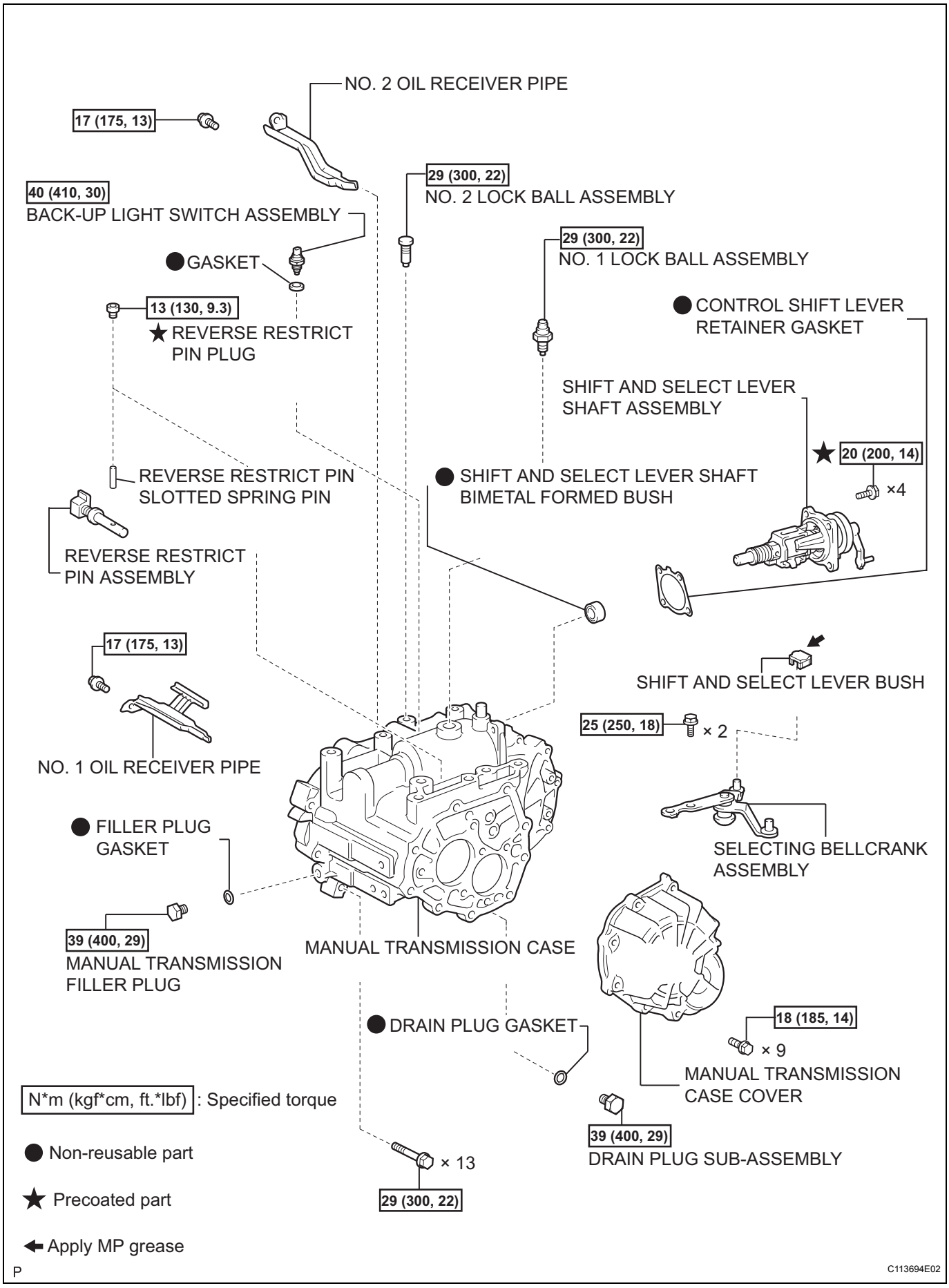
⬅ Apply MP grease

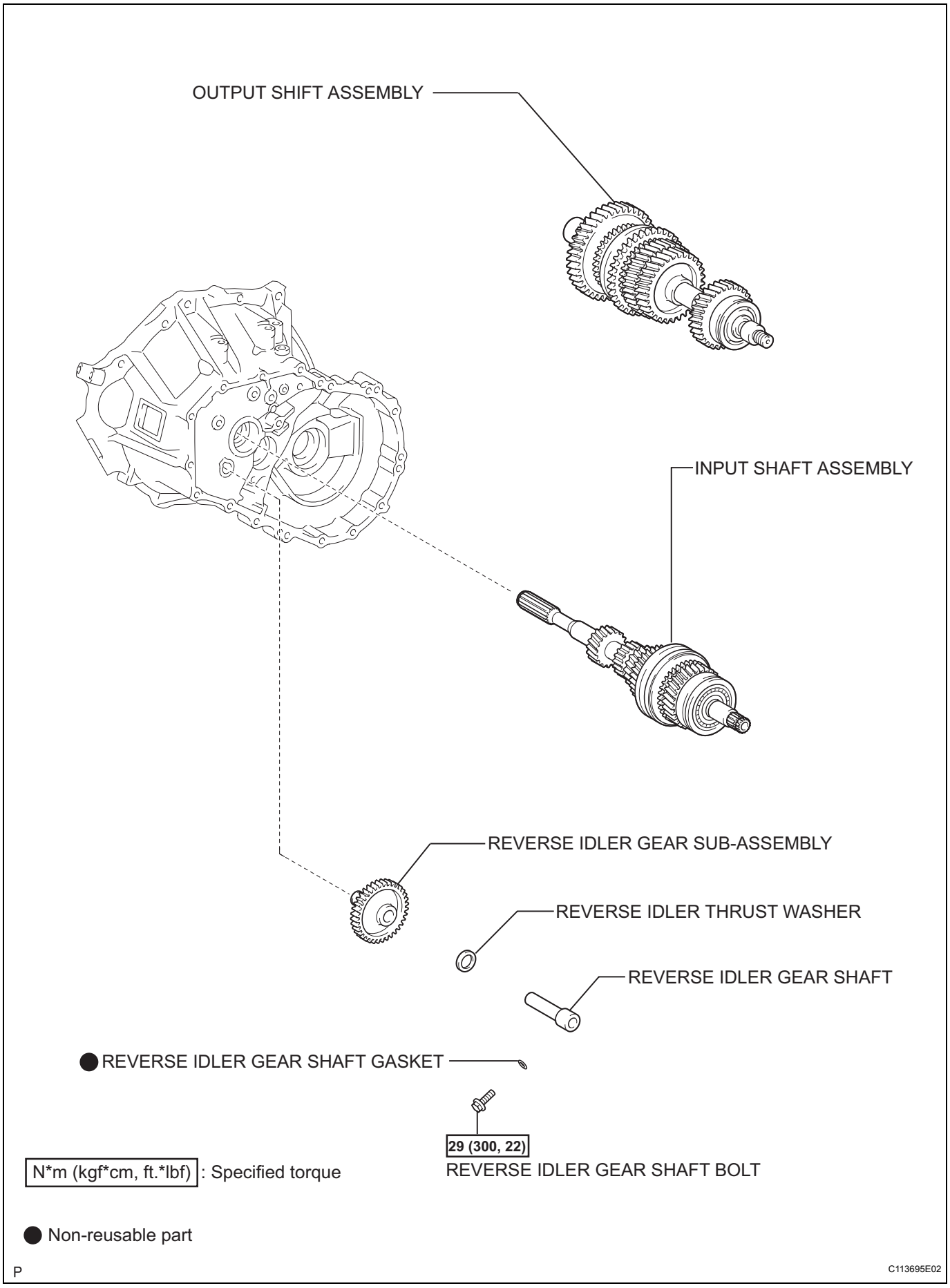
P

C113692E02

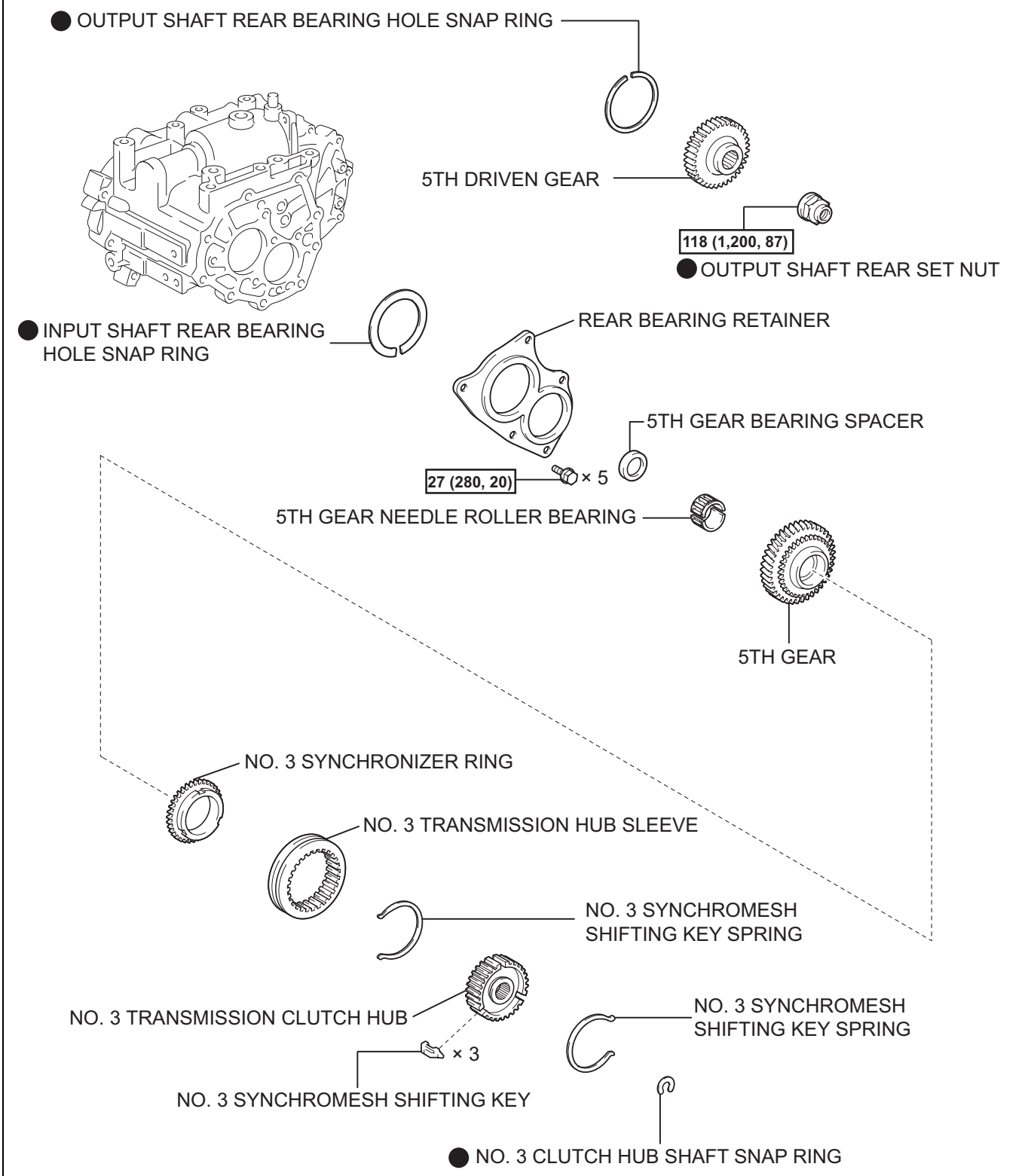

22 (224, 16)
★ SHIFT DETENT BALL PLUG
● NO. 1 SHIFT DETENT BALL SPRING SEAT
SHIFT DETENT COMPRESSION SPRING
16 (160, 12)
SHIFT FORK SET BOLT
NO. 1 GEAR SHIFT FORK
SHIFT DETENT BALL
1ST AND 2ND SHIFT HEAD SNAP RING
NO. 1 GEAR SHIFT FORK SHAFT
22 (224, 16)
★ SHIFT DETENT BALL PLUG
● SHIFT FORK SHAFT SHAFT SNAP RING
● SHIFT FORK SHAFT SHAFT SNAP RING
17 (175, 13)
NO. 1 SHIFT SPRING SEAT
REVERSE SHIFT ARM BRACKET ASSEMBLY
SHIFT DETENT COMPRESSION SPRING
REVERSE SHIFT FORK
NO. 3 GEAR SHIFT FORK SHAFT
16 (160, 12)
SHIFT FORK SET BOLT
NO. 3 GEAR SHIFT FORK
SHIFT DETENT BALL
REVERSE SHIFT FORK BALL
NO. 1 SHIFT SPRING SEAT
22 (224, 16)
★ SHIFT DETENT BALL PLUG
NO. 2 GEAR SHIFT FORK SHAFT
SHIFT DETENT COMPRESSION SPRING
● SHIFT FORK SHAFT SHAFT SNAP RING
SHIFT DETENT BALL
16 (160, 12)
SHIFT FORK SET BOLT
N*m (kgf*cm, ft.*lbf) : Specified torque
NO. 1 GEAR SHIFT HEAD
● Non-reusable part
★ Precoated part
NO. 2 GEAR SHIFT FORK SHAFT
⬅ Apply MP grease
P
C113693E02

MX


NO. 2 OIL RECEIVER PIPE
17 (175, 13)
29 (300, 22)
NO. 2 LOCK BALL ASSEMBLY
40 (410, 30)
BACK-UP LIGHT SWITCH ASSEMBLY
GASKET
29 (300, 22)
NO. 1 LOCK BALL ASSEMBLY
13 (130, 9.3)
REVERSE RESTRICT PIN PLUG
CONTROL SHIFT LEVER RETAINER GASKET
SHIFT AND SELECT LEVER SHAFT ASSEMBLY
20 (200, 14)
×4
REVERSE RESTRICT PIN SLOTTED SPRING PIN
SHIFT AND SELECT LEVER SHAFT BIMETAL FORMED BUSH
REVERSE RESTRICT PIN ASSEMBLY
17 (175, 13)
SHIFT AND SELECT LEVER BUSH
25 (250, 18)
× 2
NO. 1 OIL RECEIVER PIPE
FILLER PLUG GASKET
SELECTING BELLCRANK ASSEMBLY
39 (400, 29)
MANUAL TRANSMISSION FILLER PLUG
MANUAL TRANSMISSION CASE
DRAIN PLUG GASKET
18 (185, 14)
× 9
MANUAL TRANSMISSION CASE COVER
N*m (kgf*cm, ft.*lbf) : Specified torque
39 (400, 29)
DRAIN PLUG SUB-ASSEMBLY
Non-reusable part
× 13
29 (300, 22)
Precoated part
Apply MP grease
P
C113694E02


OUTPUT SHIFT ASSEMBLY
INPUT SHAFT ASSEMBLY
REVERSE IDLER GEAR SUB-ASSEMBLY
REVERSE IDLER THRUST WASHER
REVERSE IDLER GEAR SHAFT
● REVERSE IDLER GEAR SHAFT GASKET
29 (300, 22)
REVERSE IDLER GEAR SHAFT BOLT
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
P
C113695E02

MX



MX

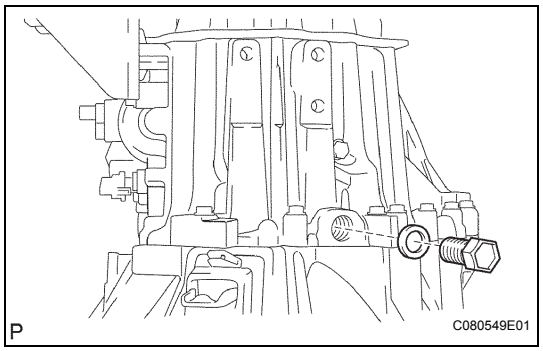
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

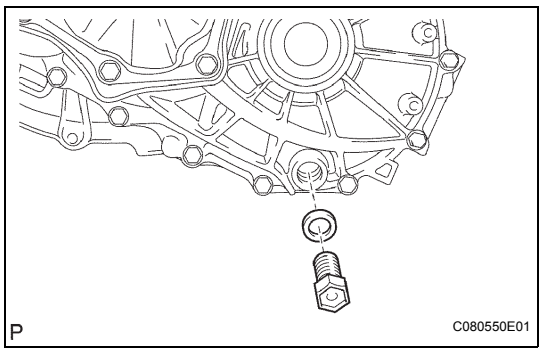
C113696E02

DISASSEMBLY



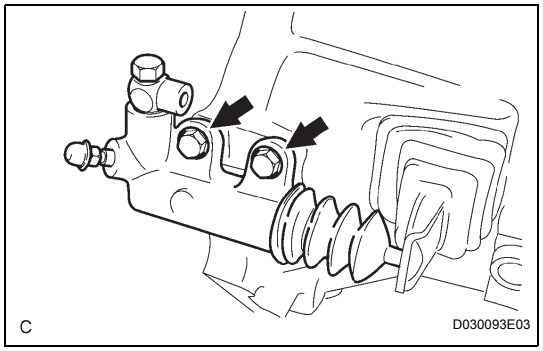
1. REMOVE MANUAL TRANSMISSION FILLER PLUG

(a) Remove the transmission filler plug and gasket from the transmission case.



2. REMOVE DRAIN PLUG SUB-ASSEMBLY

(a) Remove the drain plug and gasket from the transmission case.



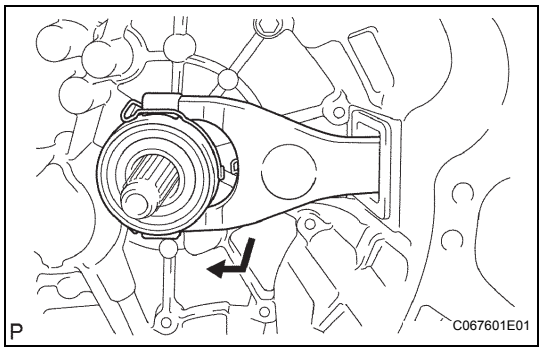
3. REMOVE CLUTCH RELEASE CYLINDER ASSEMBLY

(a) Remove the 2 bolts and clutch release cylinder.

4. REMOVE SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

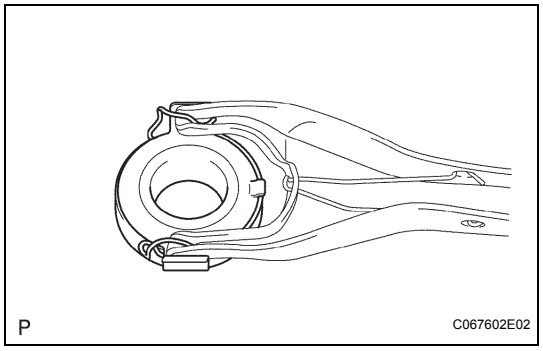
(a) Remove the bolt and driven hole cover from the transaxle case.

(b) Remove the O-ring from the driven hole cover.



5. REMOVE CLUTCH RELEASE FORK SUB-ASSEMBLY

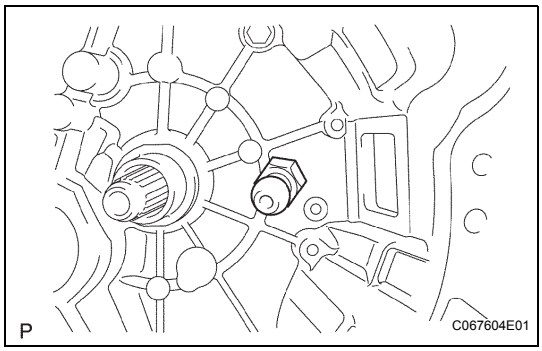
(a) Remove the clutch release fork with clutch release bearing from the front transaxle case.



6. REMOVE CLUTCH RELEASE BEARING ASSEMBLY

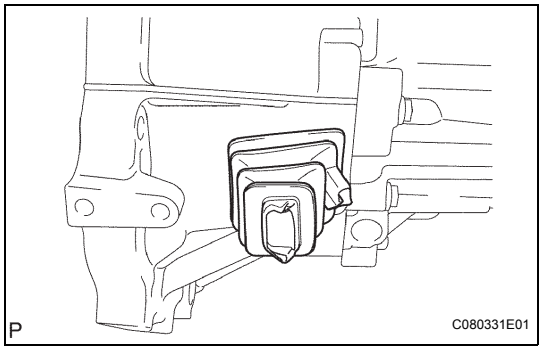
(a) Remove the clutch release fork bearing hub clip and clutch release bearing from the clutch release fork.

MX



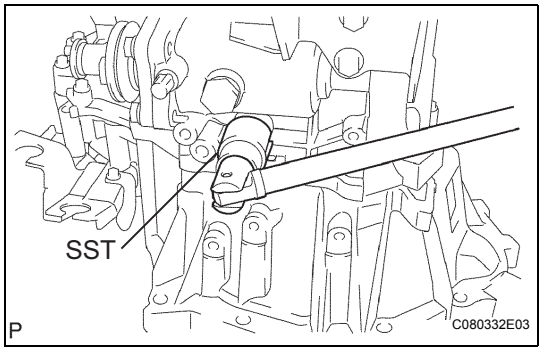
7. REMOVE RELEASE FORK SUPPORT

(a) Remove the clutch release fork support from the front transaxle case.



8. REMOVE CLUTCH RELEASE FORK BOOT

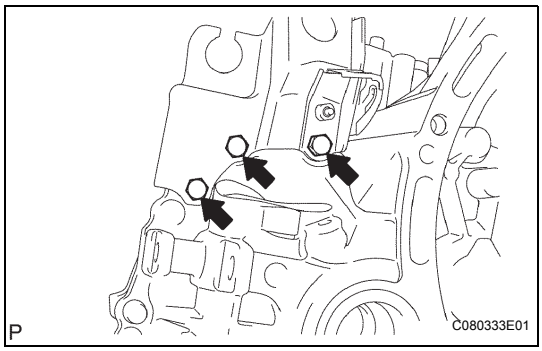
(a) Remove the clutch release fork boot from the front transaxle case.



9. REMOVE BACK-UP LIGHT SWITCH ASSEMBLY

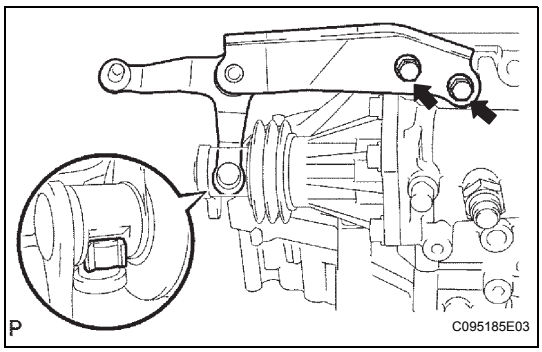
(a) Using SST, remove the back-up light switch and gasket from the transmission case.
SST 09817-16011

MX



10. REMOVE FLOOR SHIFT CONTROL LEVER HOUSING SUPPORT BRACKET

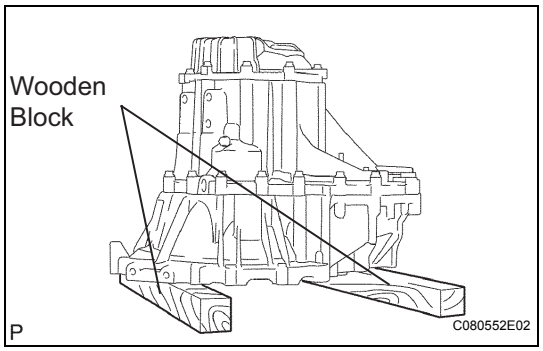
(a) Remove the 3 bolts and floor shift control lever housing support bracket from the front transaxle case.



11. REMOVE SELECTING BELLCRANK ASSEMBLY

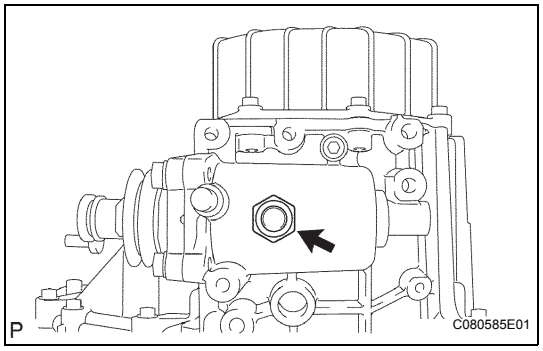
(a) Remove the 2 bolts and selecting bellcrank from the transmission case.

(b) Remove the control shift lever bush.



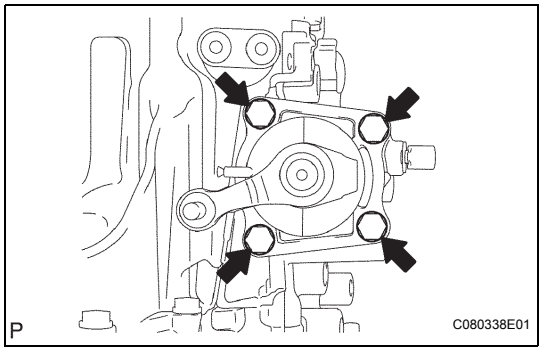
12. FIX MANUAL TRANSAXLE ASSEMBLY

(a) Place the transaxle on wooden blocks.



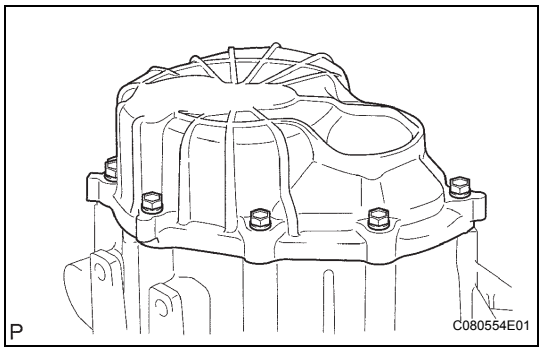
13. REMOVE NO. 1 LOCK BALL ASSEMBLY

(a) Remove the lock ball from the transmission case.



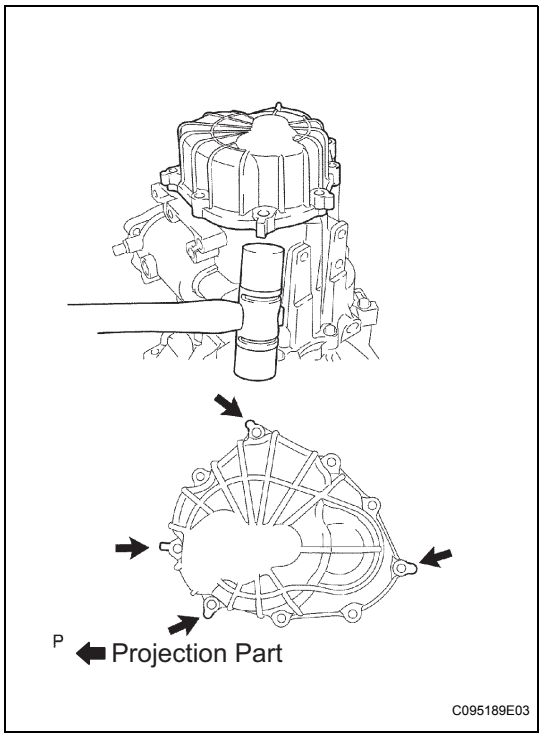
14. REMOVE SHIFT AND SELECT LEVER SHAFT ASSEMBLY

(a) Remove the 4 bolts, lever shaft and gasket from the transmission case.

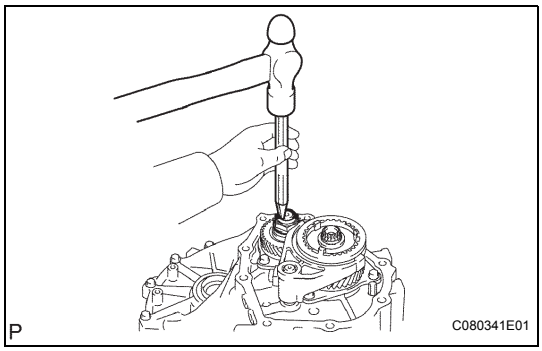


15. REMOVE MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY

(a) Remove the 9 bolts.

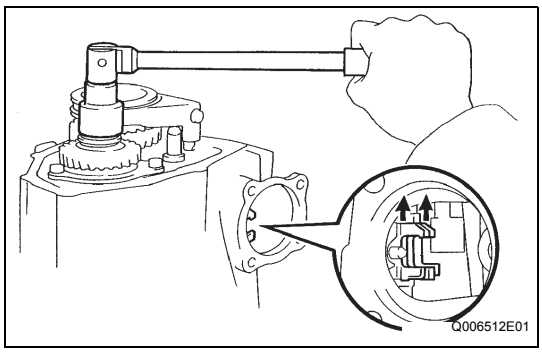


(b) Using a plastic-faced hammer, carefully tap the projection of the manual transmission case cover to remove it from the transmission case.
NOTICE:
Do not damage the transmission case.

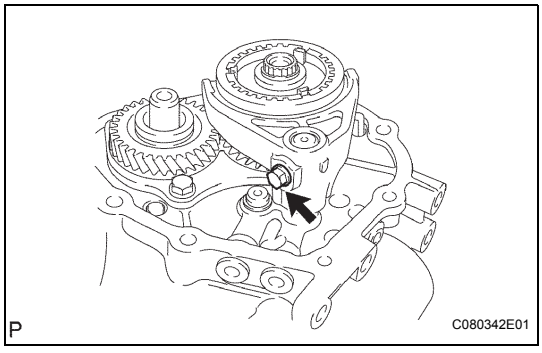


16. REMOVE MANUAL TRANSMISSION REAR OUTPUT SHAFT SET NUT

(a) Using a chisel and hammer, loosen the staked part of the set nut.

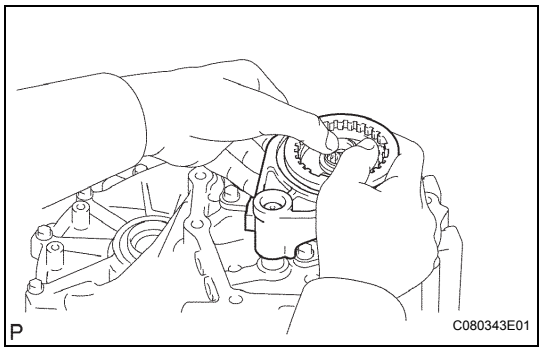


(b) Engage the 2 gears simultaneously to lock the transmission.
(c) Remove the transmission output shaft rear set nut.
(d) Disengage the 2 gears.

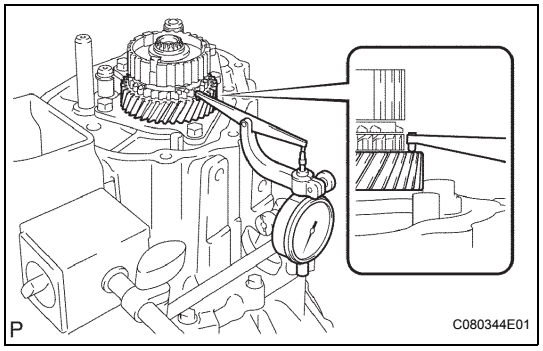


17. REMOVE NO. 3 GEAR SHIFT FORK

(a) Remove the gear shift fork lock bolt from the No. 3 gear shift fork.



(b) Remove the No. 3 transmission hub sleeve with No. 3 gear shift fork from the No. 3 transmission clutch hub.



18. INSPECT 5TH GEAR THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance.

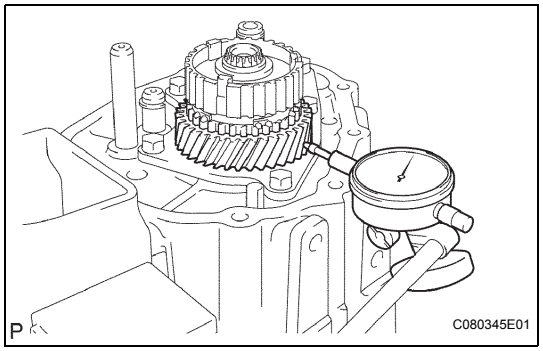
Standard clearance:

0.10 to 0.57 mm (0.0039 to 0.02244 in.)

Maximum clearance:

0.57 mm (0.02244 in.)

If the clearance is greater than the maximum, replace the 5th gear needle roller bearing or input shaft.



19. INSPECT 5TH GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 5th gear radial clearance.

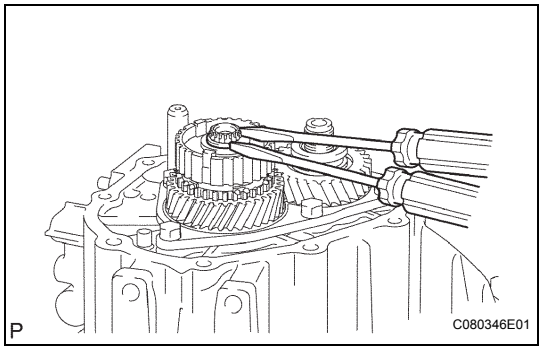
Standard clearance

Item	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

Maximum clearance

Item	Specified Condition
KOYO made	0.058 mm (0.0023 in.)
NSK made	0.056 mm (0.0022 in.)

If the clearance is greater than the maximum, replace the gear, needle roller bearing or shaft.

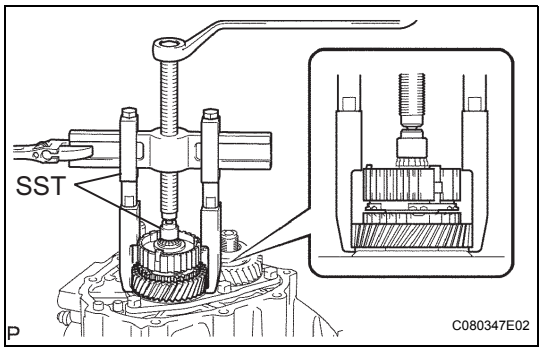


20. REMOVE NO. 3 TRANSMISSION CLUTCH HUB

(a) Using 2 screwdrivers and a hammer, tap out the snap ring.

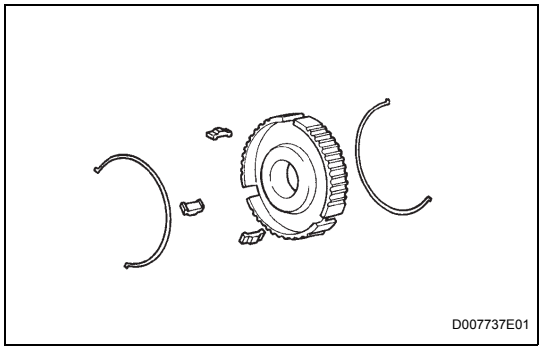
NOTICE:

Use a cloth to keep the snap ring from springing away.

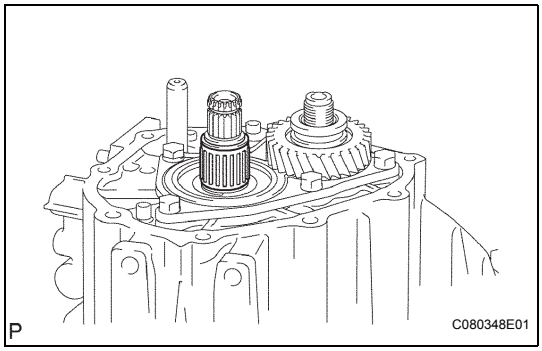


(b) Using SST, remove the No. 3 transmission clutch hub, 5th gear and No. 3 synchronizer ring from the input shaft.

SST 09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04071, 09957-04010), 09950-60010 (09951-00200)

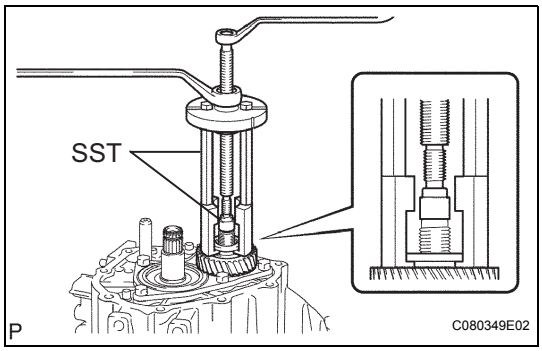


(c) Remove the 3 synchromesh shifting keys and 2 synchromesh shifting key springs from the No. 3 transmission clutch hub.



21. REMOVE 5TH GEAR NEEDLE ROLLER BEARING

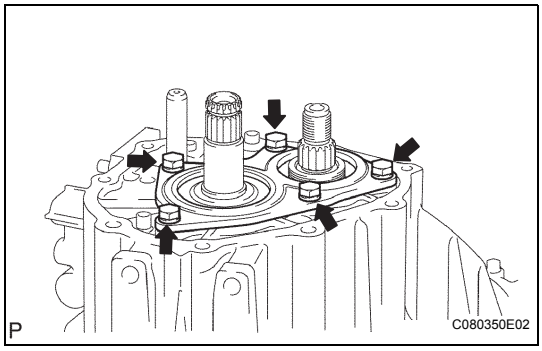
(a) Remove the 5th gear needle roller bearing and 5th gear bearing spacer from the input shaft.



22. REMOVE 5TH DRIVEN GEAR

(a) Using SST, remove the 5th driven gear from the output shaft.

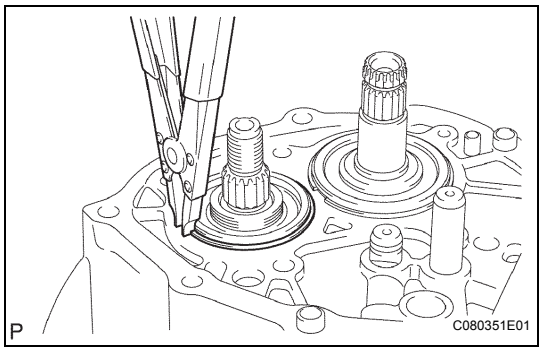
SST 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03011, 09957-04010), 09950-60010 (09951-00190)



23. REMOVE REAR BEARING RETAINER

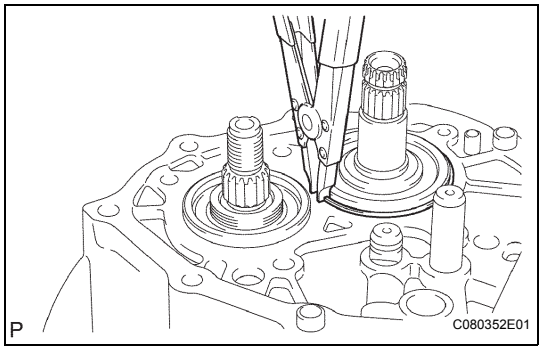
(a) Remove the 5 bolts and bearing retainer from the manual transmission case.

MX



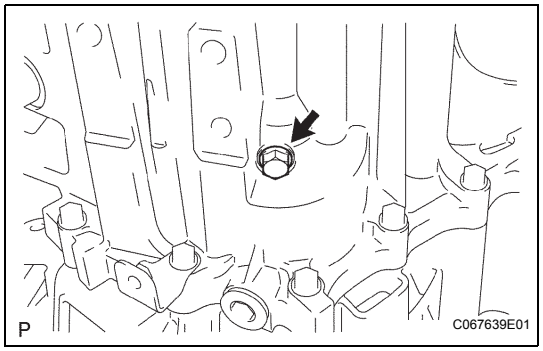
24. REMOVE OUTPUT SHAFT REAR BEARING HOLE SNAP RING

(a) Using a snap ring expander, remove the hole snap ring from the output shaft.



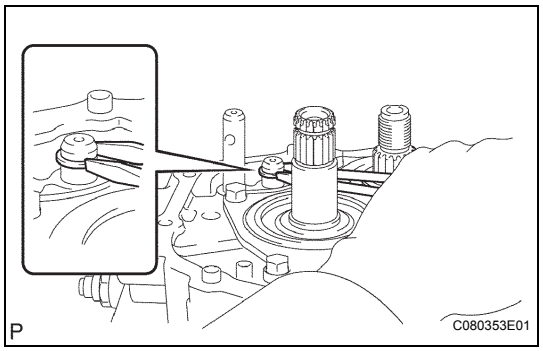
25. REMOVE INPUT SHAFT REAR BEARING SHAFT SNAP RING

(a) Using a snap ring expander, remove the hole snap ring from the input shaft.



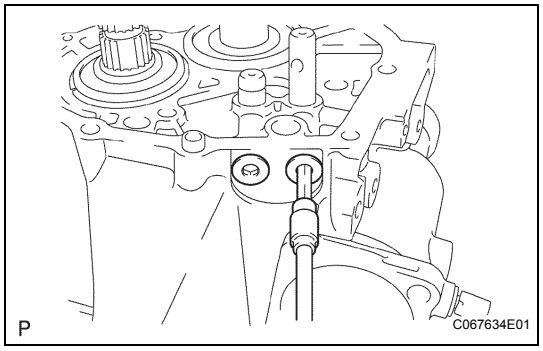
26. REMOVE REVERSE IDLER GEAR SHAFT BOLT

(a) Remove the shaft bolt and gasket from the transmission case.



27. REMOVE SHIFT FORK SHAFT SHAFT SNAP RING

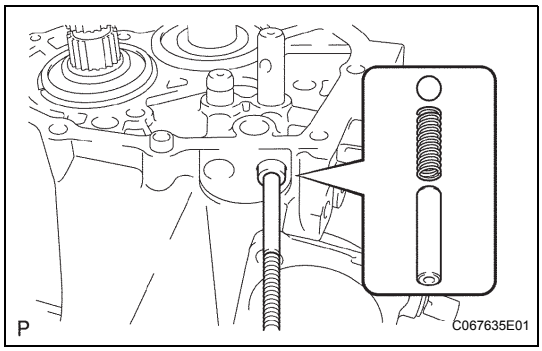
(a) Using 2 screwdrivers and a hammer, tap out the snap ring from the No. 2 gear shift fork shaft.
NOTICE:
Use a cloth to keep the snap ring from springing away.



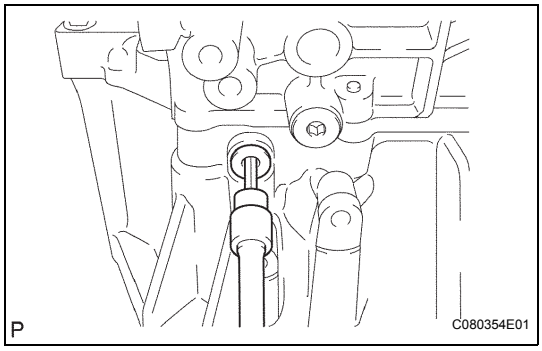
28. REMOVE SHIFT DETENT BALL

(a) Using a hexagon wrench, remove the 2 shift detent ball plugs from the transmission case.

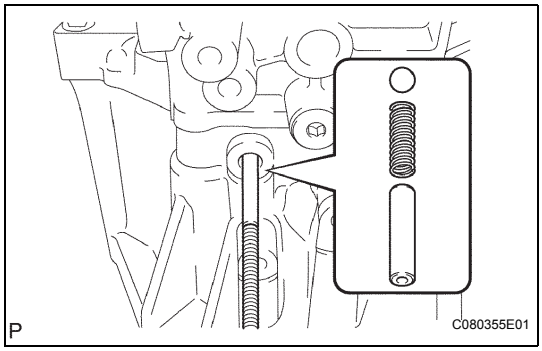
MX



(b) Using a magnetic finger, remove the 2 No. 1 shift detent ball spring seats, 2 shift detent ball springs and 2 shift detent balls from the transmission case.

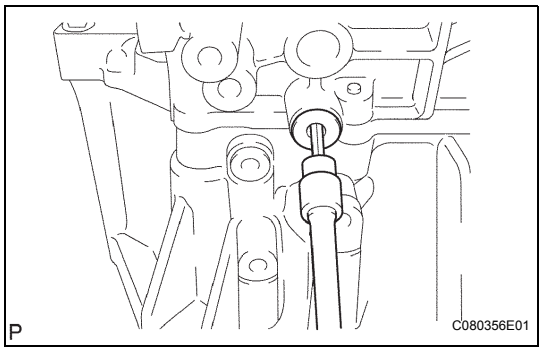


(c) Using a hexagon wrench, remove the shift detent ball plug from the front transaxle case.



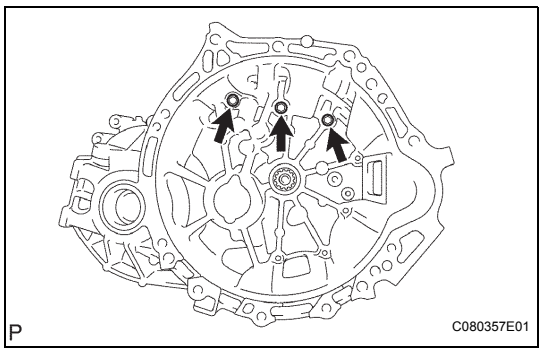
(d) Using a magnetic finger, remove the seat, spring and ball from the front transaxle case.

MX



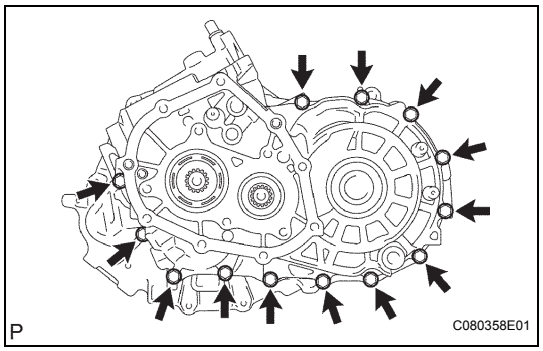
29. REMOVE NO. 2 LOCK BALL ASSEMBLY

(a) Using a hexagon wrench, remove the No. 2 lock ball from the transmission case.

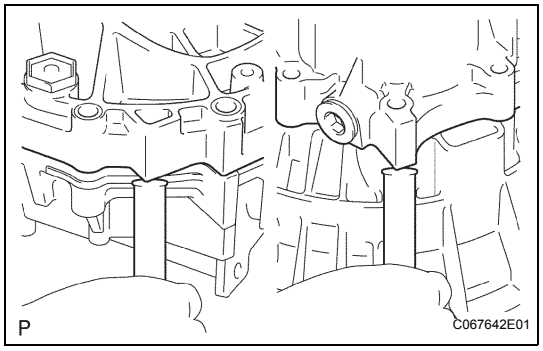


30. REMOVE MANUAL TRANSMISSION CASE

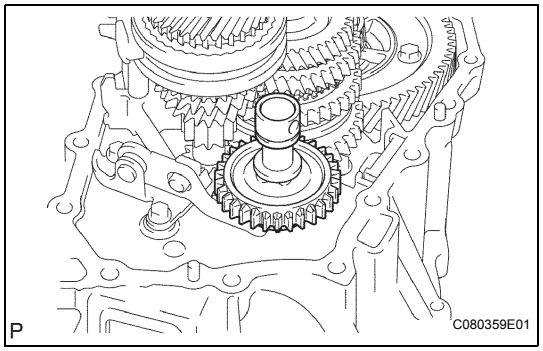
(a) Remove the 3 bolts from the front transaxle case.



(b) Remove the 13 bolts from the transmission case.

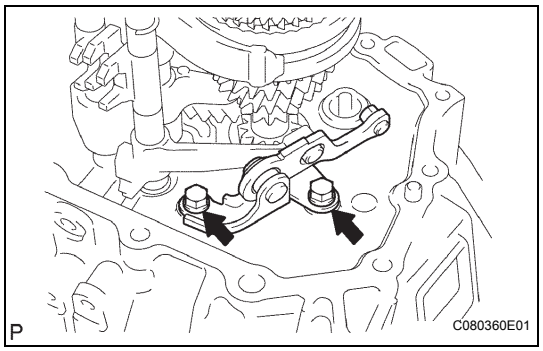


(c) Using a brass bar and hammer, carefully tap the projection of the transmission case to remove it from the transaxle case.
NOTICE:
Do not damage the transmission case and transaxle case.



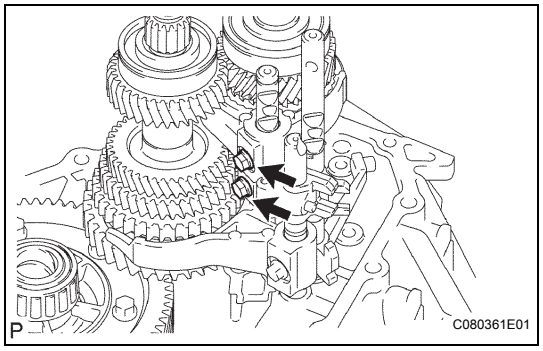
31. REMOVE REVERSE IDLER GEAR SUB-ASSEMBLY

(a) Remove the reverse idler gear, thrust washer and reverse idler gear shaft from the front transaxle case.



32. REMOVE REVERSE SHIFT ARM BRACKET ASSEMBLY

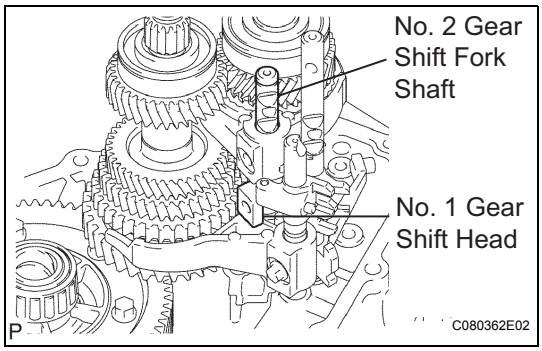
(a) Remove the 2 bolts and reverse shift arm bracket from the front transaxle case.



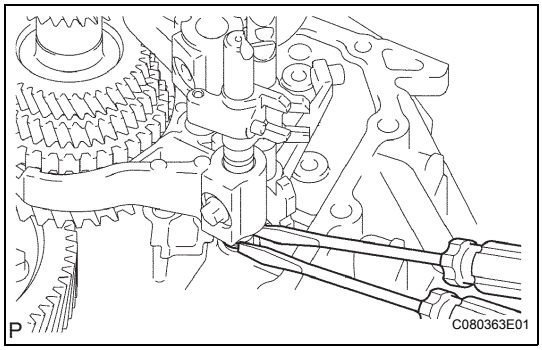
33. REMOVE NO. 2 GEAR SHIFT FORK SHAFT

(a) Remove the 2 bolts from the No. 2 gear shift fork and No. 1 gear shift head.

MX

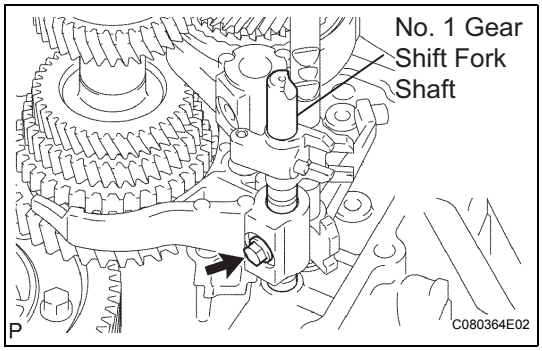


(b) Remove the No. 2 gear shift fork shaft and No. 1 gear shift head from the front transaxle case.

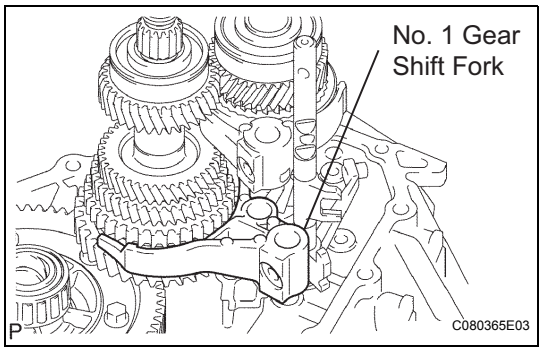


34. REMOVE NO. 1 GEAR SHIFT FORK SHAFT

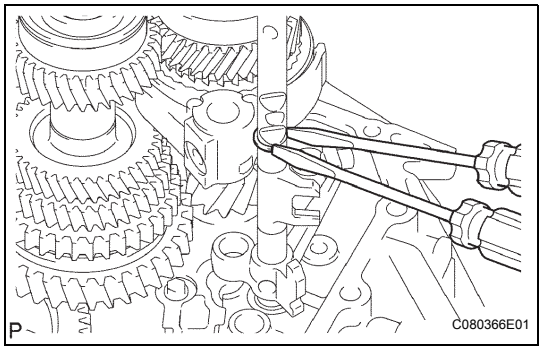
(a) Using 2 screwdrivers and a hammer, tap out the snap ring.
NOTICE:
Use a cloth to keep the snap ring from springing away.



(b) Remove the shift fork set bolt and No. 1 gear shift fork shaft from the No. 1 gear shift fork.



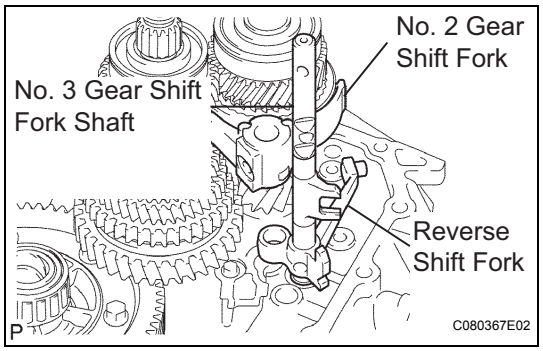
(c) Remove the No. 1 gear shift fork.



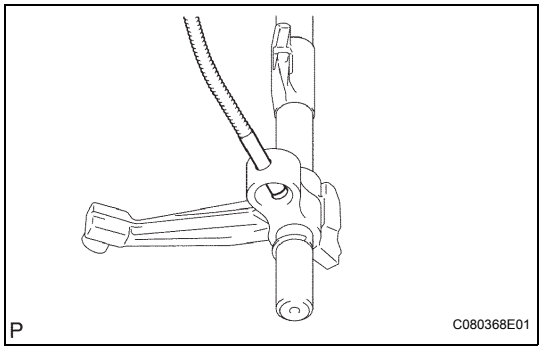
35. REMOVE NO. 3 GEAR SHIFT FORK SHAFT

(a) Using 2 screwdrivers and a hammer, tap out the snap ring from the No. 3 gear shift fork shaft.
NOTICE:
Use a cloth to keep the snap ring from springing away.

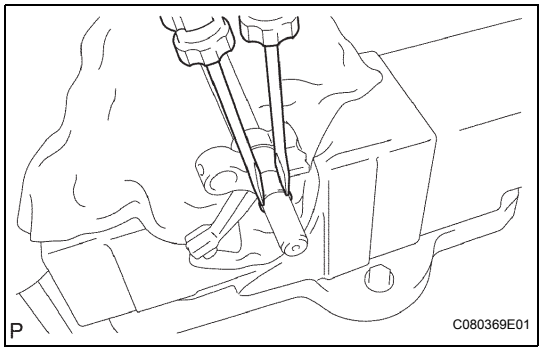
MX



(b) Remove the No. 3 gear shift fork shaft with reverse shift fork and No. 2 gear shift fork from the transaxle case.

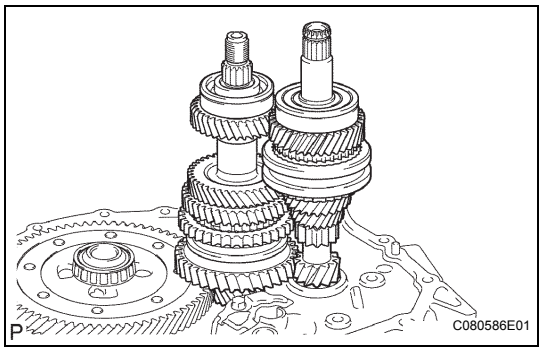


(c) Using a magnetic finger, remove the 2 reverse shift fork balls from the reverse shift fork.



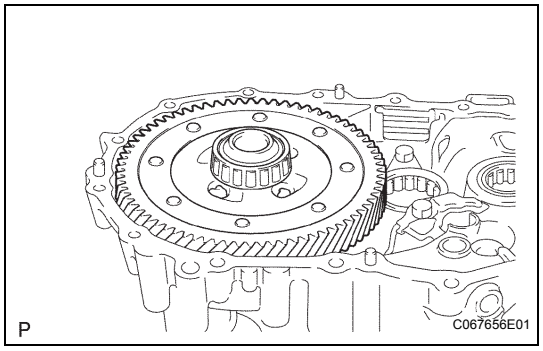
(d) Using 2 screwdrivers and a hammer, tap out the snap ring from the No. 3 shift fork shaft.
NOTICE:
Use a cloth to keep the snap ring from springing away.

(e) Remove the reverse shift fork from the No. 3 gear shift fork shaft.



36. REMOVE INPUT SHAFT ASSEMBLY

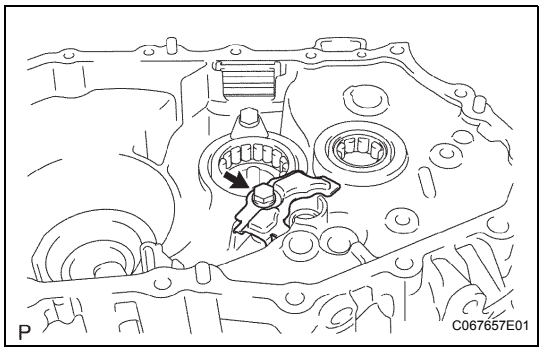
(a) Remove the input shaft and output shaft from the front transaxle case.



37. REMOVE DIFFERENTIAL CASE ASSEMBLY

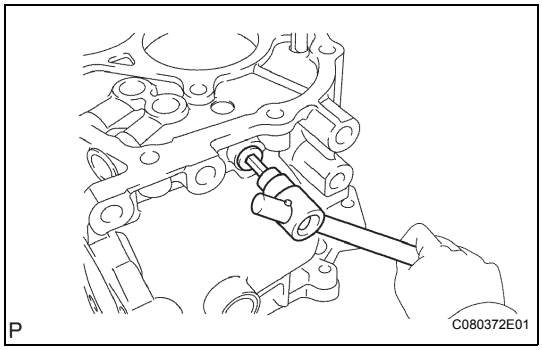
(a) Remove the differential case from the front transaxle case.

MX



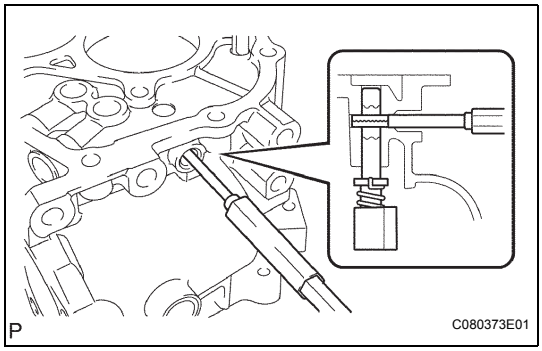
38. REMOVE MANUAL TRANSAXLE CASE RECEIVER

(a) Remove the bolt and transaxle case receiver from the front transaxle case.



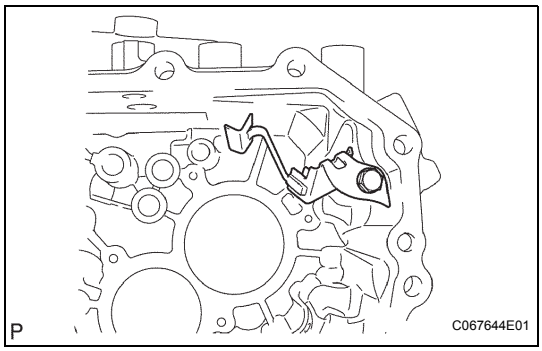
39. REMOVE REVERSE RESTRICT PIN ASSEMBLY

(a) Using a hexagon wrench, remove the reverse restrict pin plug from the transmission case.



(b) Using a 5 mm pin punch and hammer, tap out the slotted spring pin and remove the reverse restrict pin from the transmission case.

MX

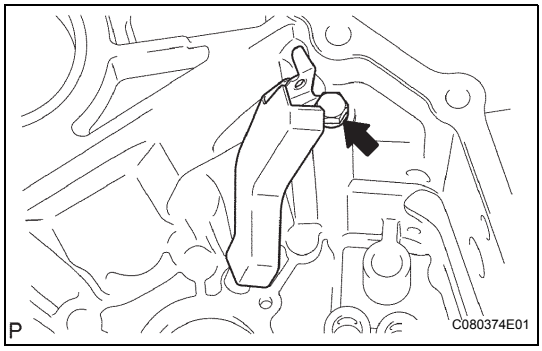


40. REMOVE NO. 1 OIL RECEIVER PIPE

(a) Remove the bolt and No. 1 oil receiver pipe from the transmission case.

NOTICE:

Be careful not to damage the No. 1 oil receiver pipe.

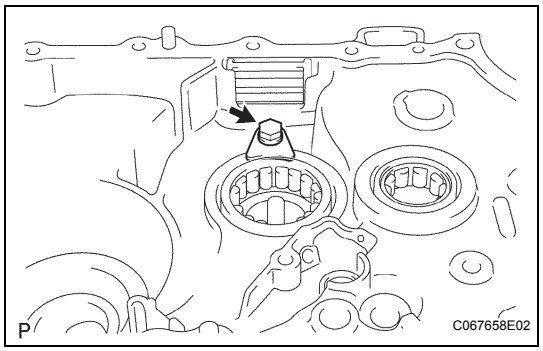


41. REMOVE NO. 2 OIL RECEIVER PIPE

(a) Remove the bolt and No. 2 oil receiver pipe from the transmission case.

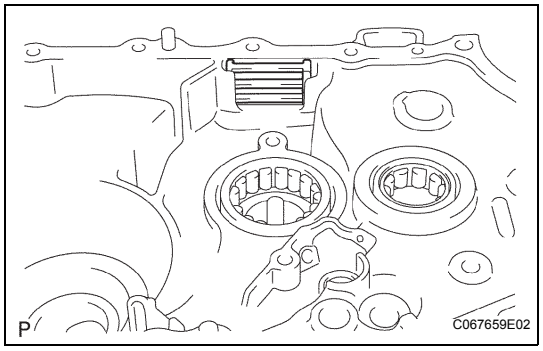
NOTICE:

Be careful not to damage the No. 2 oil receiver pipe.



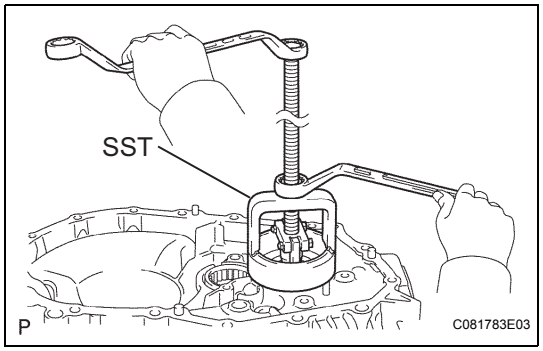
42. REMOVE BEARING LOCK PLATE

(a) Remove the bolt and bearing lock plate from the front transaxle case.



43. REMOVE TRANSMISSION MAGNET

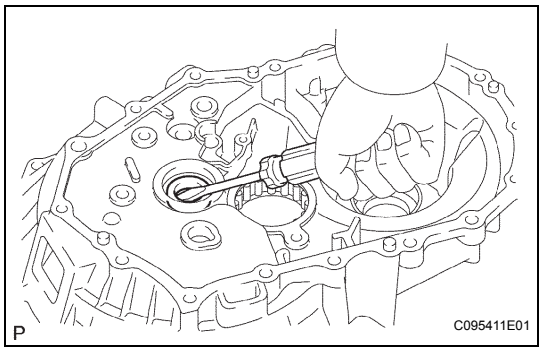
(a) Remove the transmission magnet from the front transaxle case.



44. REMOVE INPUT SHAFT FRONT BEARING

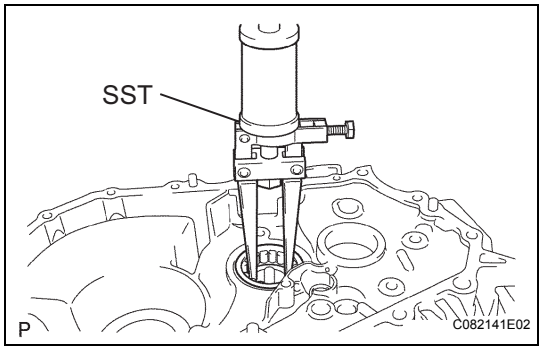
(a) Using SST, remove the front bearing from the front transaxle case.

SST 09612-65014 (09612-01050, 09612-01060)



45. REMOVE FRONT TRANSAXLE CASE OIL SEAL

(a) Using a screwdriver, pry out the front transaxle case oil seal from the transaxle case.



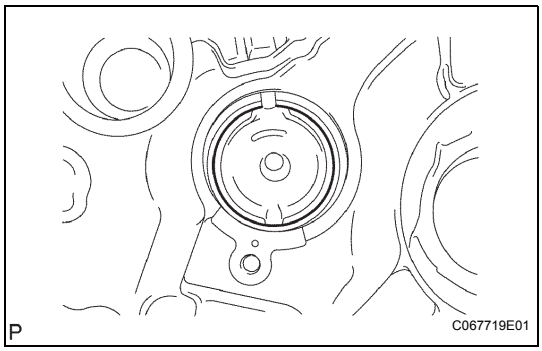
46. REMOVE OUTPUT SHAFT FRONT BEARING

(a) Using SST, remove the front bearing from the front transaxle case.

SST 09308-00010

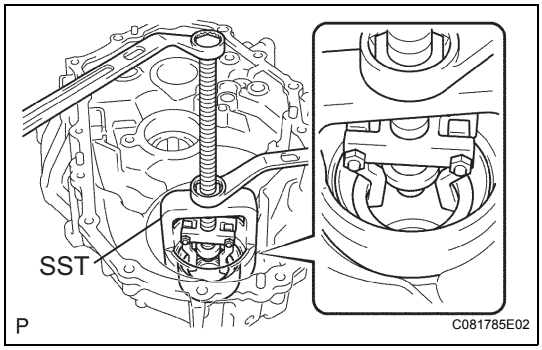
NOTICE:

Do not apply excessive force to the front transaxle case when installing it.



47. REMOVE OUTPUT SHAFT COVER

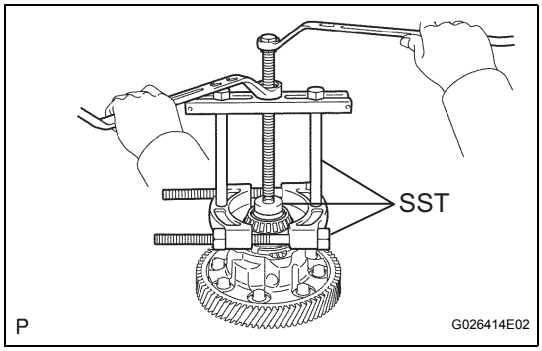
(a) Remove the output shaft cover from the front transaxle case.



48. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST, remove the front differential case front tapered roller bearing (outer race) and plate washer from the front transaxle case.

SST 09612-65014 (09612-01040, 09612-01050)

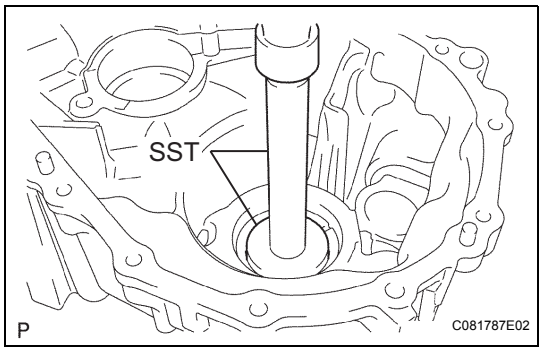


(b) Using SST, remove the front differential case front tapered roller bearing (inner race) from the differential case assembly.

SST 09950-00020, 09950-00030, 09950-40011 (09957-04010), 09950-60010 (09951-00360)

NOTICE:

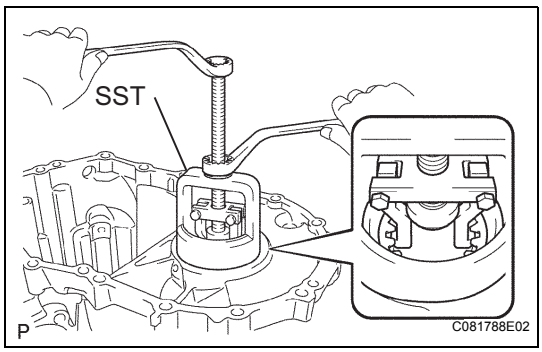
Be careful not to damage the bearing.



49. REMOVE TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, tap out the transaxle case oil seal from the front transaxle case.

SST 09950-60010 (09951-00530), 09950-70010 (09951-07150)

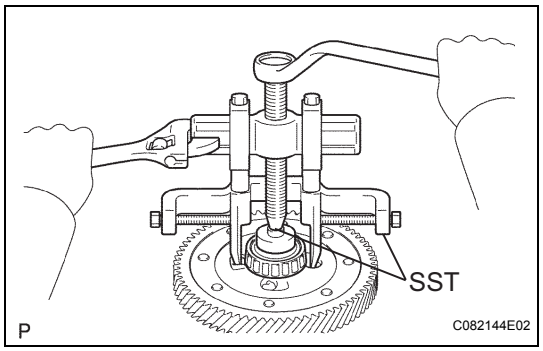


50. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

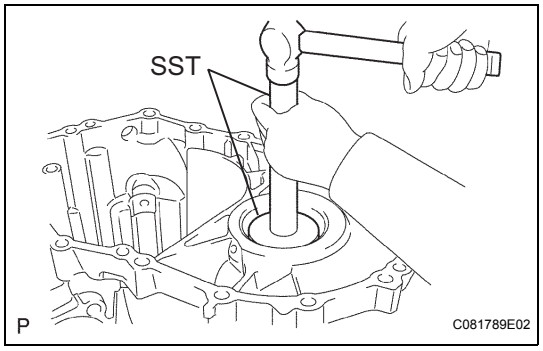
(a) Using SST, remove the rear tapered roller bearing (outer race) and plate washer from the transmission case.

SST 09612-65014 (09612-01040, 09612-01050)

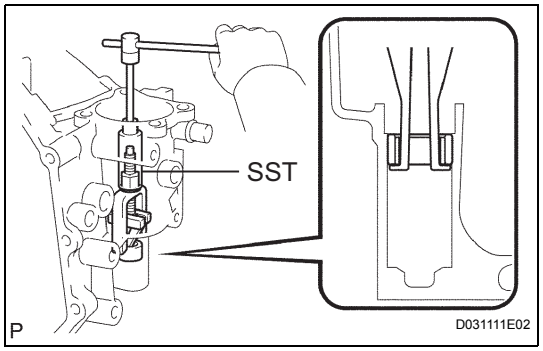
MX



(b) Using SST, remove the rear tapered roller bearing (inner race) from the front differential case.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011), 09950-60010 (09951-00360)
NOTICE:
Be careful not to damage the bearing.

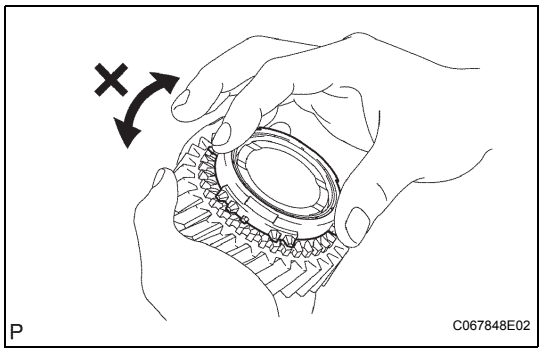


51. REMOVE TRANSMISSION CASE OIL SEAL
(a) Using SST and a hammer, tap out the transmission case oil seal from the transmission case.
SST 09950-60010 (09951-00530), 09950-70010 (09951-07150)

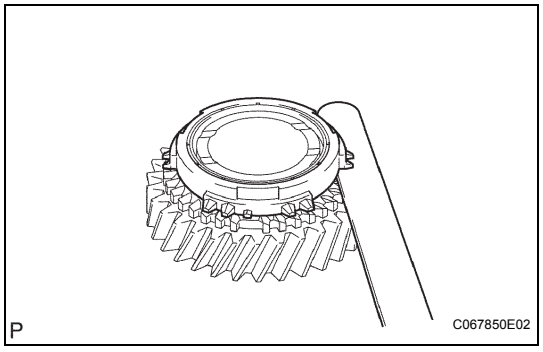


52. REMOVE SHIFT AND SELECT LEVER SHAFT BIMETAL FORMED BUSH
(a) Using SST, remove the bush.
SST 09319-60020

INSPECTION

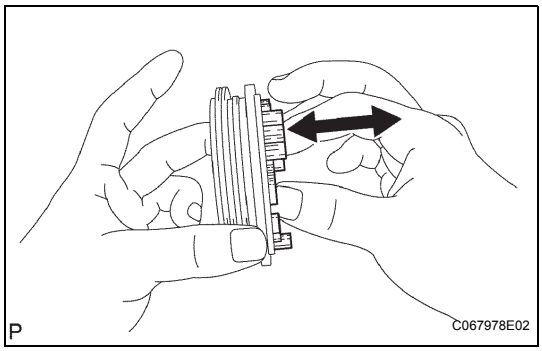


1. INSPECT NO. 3 SYNCHRONIZER RING
(a) Check for wear or damage.
(b) Coat the 5th gear cone with gear oil. Turn the synchronizer ring in one direction while pushing it against the 5th gear cone. Check that the ring locks. If the synchronizer ring does not lock, replace the ring or 5th gear.



(c) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.
Minimum clearance:
0.75 mm (0.0295 in.)
If the clearance is less than the minimum, replace the synchronizer ring and gear.
NOTICE:
Ensure the fine lapping compound is completely washed off after rubbing.

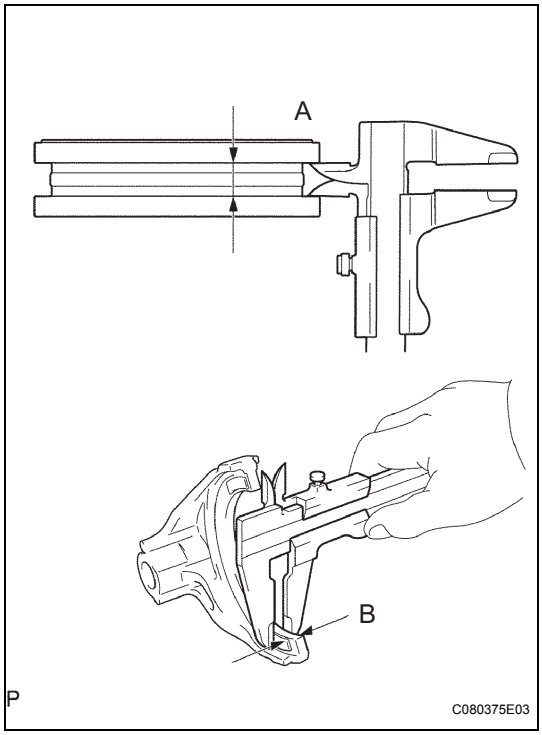
MX



2. INSPECT NO. 3 TRANSMISSION HUB SLEEVE

(a) Check the sliding condition between the No. 3 transmission hub sleeve and No. 3 transmission clutch hub.

(b) Check that the spline gear edges of the No. 3 transmission hub sleeve are not worn down.



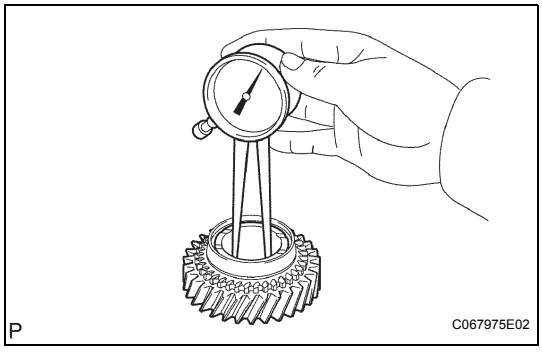
(c) Using a vernier caliper, measure the width of the No. 3 transmission hub sleeve groove (A) and the thickness of the claw part on the No. 3 gear shift fork (B), and calculate the clearance.

Standard clearance:

A - B = 0.3 to 0.5 mm (0.012 to 0.020 in.)

If the clearance exceeds the standard clearance, replace the No. 3 transmission hub sleeve and No. 3 gear shift fork.

MX



3. INSPECT 5TH GEAR

(a) Using a caliper gauge, inspect the inside diameter of the 5th gear.

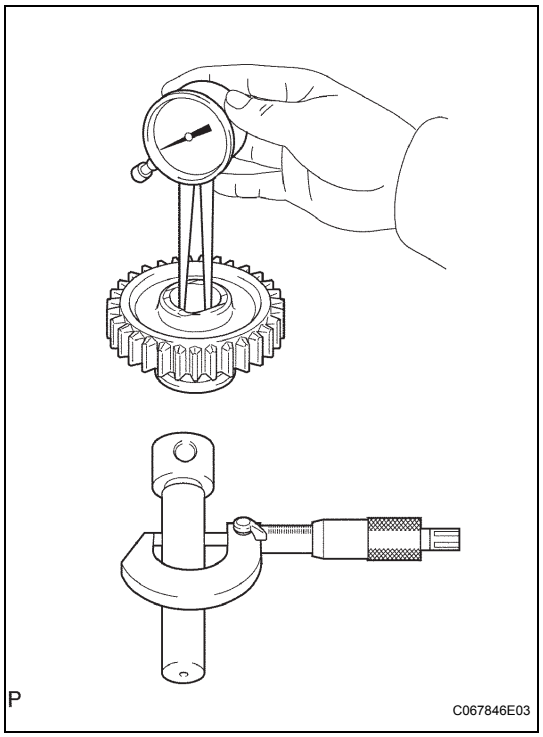
Standard inside diameter:

29.915 to 29.931 mm (1.1778 to 1.1783 in.)

Maximum inside diameter:

29.931 mm (1.1783 in.)

If the inside diameter is greater than the maximum, replace the 5th gear.



4. INSPECT REVERSE IDLER GEAR SUB-ASSEMBLY

(a) Using a caliper gauge, measure the inside diameter of the reverse idler gear.

Standard inside diameter:
18.040 to 18.058 mm (0.7102 to 0.7109 in.)
Maximum inside diameter:
18.058 mm (0.7109 in.)

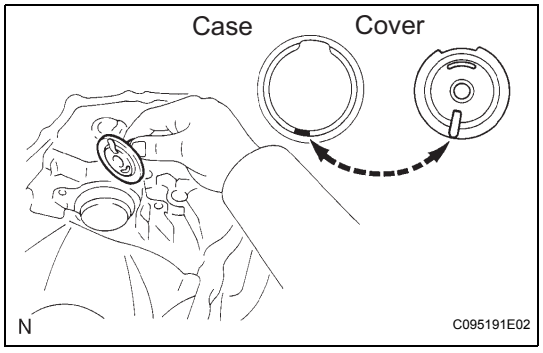
If the inside diameter is greater than the maximum, replace the reverse idler gear sub-assembly.

(b) Using a micrometer, measure the diameter of the reverse idler gear shaft.

Standard diameter:
17.966 to 17.984 mm (0.7073 to 0.7080 in.)
Minimum diameter:
17.966 mm (0.7073 in.)

If the diameter is less than the minimum, replace the reverse idler gear shaft sub-assembly.

REASSEMBLY



1. INSTALL OUTPUT SHAFT COVER

(a) Coat the output shaft cover with MP grease, and install it to the front transaxle case.

NOTICE:
Install the output shaft cover projection into the case hole.

2. INSTALL OUTPUT SHAFT FRONT BEARING

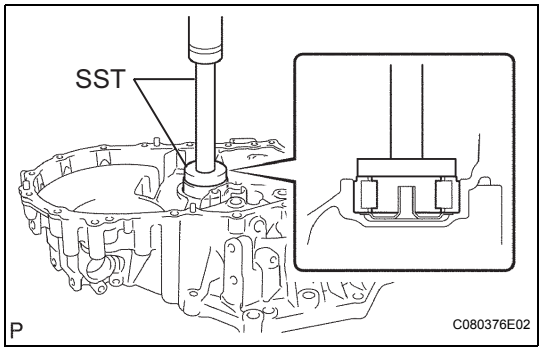
(a) Coat a new front bearing with gear oil.

(b) Using SST and a press, press it into the front transaxle case.

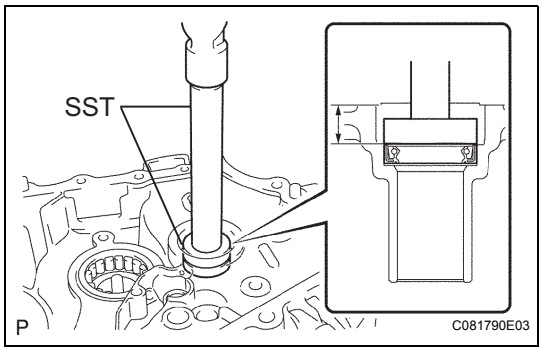
SST 09950-60010 (09951-00550), 09950-70010 (09951-07150)

NOTICE:

- **Be sure to install the bearing in the correct direction, as shown in the illustration.**
- **When replacing the output shaft front bearing, also replace the front bearing inner race.**



MX



3. INSTALL FRONT TRANSAXLE CASE OIL SEAL

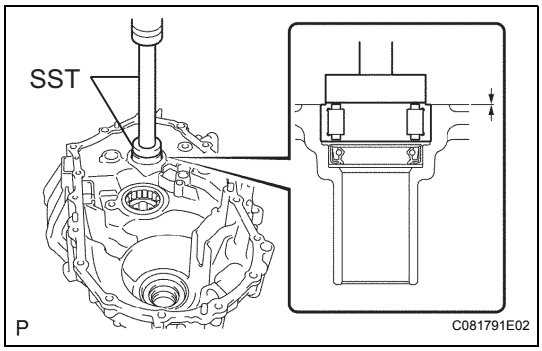
(a) Using SST and a hammer, press in a new front transaxle case oil seal to the front transaxle case.

SST 09950-60010 (09951-00370), 09950-70010 (09951-07150)

Standard depth:

15.6 to 16.0 mm (0.6141 to 0.6299 in.)

(b) Coat the lip of the front transaxle case oil seal with MP grease.



4. INSTALL INPUT SHAFT FRONT BEARING

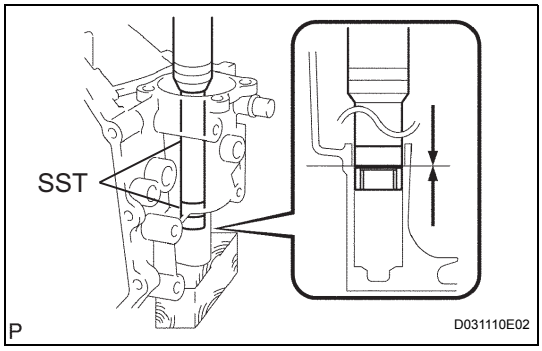
(a) Coat a new input shaft front bearing with gear oil.

(b) Using SST and a press, press it into the front transaxle case.

SST 09950-60010 (09951-00420), 09950-70010 (09951-07150)

Standard depth:

0 to 0.3 mm (0 to 0.0118 in.)



5. INSTALL SHIFT AND SELECT LEVER SHAFT BIMETAL FORMED BUSH

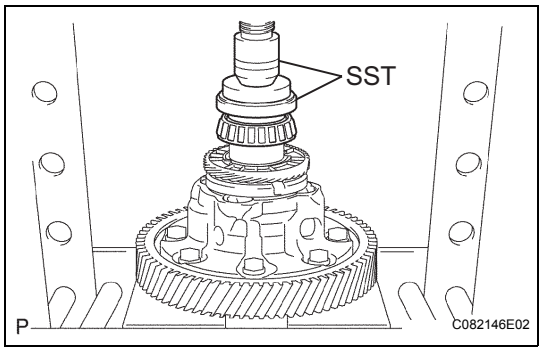
(a) Using SST and a press, press in a new bush to the transmission case.

SST 09950-60010 (09951-00220), 09950-70010 (09951-07100)

Standard depth:

0 to 0.5 mm (0 to 0.020 in.)

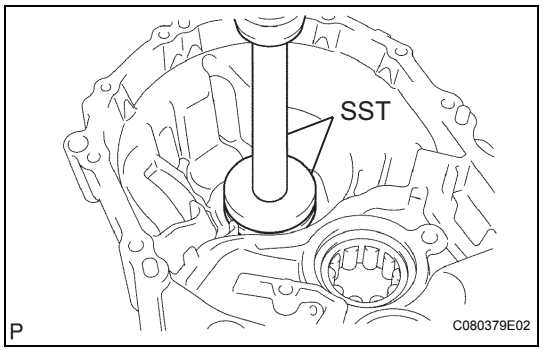
MX



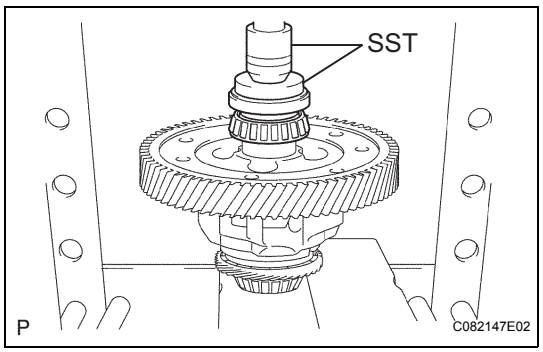
6. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, press in the front tapered roller bearing (inner race) to the front differential case.

SST 09950-60020 (09951-00680), 09950-70010 (09951-07150)

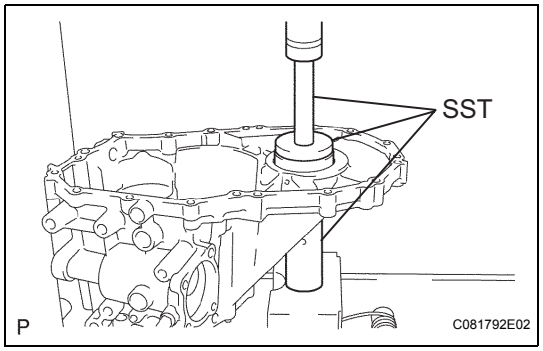


(b) Using SST and a press, press in the front tapered roller bearing (outer race) with plate washer to the front transaxle case.
SST 09350-32014 (09351-32120), 09950-60010 (09951-00530)

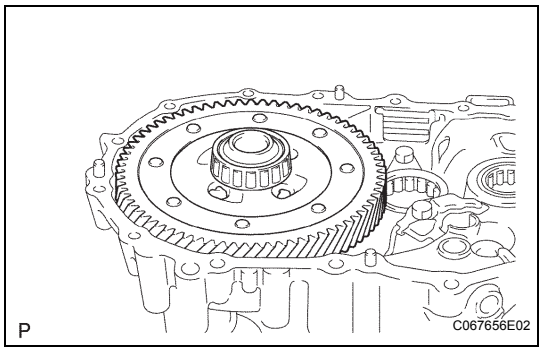


7. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST and a press, press in the rear tapered roller bearing (inner race) to the differential case.
SST 09350-32014 (09351-32120), 09950-60010 (09951-00530)



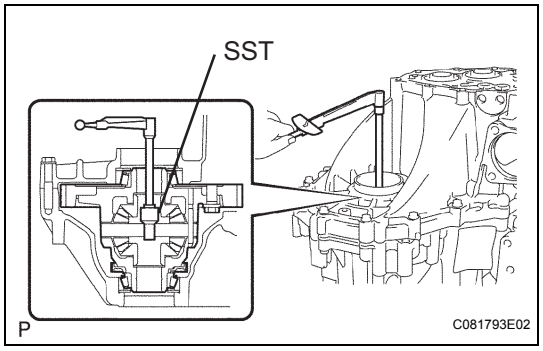
(b) Using SST and a press, press in the rear tapered roller bearing (outer race) with plate washer to the transmission case.
SST 09309-36010, 09950-60020 (09951-00710), 09950-70010 (09951-07150)
HINT:
Use a plate washer with the same thickness as the removed one.



8. ADJUST DIFFERENTIAL SIDE BEARING PRELOAD

(a) Coat the differential case with gear oil, and install it to the front transaxle case.

(b) Install the transmission case with the 16 bolts.
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)



(c) Using SST and a torque wrench, turn the differential case to the right and left 2 or 3 times to allow the bearings to settle.
SST 09564-32011

(d) Using SST and a torque wrench, measure the preload.
Standard preload (at starting)

Item	specified Condition
New bearing	0.78 to 1.57 N*m (7.95 to 16.0 kgf*cm, 6.9 to 13.89 in.*lbf)

MX

Item	specified Condition
Reused bearing	0.49 to 0.98 N*m (5.0 to 10.0 kgf*cm, 4.34 to 8.67 in.*lbf)

If the preload is not within the specification, select another plate washer.

Standard plate washer thickness

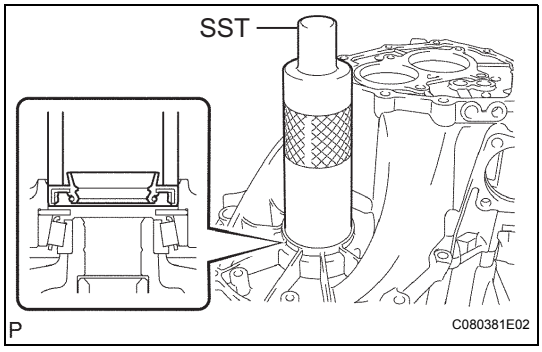
Mark	Thickness mm (in.)
AA	2.10 (0.0827)
BB	2.15 (0.0846)
CC	2.20 (0.0866)
DD	2.25 (0.0886)
EE	2.30 (0.0906)
FF	2.35 (0.0925)
GG	2.40 (0.0945)
HH	2.45 (0.0965)
JJ	2.50 (0.0984)
KK	2.55 (0.1004)
LL	2.60 (0.1024)
MM	2.65 (0.1043)
NN	2.70 (0.1063)
PP	2.75 (0.1083)
QQ	2.80 (0.1102)
RR	2.85 (0.1122)
SS	2.90 (0.1142)
TT	2.95 (0.1161)
UU	3.00 (0.1181)

HINT:

The preload will change by about 0.3 to 0.4 N*m (3 to 4 kgf*cm, 2.6 to 3.5 in.*lbf) corresponding to a change of 0.05 mm (0.0020 in.) in plate washer thickness.

(e) Remove the 16 bolts and transmission case.

(f) Remove the differential case from the front transaxle case.



9. INSTALL TRANSMISSION CASE OIL SEAL

(a) Using SST and a hammer, tap in a new transmission case oil seal to the transmission case.

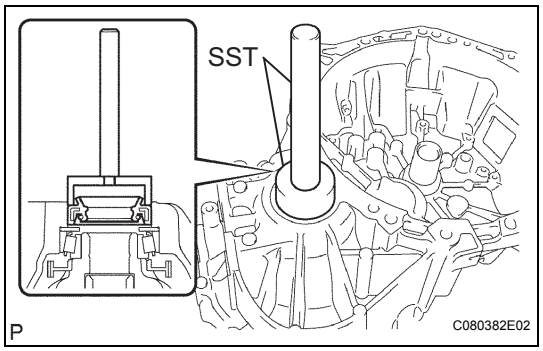
SST 09316-60011 (09316-00011)

Standard drive depth:

2.1 to 2.7 mm (0.082677 to 0.106299 in.)

(b) Coat the lip of the front transmission case oil seal with MP grease.

MX



10. INSTALL TRANSAXLE CASE OIL SEAL

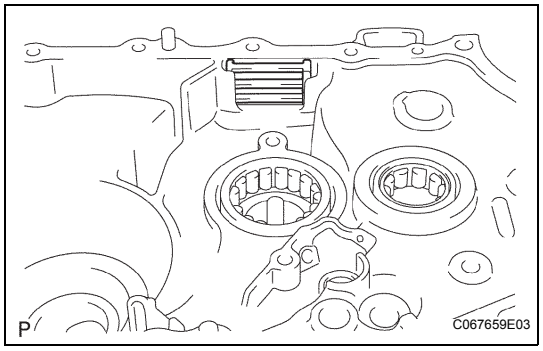
(a) Using SST and a hammer, tap in a new oil seal to the front transaxle case.

SST 09710-20011 (09710-06071), 09950-70010 (09951-07150)

Standard depth:

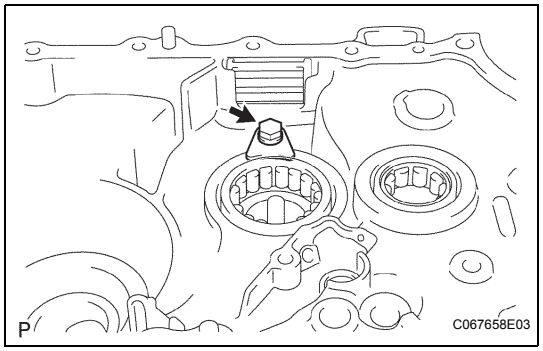
1.6 to 2.2 mm (0.0629 to 0.0866 in.)

(b) Coat the lip of the oil seal with MP grease.



11. INSTALL TRANSMISSION MAGNET

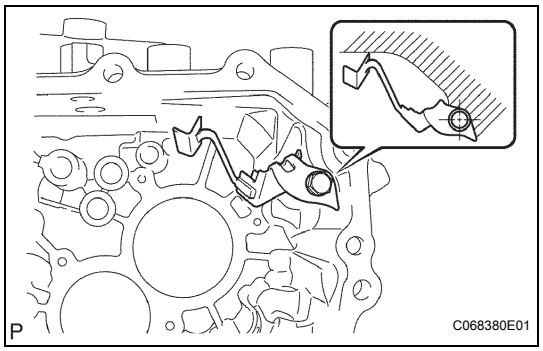
(a) Clean the transmission magnet, and install it to the front transaxle case.



12. INSTALL BEARING LOCK PLATE

(a) Install the bearing lock plate to the front transaxle case with the bolt.

Torque: 11 N*m (115 kgf*cm, 8.3 ft.*lbf)



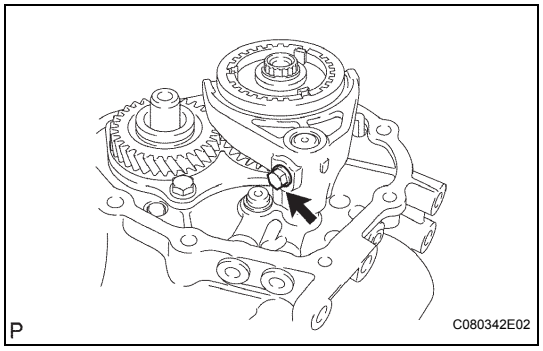
13. INSTALL NO. 1 OIL RECEIVER PIPE

(a) Install the No. 1 oil receiver pipe to the transmission case with the bolt.

Torque: 17 N*m (175 kgf*cm, 13 ft.*lbf)

NOTICE:

- **Prevent the No. 1 oil receiver pipe from being deformed.**
- **Install the No. 1 oil receiver pipe while placing it against the transmission case, as shown in the illustration.**



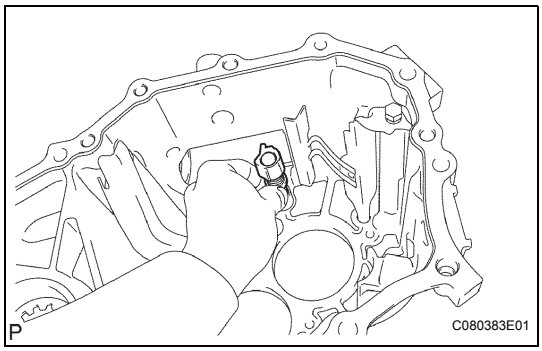
14. INSTALL NO. 2 OIL RECEIVER PIPE

(a) Install the No. 2 oil receiver pipe to the transmission case with the bolt.

Torque: 17 N*m (175 kgf*cm, 13 ft.*lbf)

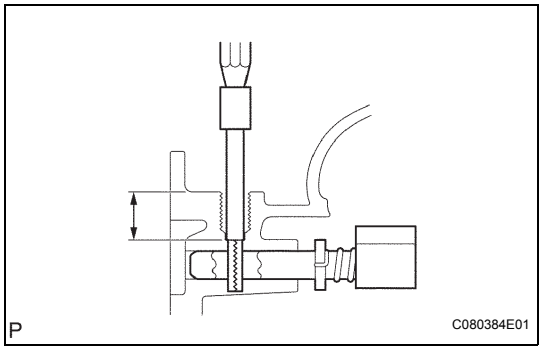
NOTICE:

- **Prevent the No. 2 oil receiver pipe from being deformed.**
- **Install the No. 2 oil receiver pipe while placing it against the transmission case, as shown in the illustration.**

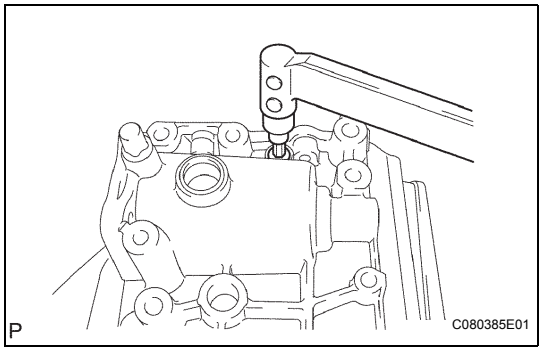


15. INSTALL REVERSE RESTRICT PIN ASSEMBLY

(a) Install the reverse restrict pin to the manual transmission case.
NOTICE:
Be sure to set the reverse restrict pin in the correct orientation.



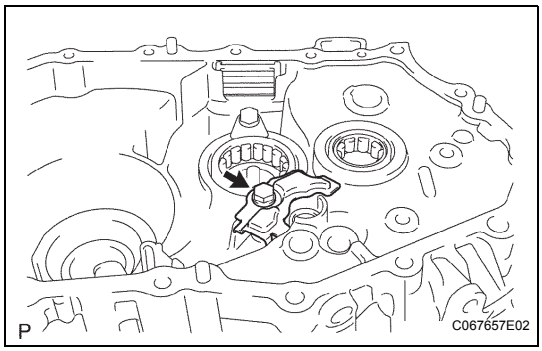
(b) Using a 5 mm pin punch and hammer, tap in the slotted pin to the reverse restrict pin.
Standard depth:
16.0 to 17.0 mm (0.6299 to 0.6693 in.)



(c) Apply sealant to the reverse restrict pin plug.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

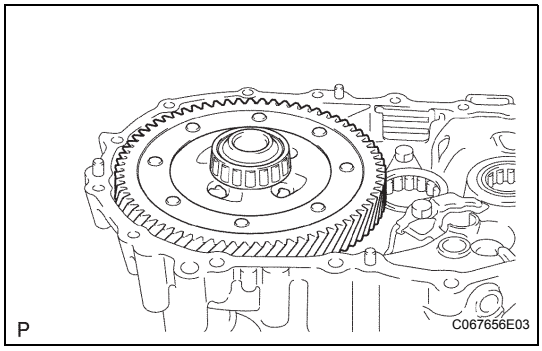
(d) Using a hexagon wrench and torque wrench, install the reverse restrict pin plug to the transmission case.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

MX



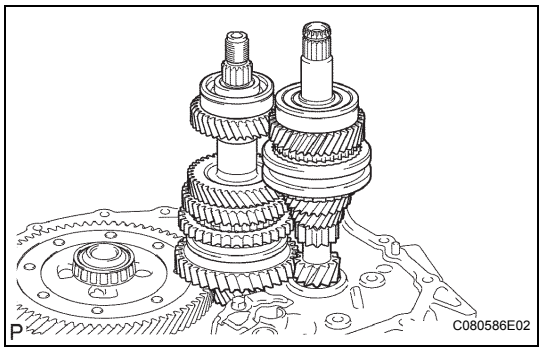
16. INSTALL MANUAL TRANSAXLE CASE RECEIVER

(a) Install the transaxle case receiver to the front transaxle case with the bolt.
Torque: 11 N*m (115 kgf*cm, 8 ft.*lbf)



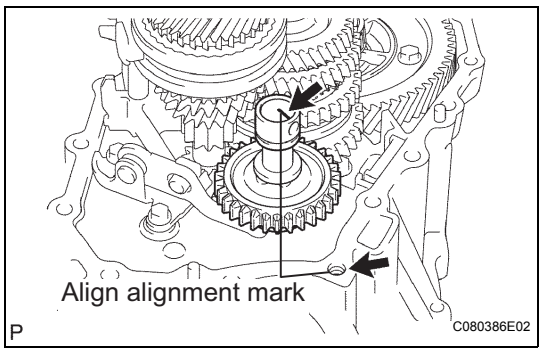
17. INSTALL DIFFERENTIAL CASE ASSEMBLY

(a) Coat the differential case tapered roller bearing with gear oil, and install the differential case to the front transaxle case.



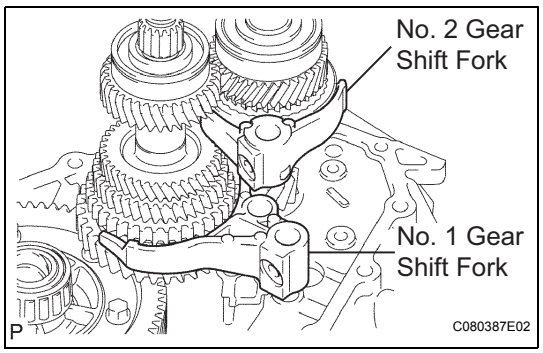
18. INSTALL INPUT SHAFT ASSEMBLY

(a) Coat the sliding and rotating surface of the input and output shafts with gear oil, and install them to the transaxle case.



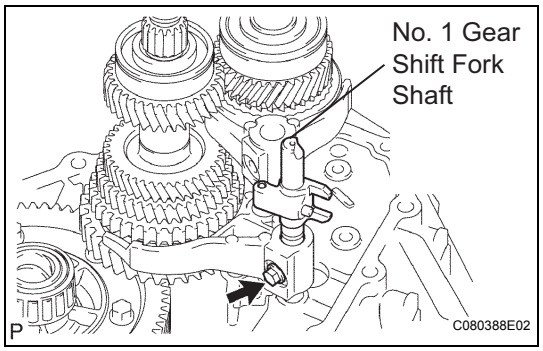
19. INSTALL REVERSE IDLER GEAR SUB-ASSEMBLY

(a) Coat the reverse idler gear, thrust washer and reverse idler gear shaft with gear oil, and install them as shown in the illustration.
HINT:
Align the mark on the reverse idler gear shaft with the bolt hole, as shown in the illustration.



20. INSTALL NO. 1 GEAR SHIFT FORK SHAFT

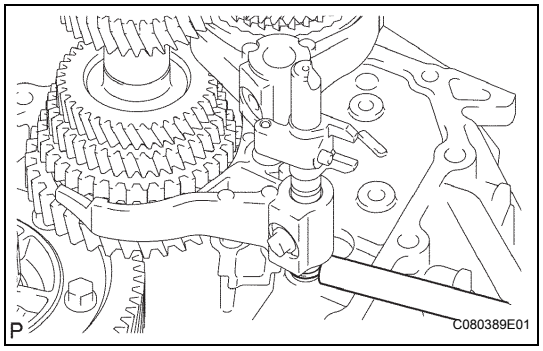
(a) Coat the No. 1 gear shift fork and No. 2 gear shift fork with gear oil, and install them.



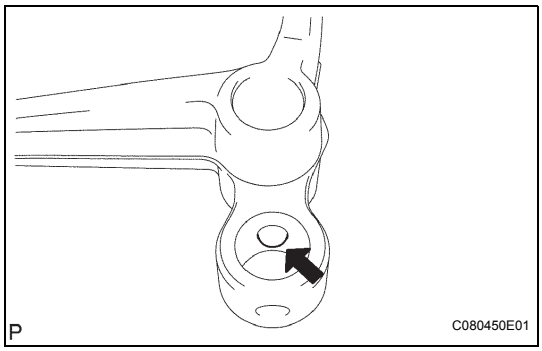
(b) Coat the No. 1 gear shift fork shaft with gear oil, and install it.

(c) Apply sealant to the shift fork set bolt.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(d) Install the shift fork set bolt.
Torque: 16 N*m (160 kgf*cm, 12 ft.*lbf)



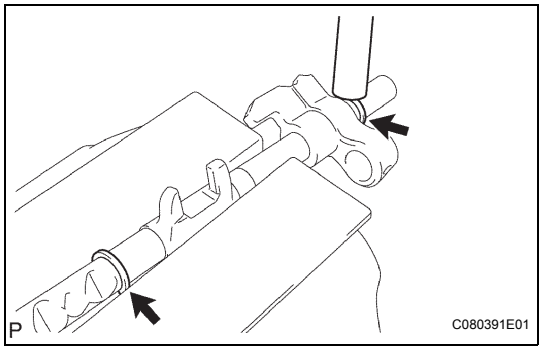
(e) Using a brass bar and hammer, tap in a new shaft snap ring to the No. 1 gear shift fork shaft.



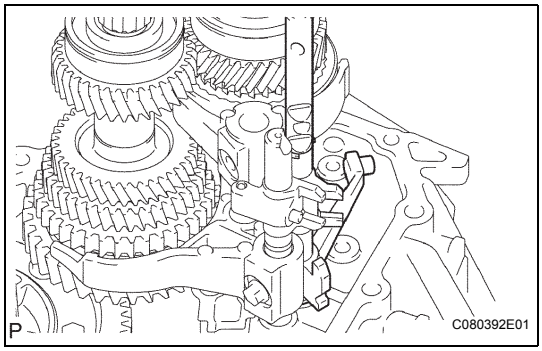
21. INSTALL NO. 3 GEAR SHIFT FORK SHAFT

(a) Coat the 2 shift fork balls with MP grease, and install them to the reverse shift fork.

(b) Install the reverse shift fork to the No. 3 gear shift fork shaft.

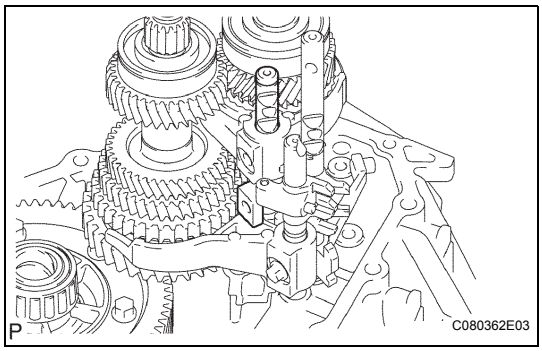


(c) Using a brass bar and hammer, tap in 2 new shift fork shaft shaft snap rings to the No. 3 shift fork shaft.

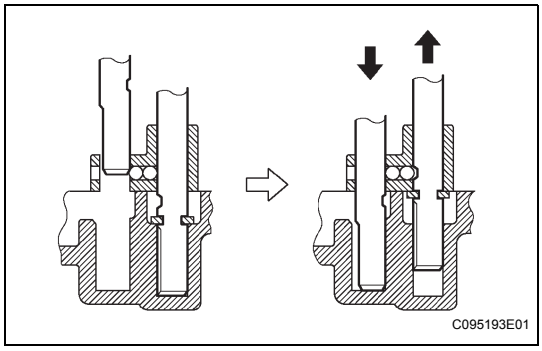


(d) Coat the No. 3 gear shift fork shaft with gear oil, and install it.

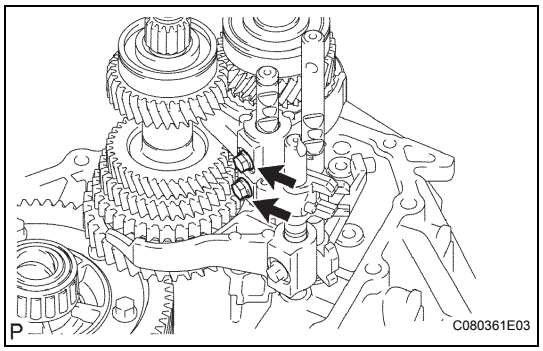
MX



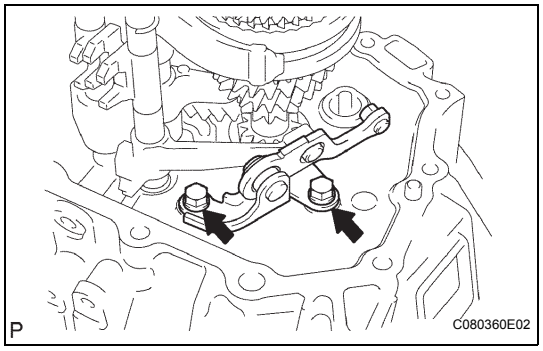
22. INSTALL NO. 2 GEAR SHIFT FORK SHAFT



(a) Coat the No. 1 gear shift head and No. 2 gear shift fork shaft with gear oil, and install them.
NOTICE:
To avoid the interference of the 2 shift fork balls, lift up the No. 3 gear shift fork shaft to the position shown in the illustration.

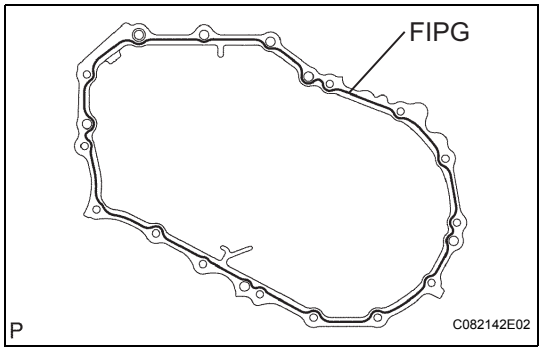


(b) Coat the 2 shift lock bolts with sealant, and install them to the No. 2 gear shift fork and No. 1 shift head.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 16 N*m (160 kgf*cm, 12 ft.*lbf)



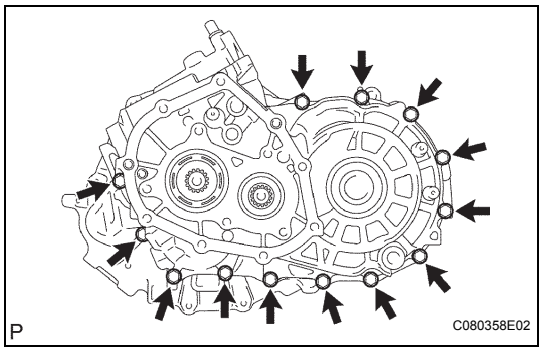
23. INSTALL REVERSE SHIFT ARM BRACKET ASSEMBLY

(a) Install the reverse shift arm bracket to the front transaxle case with 2 bolts.
Torque: 17 N*m (175 kgf*cm, 13 ft.*lbf)

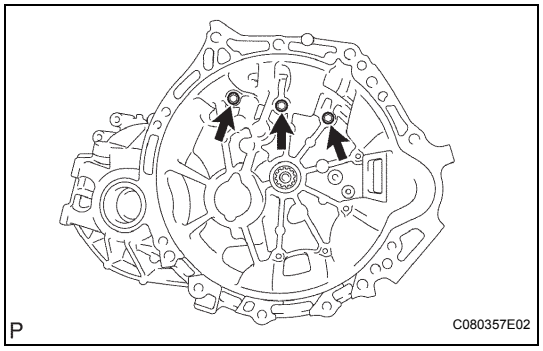


24. INSTALL MANUAL TRANSMISSION CASE

(a) Apply FIPG to the transmission case, as shown in the illustration.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent
NOTICE:
Parts must be assembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.

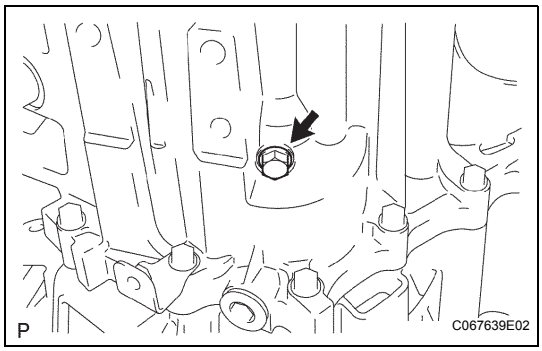


(b) Coat the 13 bolts with sealant, and install them to the transmission case.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)



(c) Coat the 3 bolts with sealant, and install them to the front transaxle case.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)

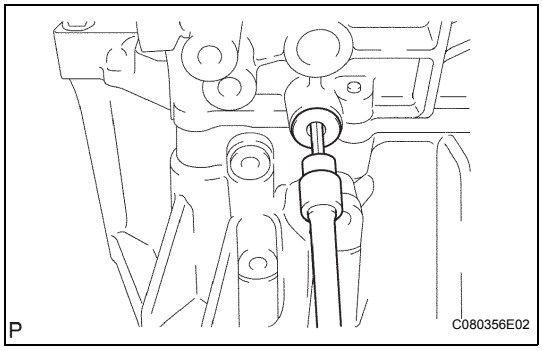
MX



25. INSTALL REVERSE IDLER GEAR SHAFT BOLT

(a) Coat the reverse idler gear shaft bolt with sealant, and install it with a new gasket.

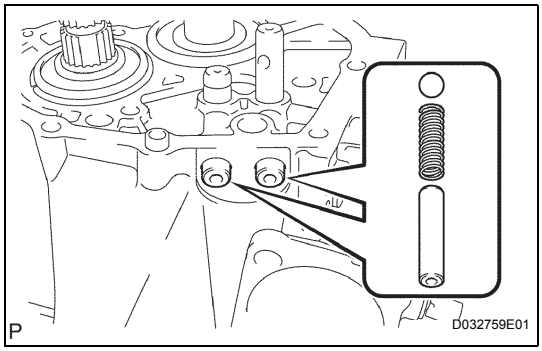
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)



26. INSTALL NO. 2 LOCK BALL ASSEMBLY

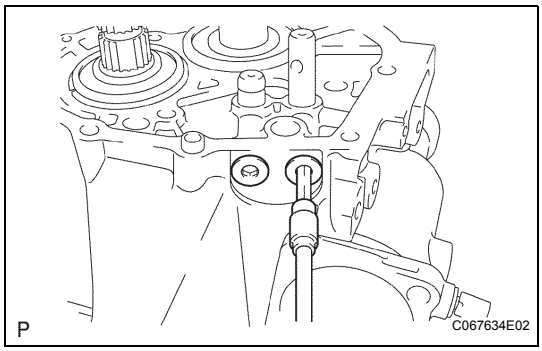
(a) Coat the No. 2 lock ball with sealant, and install it with a hexagon wrench.

Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)



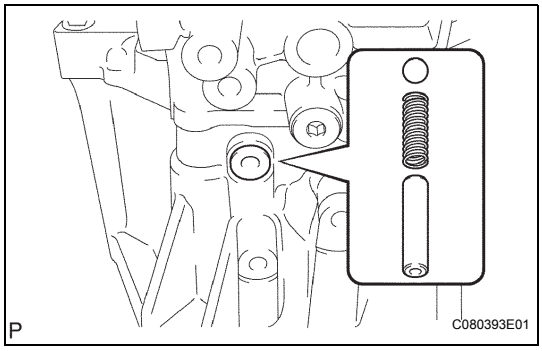
27. INSTALL SHIFT DETENT BALL

(a) Install the 2 shift detent balls, 2 shift detent ball springs with 2 No. 1 shift detent ball spring seats to the manual transmission case.



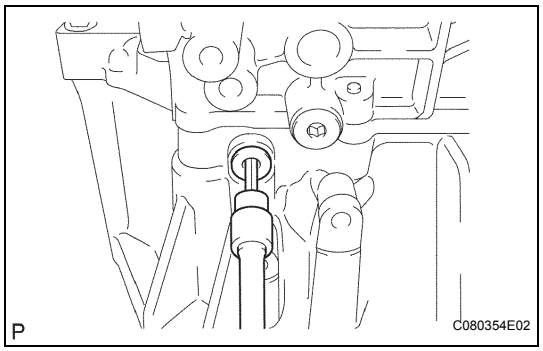
(b) Coat the 2 shift detent ball plugs with sealant, and install them with a hexagon wrench.

Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)

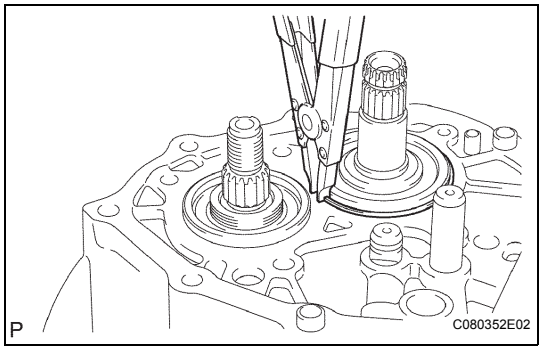


(c) Install the shift detent ball, shift detent ball compression spring and No. 1 shift detent ball spring seat to the front transaxle case.

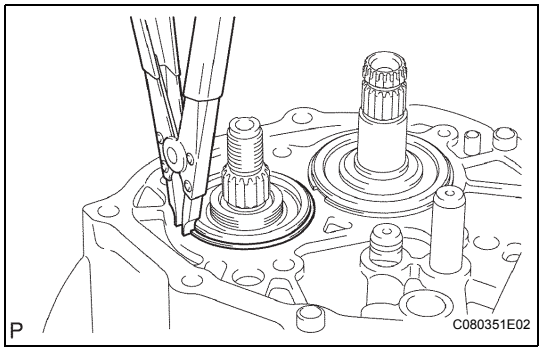
MX



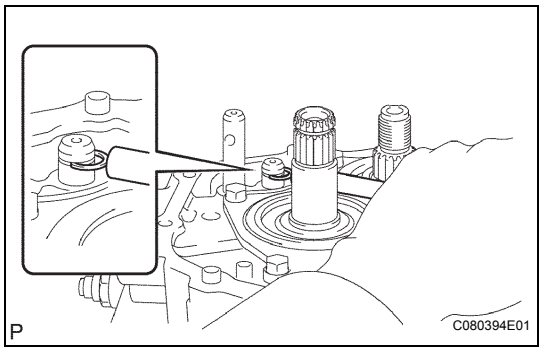
(d) Coat the shift detent ball plug with sealant, and install it with a hexagon wrench.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)



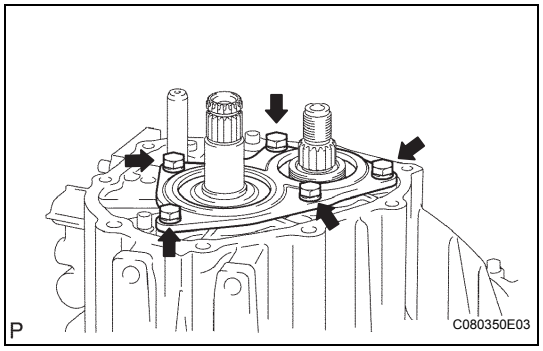
28. INSTALL INPUT SHAFT REAR BEARING HOLE SNAP RING
(a) Using a snap ring expander, install the hole snap ring to the input shaft.



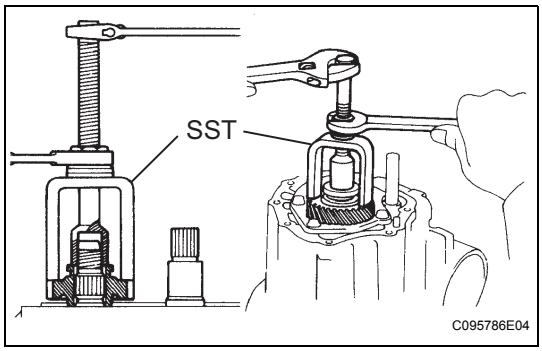
29. INSTALL OUTPUT SHAFT REAR BEARING HOLE SNAP RING
(a) Using a snap ring expander, install the hole snap ring to the output shaft.



30. INSTALL SHIFT FORK SHAFT SHAFT SNAP RING
(a) Using a brass bar and hammer, tap in a new shift fork shaft shaft snap ring to the No. 2 shift fork shaft.

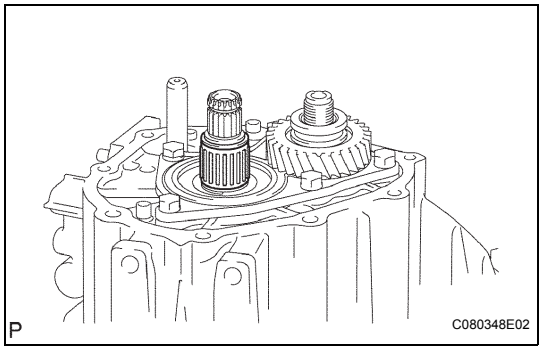


31. INSTALL REAR BEARING RETAINER
(a) Coat the 5 bolts with sealant, and install the rear bearing retainer to the transmission case with the 5 bolts.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 27 N*m (280 kgf*cm, 20 ft.*lbf)



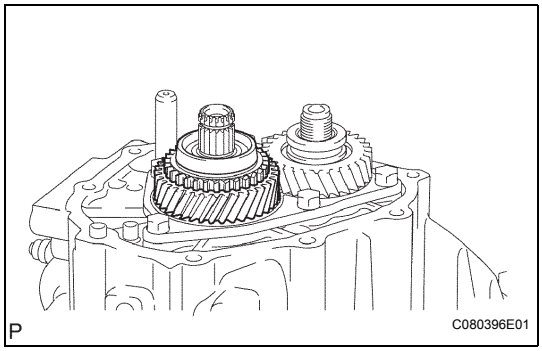
32. INSTALL 5TH DRIVEN GEAR

(a) Using SST, install the 5th driven gear to the output shaft.
SST 09309-12020



33. INSTALL 5TH GEAR NEEDLE ROLLER BEARING

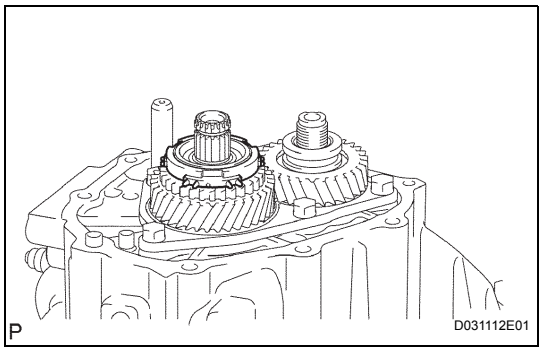
(a) Coat the 5th gear needle roller bearing and 5th gear bearing spacer with gear oil, and install them to the input shaft.



34. INSTALL 5TH GEAR

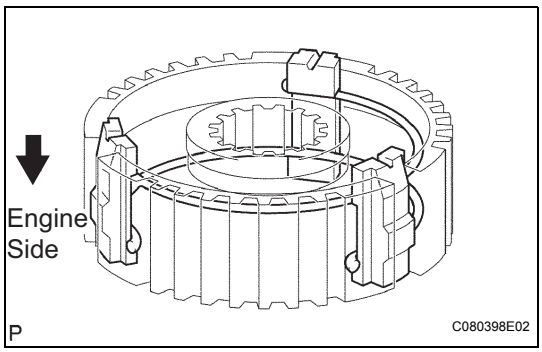
(a) Coat the 5th gear with gear oil, and install it to the input shaft.

MX



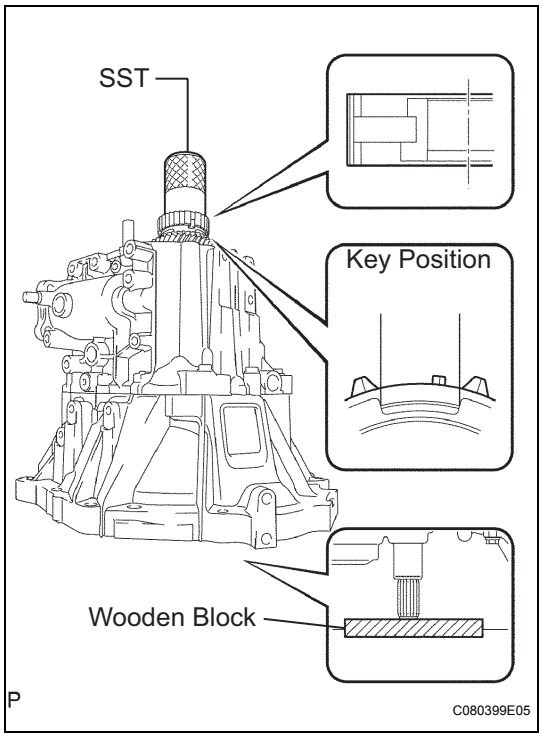
35. REMOVE NO. 3 SYNCHRONIZER RING

(a) Coat the No. 3 synchronizer ring with gear oil, and install it to the 5th gear.



36. INSTALL NO. 3 TRANSMISSION CLUTCH HUB

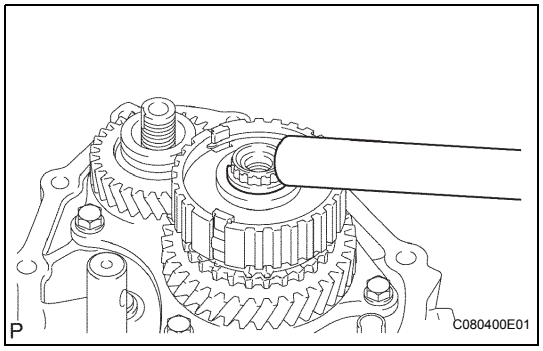
(a) Install the 3 synchromesh shifting keys and 2 synchromesh shifting key springs to the No. 3 transmission clutch hub as shown in the illustration.
NOTICE:
Do not set both openings of the shifting key springs in the same position.



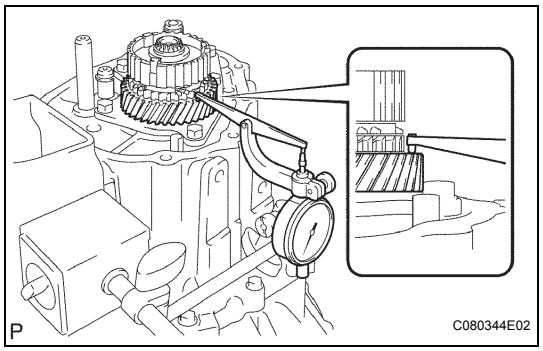
(b) Using SST and a hammer, tap in the No. 3 clutch hub to the input shaft.
SST 09636-20010
NOTICE:
- **Do not install the No. 3 transmission clutch hub with it facing in the wrong direction.**
- **Install the No. 3 transmission clutch hub checking the positions of the No. 3 synchronizer ring key groove and the No. 3 synchromesh shifting key.**
- **Check that the 5th gear is rotating.**
- **Place a suitable sized wooden block to support the input shaft.**

(c) Select a No. 3 clutch hub shaft snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Standard snap ring thickness

Mark	Thickness mm (in.)
A	2.25 (0.0886)
B	2.31 (0.0909)
C	2.37 (0.0933)
D	2.43 (0.0957)
E	2.49 (0.0980)
F	2.55 (0.1004)
G	2.61 (0.1028)



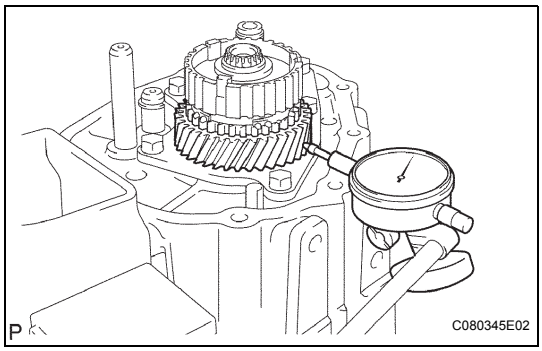
(d) Using a brass bar and hammer, tap the snap ring onto the input shaft.



37. INSPECT 5TH GEAR THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance.
Standard clearance:
0.1 to 0.57 mm (0.0039 to 0.02244 in.)
Maximum clearance:
0.57 mm (0.02244 in.)
If the clearance is greater than the maximum, replace the gear, needle roller bearing or shaft.

MX



38. INSPECT 5TH GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the radial clearance.

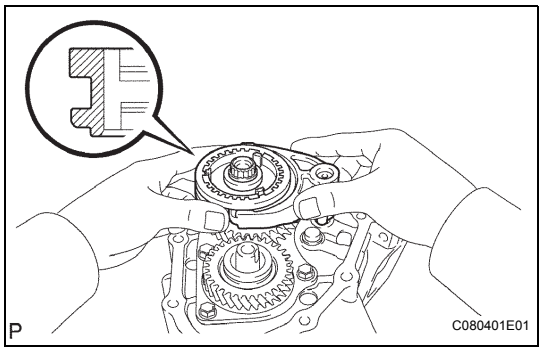
Standard clearance

Item	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

Maximum clearance

Item	Specified Condition
KOYO made	0.058 mm (0.0023 in.)
NSK made	0.056 mm (0.0022 in.)

If the clearance is greater than the maximum, replace the gear, needle roller bearing or shaft.

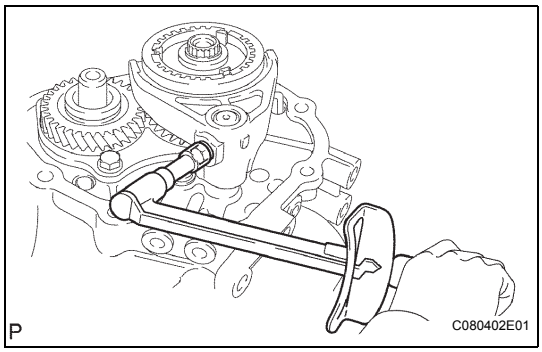


39. INSTALL NO. 3 GEAR SHIFT FORK

(a) Coat the No. 3 transmission clutch hub sleeve with gear oil, and install it and the No. 3 gear shift fork to the No. 3 transmission clutch hub.

HINT:

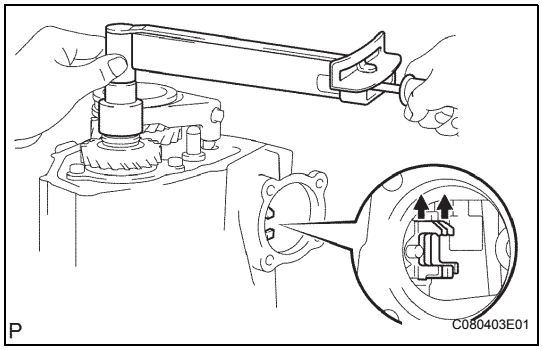
Be sure to set the No. 3 transmission clutch hub in the correct orientation.



(b) Coat the gear shift fork lock bolt with sealant, and install it to the No. 3 gear shift fork.

Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

Torque: 16 N*m (160 kgf*cm, 12 ft.*lbf)



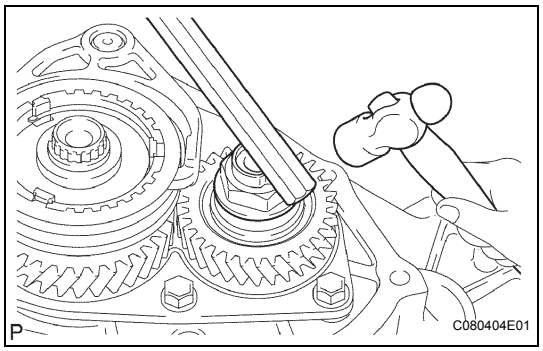
40. INSTALL MANUAL TRANSMISSION OUTPUT SHAFT REAR SET NUT

(a) Engage the 2 gears simultaneously to lock the transmission.

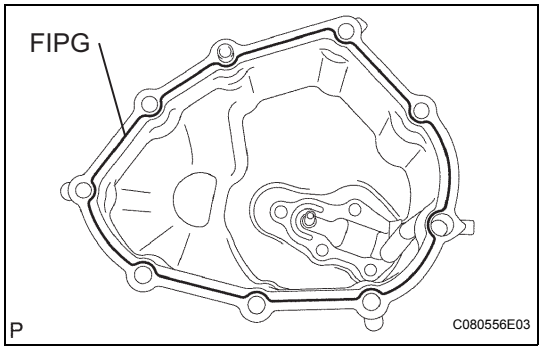
(b) Install a new set nut.

Torque: 118 N*m (1200 kgf*cm, 87 ft.*lbf)

MX

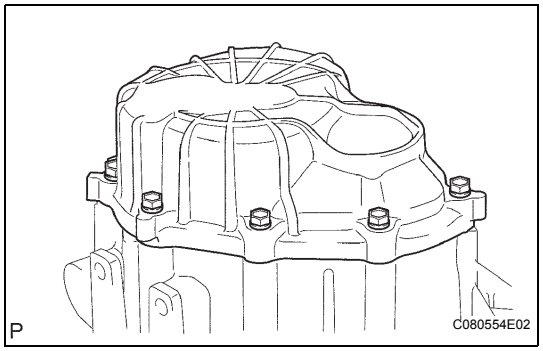


(c) Using a chisel and hammer, stake the set nut.
(d) Disengage the 2 gears.

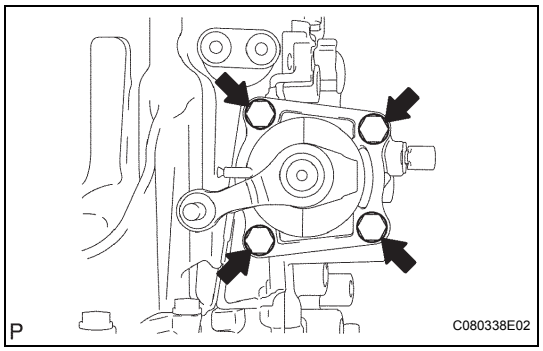


41. INSTALL MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY

(a) Apply FIPG to the transaxle case cover as shown in the illustration.
FIPG:
Part No. 08826-00090, THREE BOND 1281
NOTICE:
Parts must be assembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.

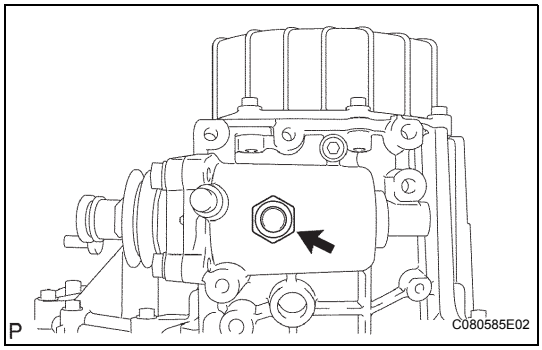


(b) Install the transmission case cover to the transmission case with the 9 bolts.
Torque: 18 N*m (185 kgf*cm, 14 ft.*lbf)



42. INSTALL SHIFT AND SELECT LEVER SHAFT ASSEMBLY

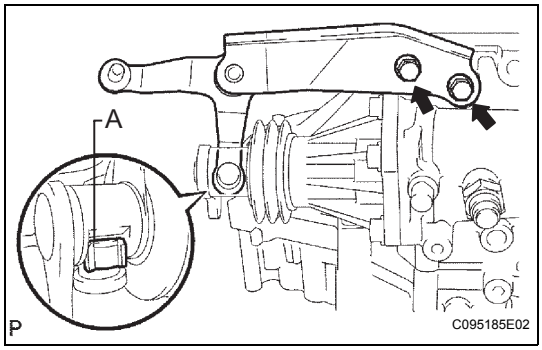
(a) Coat the 4 bolts with sealant and install a new gasket and lever shaft to the transmission case with the 4 bolts.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 20 N*m (200 kgf*cm, 14 ft.*lbf)
NOTICE:
Set the claws of the shift interlock plate into the shift head part of the gear shift fork shaft securely.



43. INSTALL NO. 1 LOCK BALL ASSEMBLY

(a) Coat the No. 1 lock ball with sealant, and install it to the transmission case.

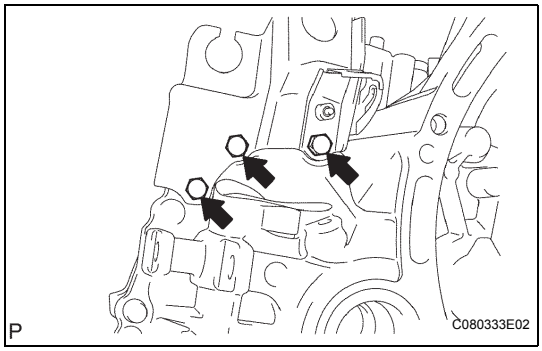
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)



44. INSTALL SELECTING BELLCRANK ASSEMBLY

(a) Install the selecting bellcrank with control shift lever bush to the transmission case with the 2 bolts.

Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)
NOTICE:
Apply MP grease to the inside circumferential surface of the control shift lever bush (A).

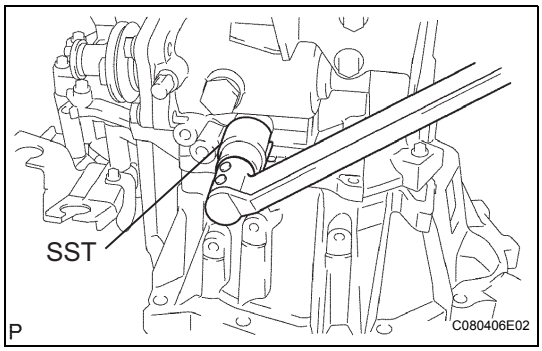


45. INSTALL FLOOR SHIFT CONTROL LEVER HOUSING SUPPORT BRACKET

(a) Install the floor shift control lever housing support bracket to the front transaxle case with the 3 bolts.

Torque: 18 N*m (188 kgf*cm, 14 ft.*lbf)

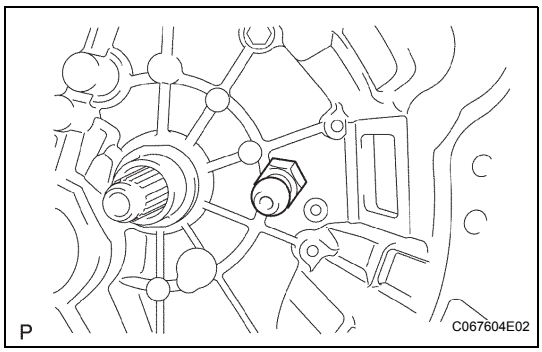
MX



46. INSTALL BACK-UP LIGHT SWITCH ASSEMBLY

(a) Using SST, install the back-up light switch to the transmission case with a new gasket.

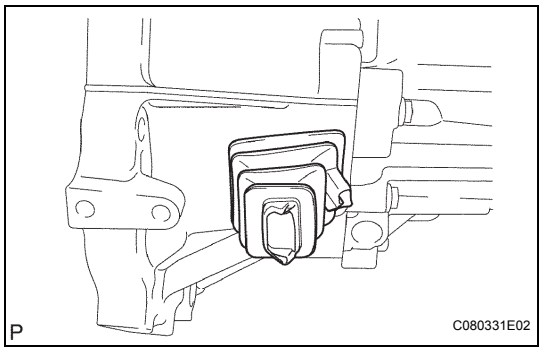
SST 09817-16011
Torque: 40 N*m (410 kgf*cm, 30 ft.*lbf)



47. INSTALL RELEASE FORK SUPPORT

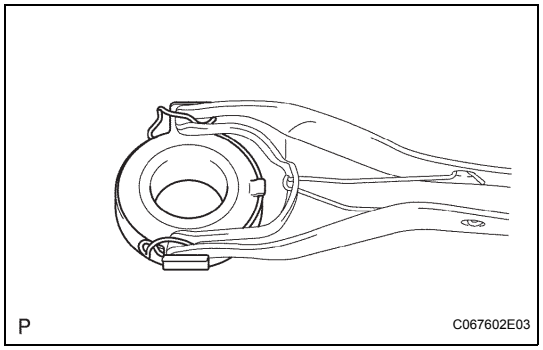
(a) Install the release fork support to the front transaxle case.

Torque: 37 N*m (375 kgf*cm, 25 ft.*lbf)



48. INSTALL CLUTCH RELEASE FORK BOOT

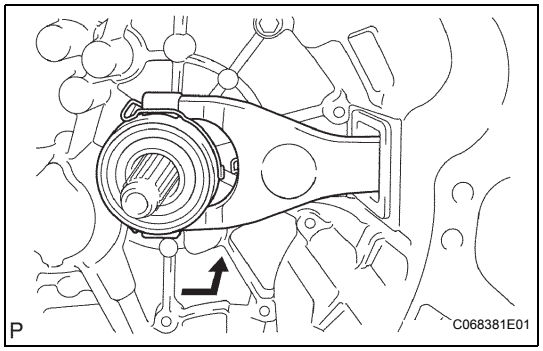
(a) Install the clutch release fork boot to the front transaxle case.



49. INSTALL CLUTCH RELEASE BEARING ASSEMBLY

(a) Coat the clutch release bearing with release hub grease, and install it to the clutch release fork with the clutch release fork bearing hub clip.

Release hub grease:
Part No. 08887-01806, RELEASE HUB GREASE or equivalent



50. INSTALL CLUTCH RELEASE FORK SUB-ASSEMBLY

(a) Install the clutch release fork to the input shaft.

(b) Apply clutch spline grease to the spline of the input shaft.

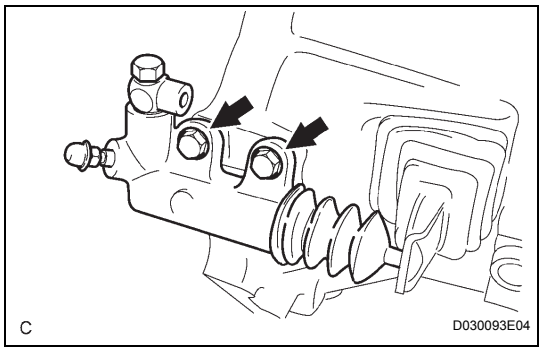
Clutch spline grease:
Part No. 08887-01806, CLUTCH SPLINE GREASE or equivalent

51. INSTALL SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

(a) Install a new O-ring to the driven hole cover.

(b) Install the driven hole cover to the transaxle case with the bolt.

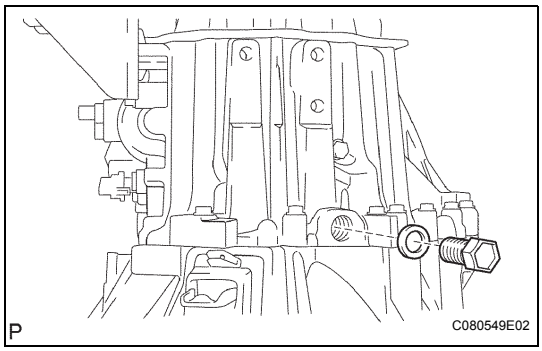
Torque: 11 N*m (115 kgf*cm, 8 ft.*lbf)



52. INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY

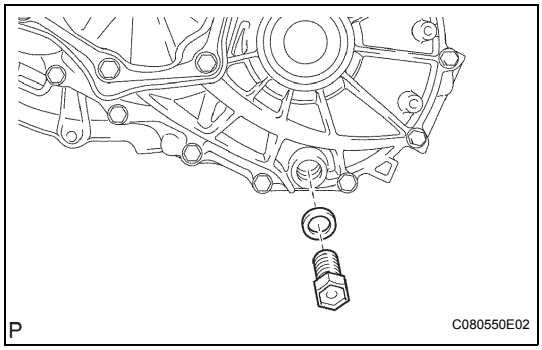
(a) Install the clutch release cylinder to the transmission case with the 2 bolts.

Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



53. INSTALL MANUAL TRANSMISSION FILLER PLUG

(a) Install the transmission filler plug to the transmission case with a new gasket.
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

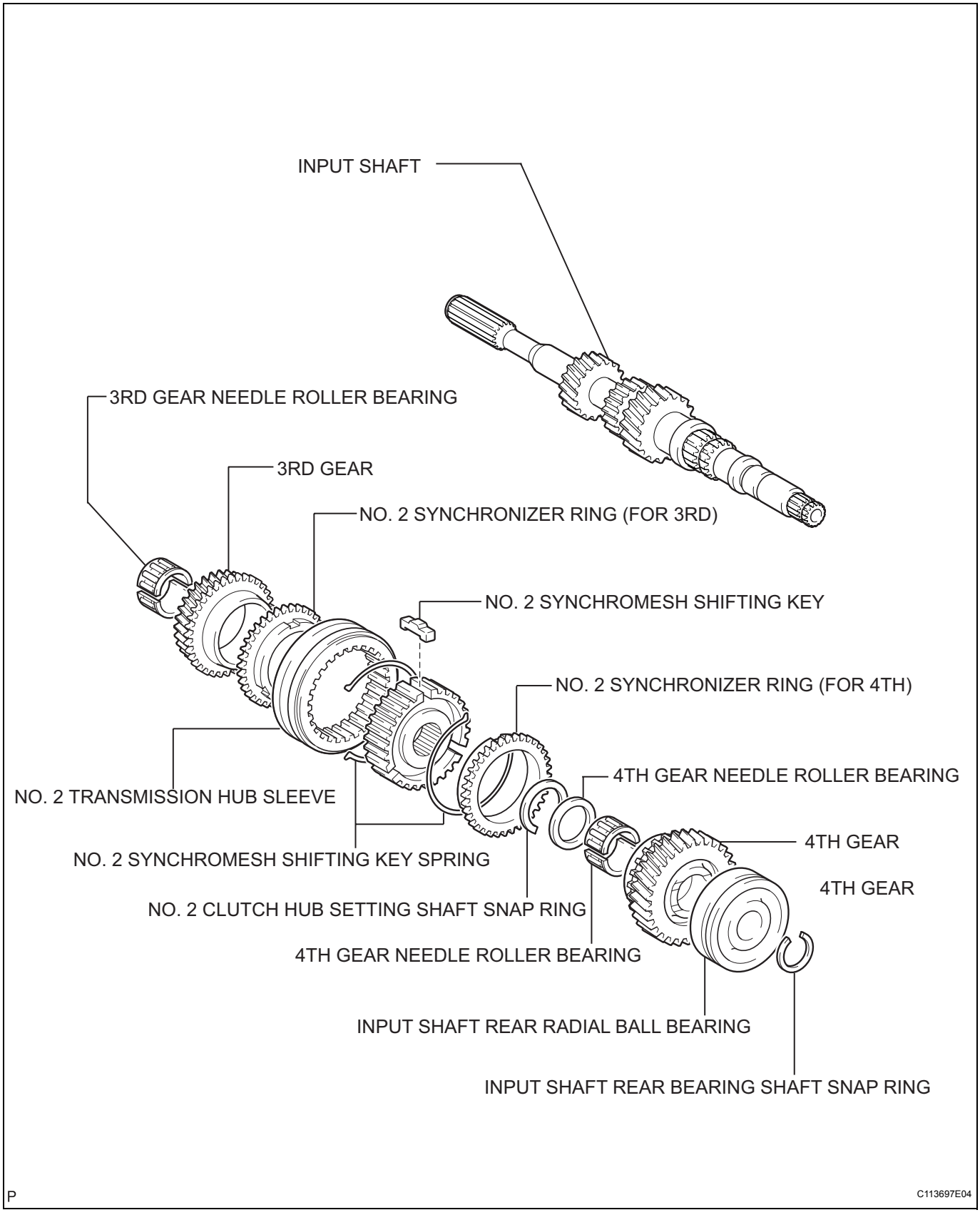


54. INSTALL DRAIN PLUG SUB-ASSEMBLY

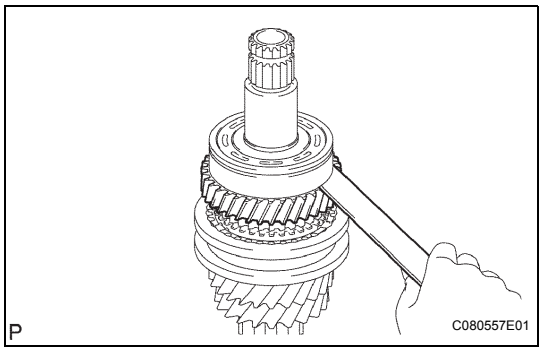
(a) Install the drain plug to the transmission case with a new gasket.
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

INPUT SHAFT

COMPONENTS



MX



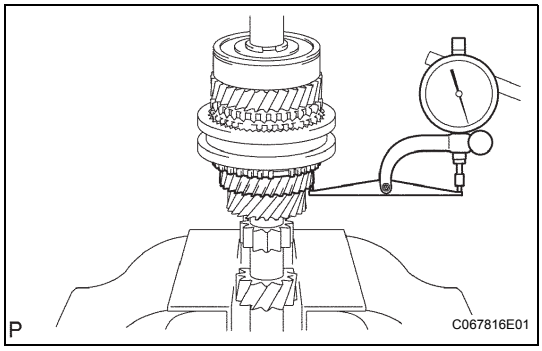
DISASSEMBLY

1. INSPECT 4TH GEAR THRUST CLEARANCE

(a) Using a feeler gauge, measure the thrust clearance.

Standard clearance:
0.1 to 0.55 mm (0.0039 to 0.0217 in.)
Maximum clearance:
0.55 mm (0.0217 in.)

If the clearance is greater than the maximum, replace the No. 2 transmission clutch hub, 4th gear or input shaft rear radial ball bearing.

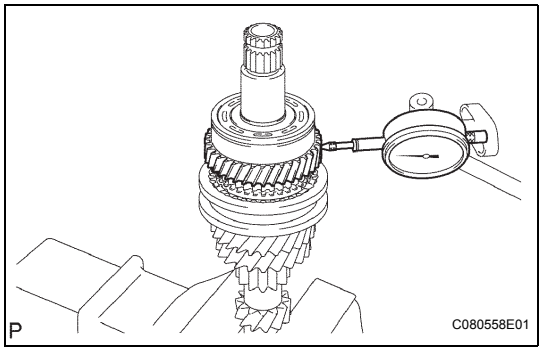


2. INSPECT 3RD GEAR THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance.

Standard clearance:
0.1 to 0.35 mm (0.0039 to 0.0138 in.)
Maximum clearance:
0.35 mm (0.0138 in.)

If the clearance is greater than the maximum, replace the No. 2 transmission clutch hub, 3rd gear or input shaft.

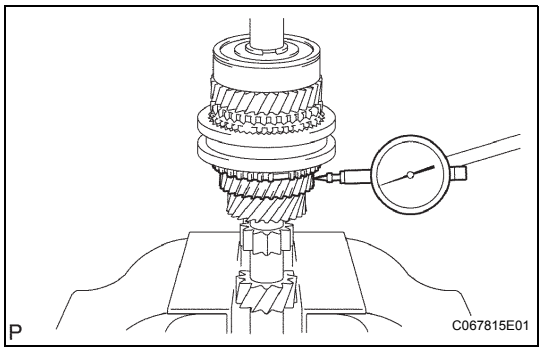


3. INSPECT 4TH GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the radial clearance between the gear and shaft.

Standard clearance:
0.009 to 0.050 mm (0.0004 to 0.0020 in.)
Maximum clearance:
0.050 mm (0.0020 in.)

If the clearance is greater the maximum, replace the gear, needle roller bearing or shaft.



4. INSPECT 3RD GEAR RADIAL CLEARANCE

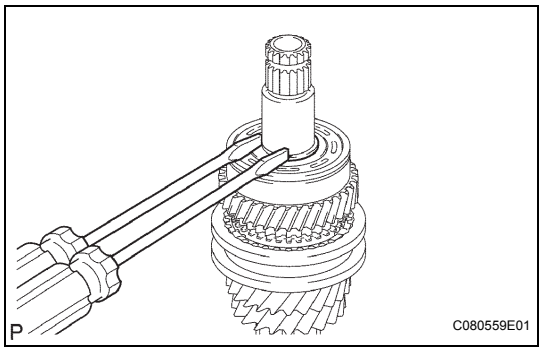
(a) Using a dial indicator, measure the radial clearance between the gear and shaft.

Standard clearance

Bearing	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

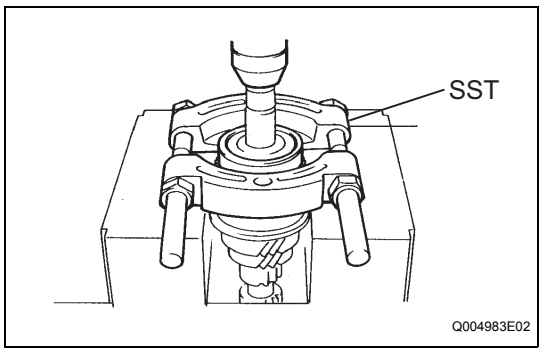
If the clearance is not within the specification, replace the gear, needle roller bearing or shaft.

MX

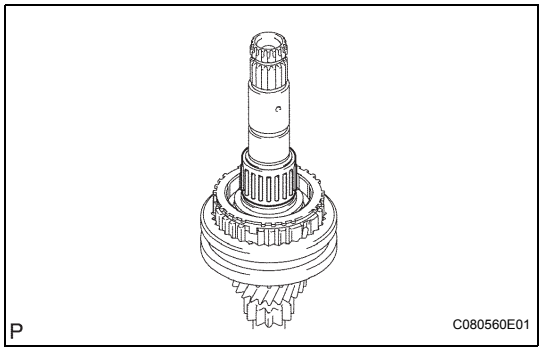


5. REMOVE 4TH GEAR

(a) Using 2 screwdrivers and a hammer, tap out the input shaft rear bearing shaft snap ring from the input shaft.
HINT:
Use a cloth to prevent the snap ring from springing away.

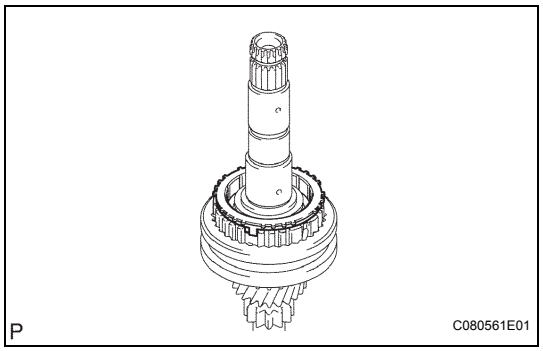


(b) Using SST and a press, press out the input shaft rear radial ball bearing and 4th gear from the input shaft.
SST 09950-00020
NOTICE:
- **Do not tighten SST excessively.**
- **Support the input shaft assembly by hand so that it will not drop.**



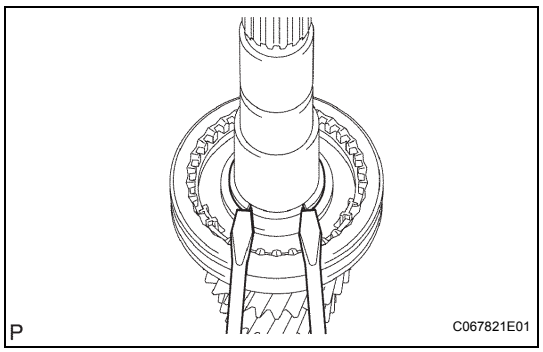
6. REMOVE 4TH GEAR NEEDLE ROLLER BEARING

(a) Remove the 4th gear needle roller bearing and 4th gear bearing spacer from the input shaft.



7. REMOVE NO. 2 SYNCHRONIZER RING (for 4th Gear)

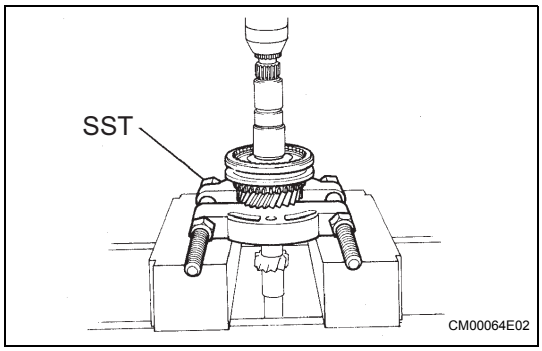
(a) Remove the No. 2 synchronizer ring from the No. 2 transmission clutch hub.



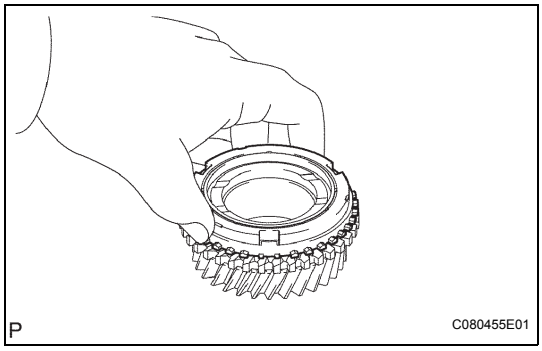
8. REMOVE 3RD GEAR

(a) Using 2 screwdrivers and a hammer, tap out the No. 2 clutch hub setting shaft snap ring from the input shaft.
HINT:
Use a cloth to prevent the snap ring from springing away.

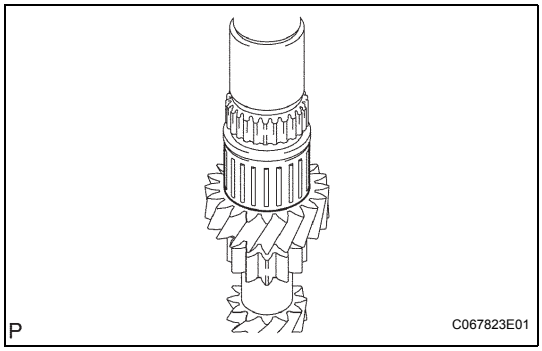
MX



(b) Using SST and a press, remove the No. 2 transmission clutch hub and 3rd gear from the input shaft.
SST 09950-00020
NOTICE:
- **Do not tighten SST excessively.**
- **Support the input shaft by hand so that it will not drop.**

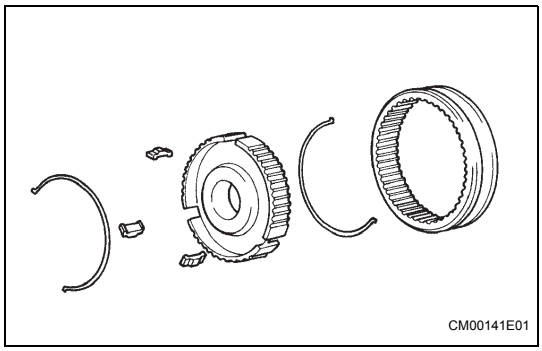


9. REMOVE NO. 2 SYNCHRONIZER RING (for 3rd Gear)
(a) Remove the No. 2 synchronizer ring from the 3rd gear.



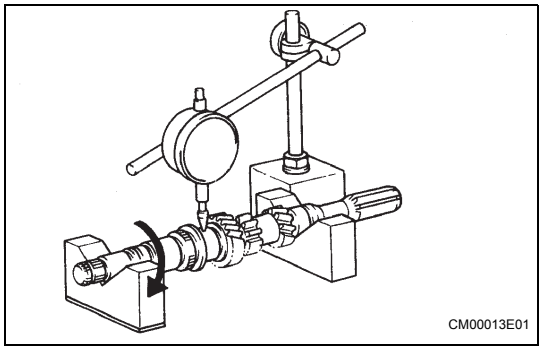
10. REMOVE 3RD GEAR NEEDLE ROLLER BEARING
(a) Remove the 3rd gear needle roller bearing from the input shaft.

MX

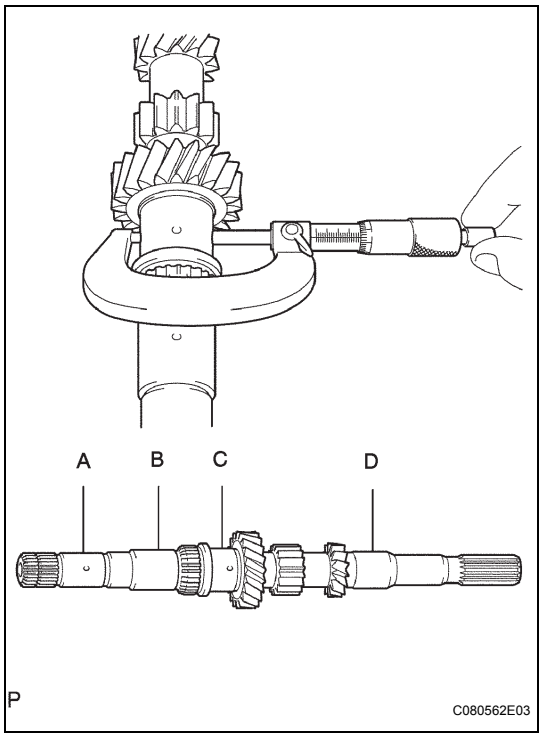


11. REMOVE NO. 2 TRANSMISSION HUB SLEEVE
(a) Remove the No. 2 transmission hub sleeve, 3 No. 2 shifting keys and 3 No. 2 shiftings key spring from the No. 2 transmission clutch hub.
NOTICE:
Use a cloth to keep the shifting key and shifting key from spring springing away.

INSPECTION



1. INSPECT INPUT SHAFT
(a) Using a dial indicator, measure the input shaft runout.
Maximum runout:
0.015 mm (0.00059 in.)
If the runout is greater than the maximum, replace the input shaft.



(b) Using a micrometer, measure the diameter of the input shaft journal surface.

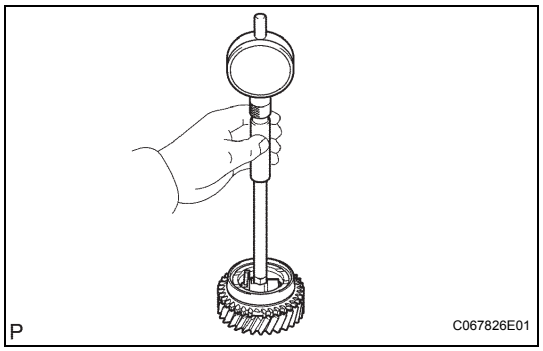
Standard diameter

Journal Position	Specified Condition
A	24.885 to 24.900 mm (0.9797 to 0.9803 in.)
B	28.991 to 29.006 mm (1.1414 to 1.1420 in.)
C	30.985 to 31.000 mm (1.2198 to 1.2204 in.)
D	24.985 to 25.000 mm (0.9836 to 0.9842 in.)

Minimum diameter

Journal Position	Specified Condition
A	24.885 mm (0.9797 in.)
B	28.991 mm (1.1414 in.)
C	30.985 mm (1.2198 in.)
D	24.985 mm (0.9836 in.)

If the diameter is less than the minimum, replace the input shaft.

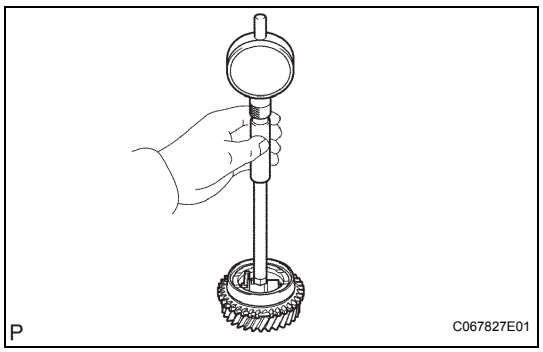


2. INSPECT 4TH GEAR

(a) Using a cylinder gauge, measure the inside diameter.

Standard inside diameter:
34.015 to 34.031 mm (1.3391 to 1.3398 in.)
Maximum inside diameter:
34.031 mm (1.3398 in.)

If the inside diameter is greater than the maximum, replace the 4th gear.

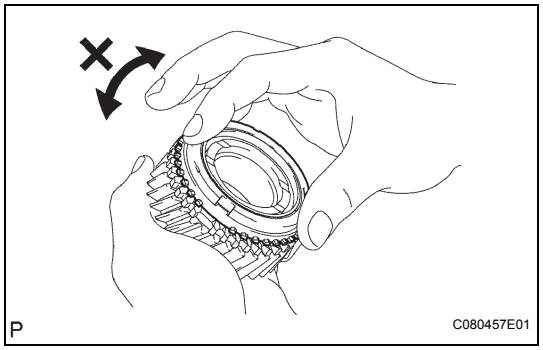


3. INSPECT 3RD GEAR

(a) Using a cylinder gauge, measure the inside diameter.

Standard inside diameter:
36.015 to 36.031 mm (1.4179 to 1.4185 in.)
Maximum inside diameter:
36.031 mm (1.4185 in.)

If the inside diameter is greater than the maximum, replace the 3rd gear.

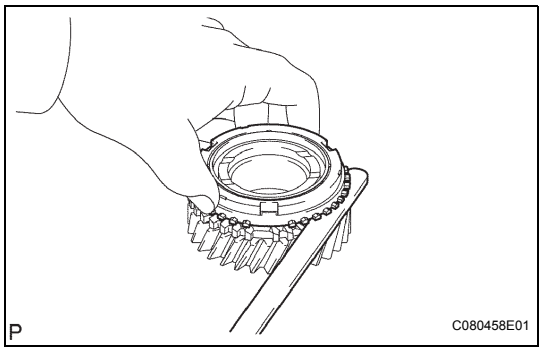


4. INSPECT NO. 2 SYNCHRONIZER RING (for 4th Gear)

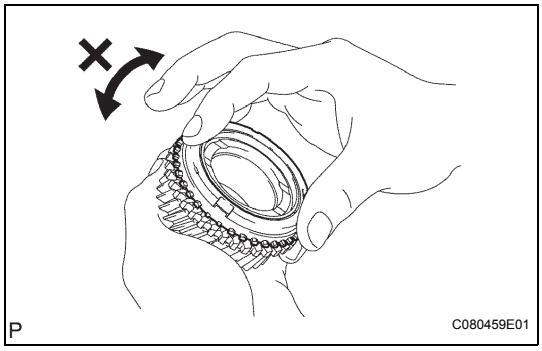
(a) Check for wear or damage.

(b) Coat the 4th gear cone with gear oil. Turn the synchronizer ring in one direction while pushing it against the 4th gear cone. Check that the ring locks. If the synchronizer outer ring does not lock, replace the ring or 4th gear.

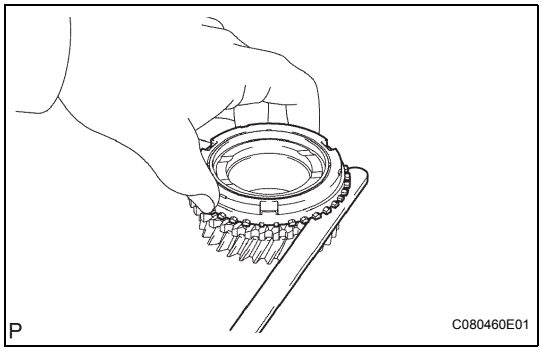
MX



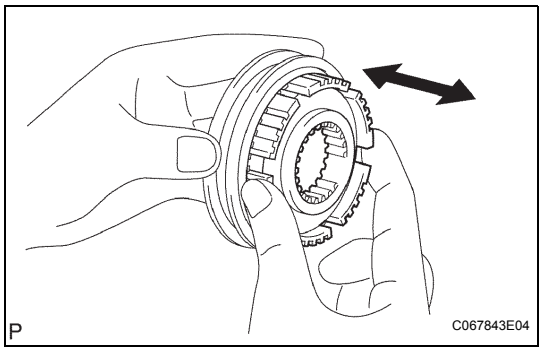
(c) Using a feeler gauge, measure the clearance between the No. 2 synchronizer ring and 4th gear with the No. 2 synchronizer ring contacting the cone of the 4th gear.
Standard clearance:
0.75 to 1.65 mm (0.0295 to 0.0649 in.)
Minimum clearance:
0.75 mm (0.0295 in)
If the clearance is less than the minimum, replace the synchronizer ring.



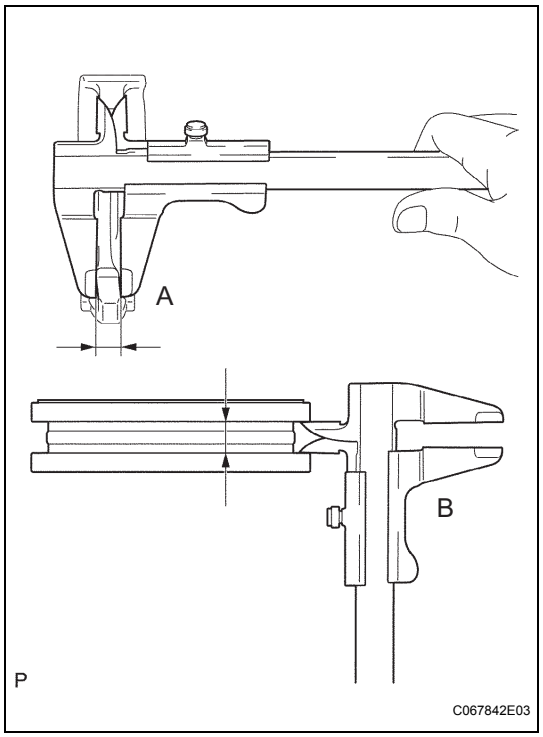
5. INSPECT NO. 2 SYNCHRONIZER RING (for 3rd Gear)
(a) Check for wear or damage.
(b) Coat the 3rd gear cone with gear oil. Turn the synchronizer ring in one direction while pushing it against the 3rd gear cone. Check that the ring locks. If the synchronizer outer ring does not lock, replace the ring or 3rd gear.



(c) Using a feeler gauge, check the clearance between the No. 2 synchronizer ring and 3rd gear with the No. 2 synchronizer ring contacting the cone of the 3rd gear.
Standard clearance:
0.75 to 1.65 mm (0.0295 to 0.0650 in.)
Minimum clearance:
0.75 mm (0.0295 in)
If the clearance is less than the minimum, replace the synchronizer ring.

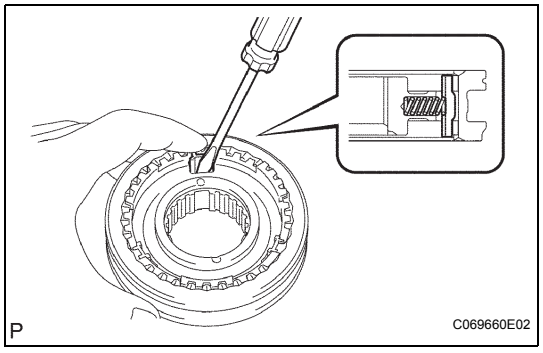


6. INSPECT NO. 2 TRANSMISSION HUB SLEEVE
(a) Check the sliding condition between the No. 2 transmission hub sleeve and No. 2 transmission clutch hub.
(b) Check that the spline gear edges of the No. 2 transmission hub sleeve are not worn down.



(c) Using a vernier caliper, measure the width of the No. 2 transmission hub sleeve groove (B) and the thickness of the claw part on the No. 2 gear shift fork (A), and calculate the clearance.
Standard clearance:
B - A = 0.15 to 0.35 mm (0.0059 to 0.0137 in.)
If the clearance is not within the specification, replace the No. 2 transmission hub sleeve and No. 2 gear shift fork.

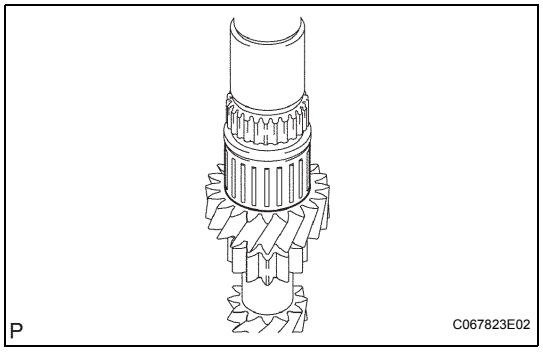
REASSEMBLY



1. INSTALL NO. 2 TRANSMISSION HUB SLEEVE

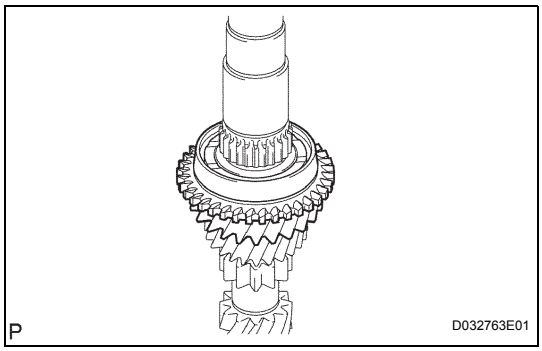
(a) Coat the No. 2 transmission hub sleeve with gear oil, and install it to the No. 2 transmission clutch hub.
NOTICE:
Be sure to set the No. 2 transmission hub sleeve and No. 2 transmission clutch hub in the correct orientation.

(b) Using a screwdriver, install the 3 synchromesh key springs with 3 No. 2 synchromesh shifting keys to the No. 2 transmission clutch hub.



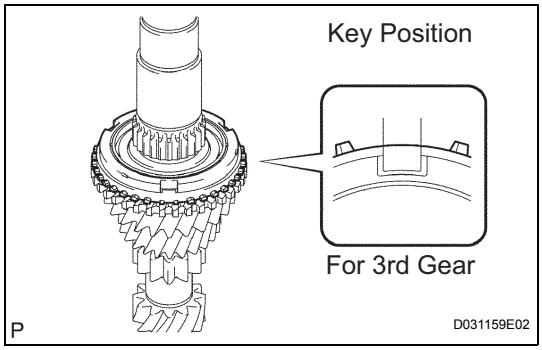
2. INSTALL 3RD GEAR NEEDLE ROLLER BEARING

(a) Coat the 3rd gear needle roller bearing with gear oil, and install it to the input shaft.



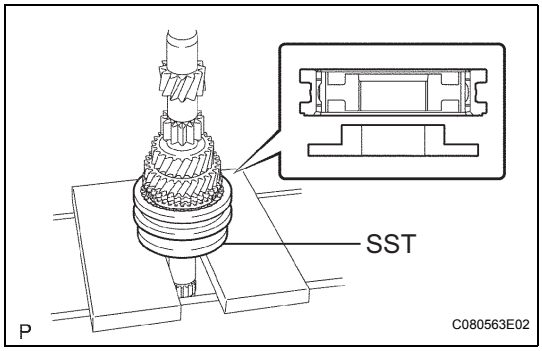
3. INSTALL 3RD GEAR

(a) Coat the 3rd gear with gear oil, and install it to the input shaft.



4. INSTALL NO. 2 SYNCHRONIZER RING (for 3rd Gear)

(a) Coat the No. 2 synchronizer ring with gear oil, and install it to the 3rd gear.

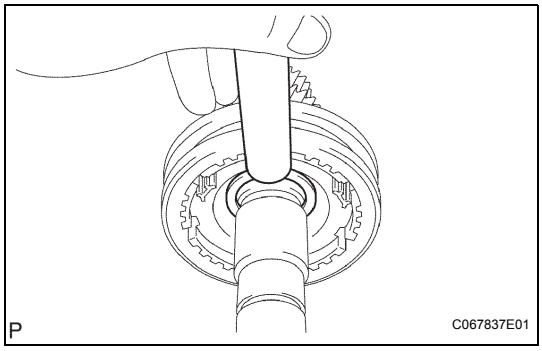


5. INSTALL NO. 2 TRANSMISSION CLUTCH HUB

(a) Using SST and a press, press in the No. 2 transmission clutch hub to the input shaft.
SST 09316-60011 (09316-00021)
NOTICE:
Fit the synchromesh shifting key into the groove of the synchronizer ring correctly.

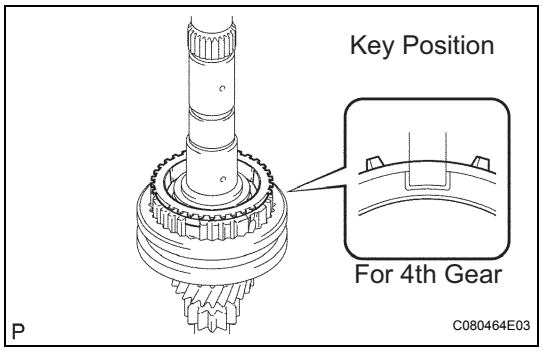
(b) Select a snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Standard snap ring thickness

Mark	Thickness mm (in)
0	2.30 (0.0906)
1	2.36 (0.0929)
2	2.42 (0.0953)
3	2.48 (0.0976)
4	2.54 (0.1000)
5	2.60 (0.1024)



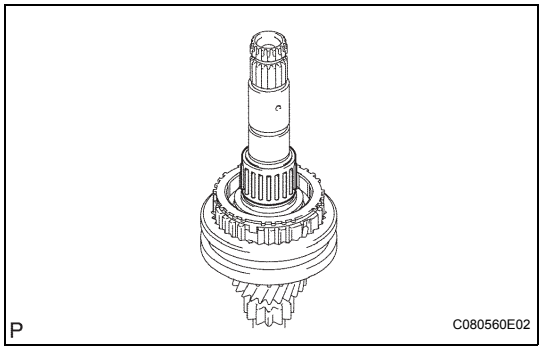
(c) Using a brass bar and hammer, and tap in the snap ring to the input shaft.

MX



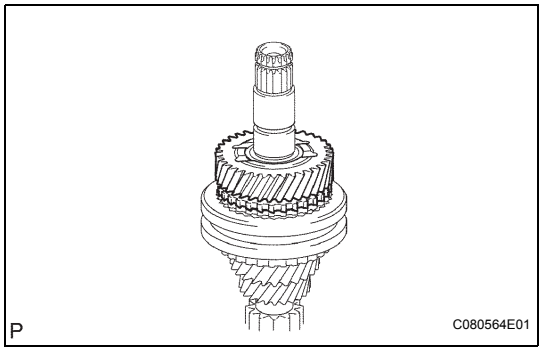
6. INSTALL NO. 2 SYNCHRONIZER RING (for 4th Gear)

(a) Coat the No. 2 synchronizer ring with gear oil, and install it to the No. 2 transmission clutch hub.



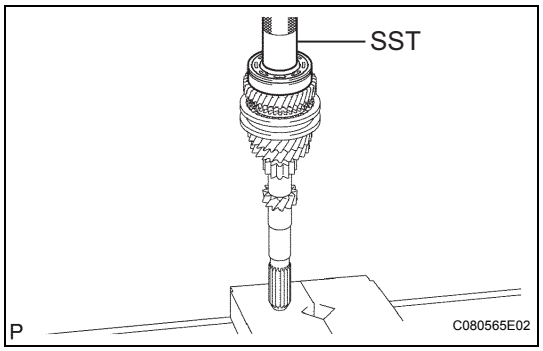
7. INSTALL 4TH GEAR NEEDLE ROLLER BEARING

(a) Coat the 4th gear needle roller bearing and 4th gear bearing spacer with gear oil, and install them to the No. 2 transmission clutch hub.



8. INSTALL 4TH GEAR

(a) Coat the 4th gear with gear oil, and install it to the input shaft.



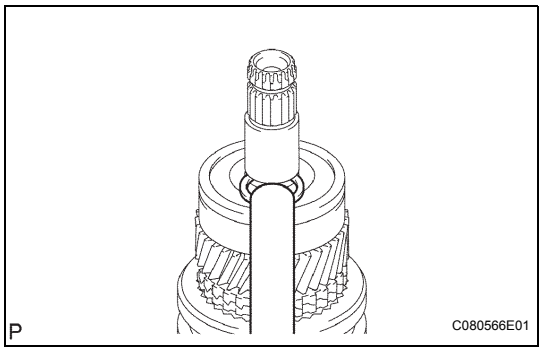
9. INSTALL REAR INPUT SHAFT BEARING SHAFT SNAP RING

(a) Using SST and a press, press in the radial ball bearing to the input shaft.
SST 09608-04031

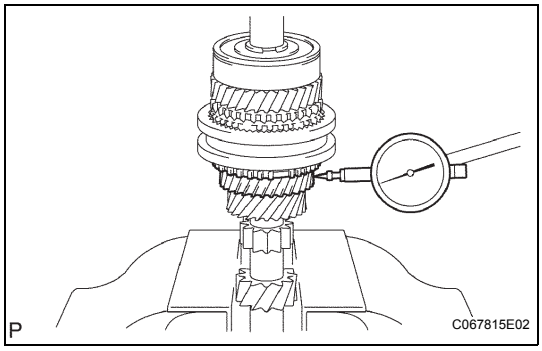
(b) Select a snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.004 in.) or less
Standard snap ring thickness

Mark	Thickness mm (in)
A	2.29 (0.0901)
B	2.35 (0.0925)
C	2.41 (0.0948)
D	2.47 (0.0972)
E	2.53 (0.0996)
F	2.59 (0.1019)

MX



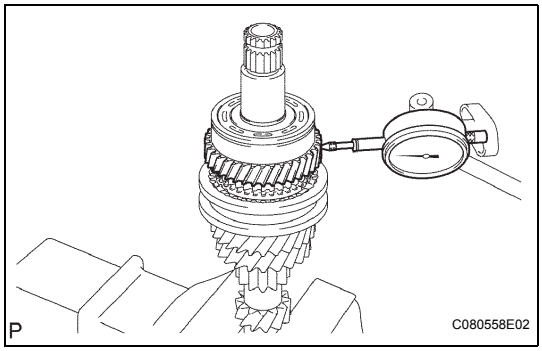
(c) Using a brass bar and hammer, and tap in the snap ring to the input shaft.
NOTICE:
Take care not to damage the journal surface of the snap ring.



10. INSPECT 3RD GEAR RADIAL CLEARANCE
(a) Using a dial indicator, measure the radial clearance.
Standard clearance

Item	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

If the clearance is not within the specification, replace the gear, needle roller bearing or shaft.

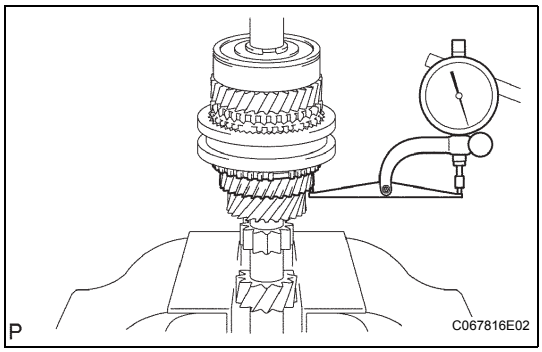


11. INSPECT 4TH GEAR RADIAL CLEARANCE
(a) Using a dial indicator, measure the radial clearance.
Standard clearance

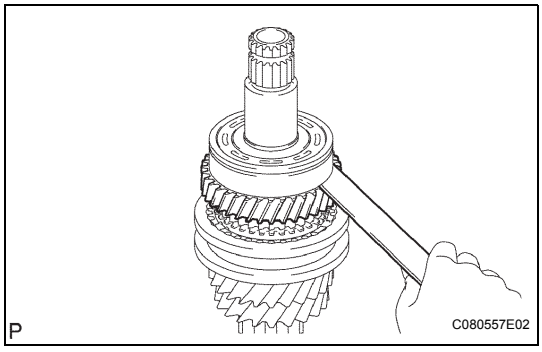
Item	Specified Condition
KOYO made	0.009 to 0.050 mm (0.0004 to 0.0020 in.)
NSK made	0.009 to 0.050 mm (0.0004 to 0.0020 in.)

If the clearance is not within the specification, replace the gear, needle roller bearing or shaft.

MX



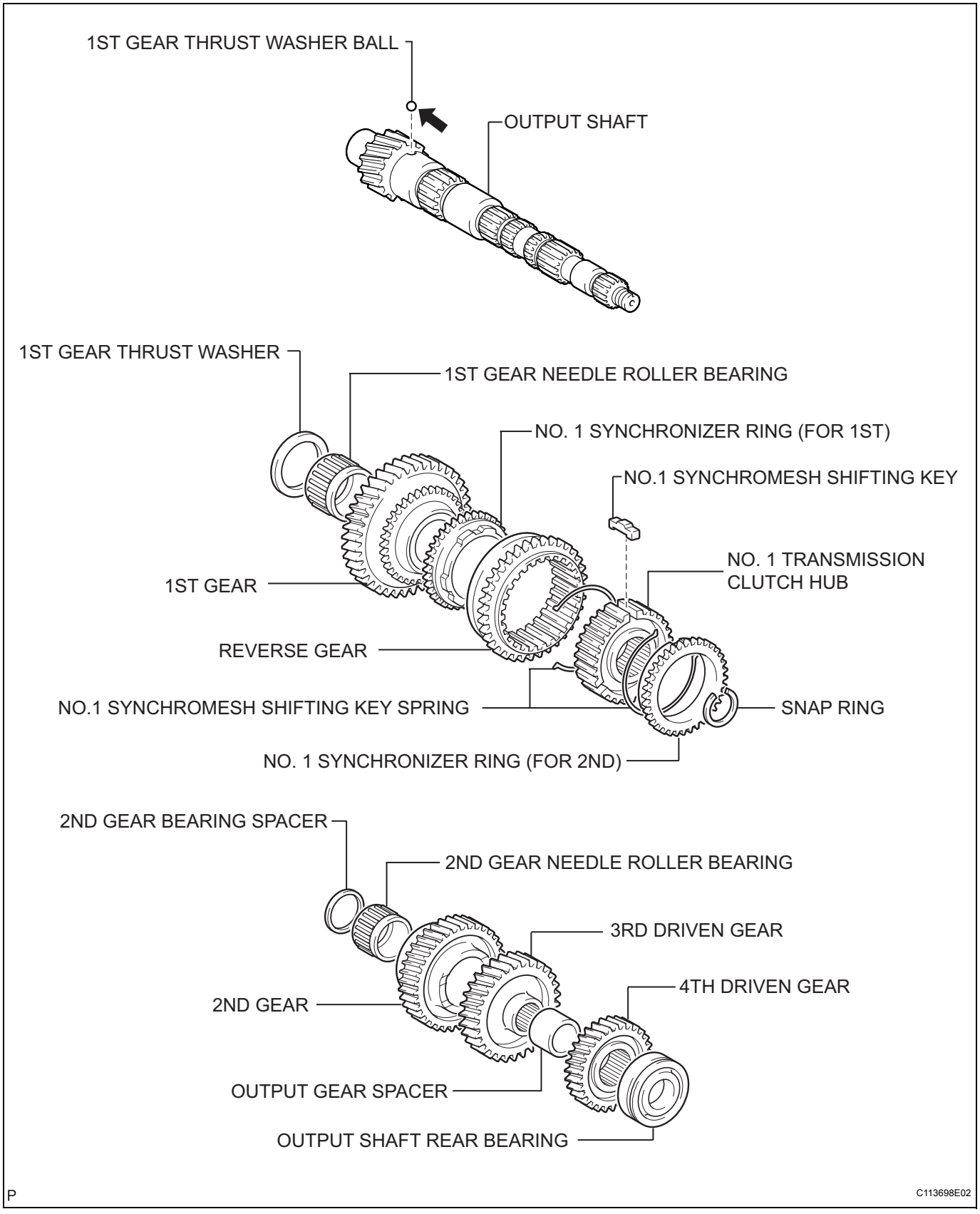
12. INSPECT 3RD GEAR THRUST CLEARANCE
(a) Using a dial indicator, measure the thrust clearance.
Standard clearance:
0.1 to 0.35 mm (0.0039 to 0.0138 in.)
If the clearance is not within the specification, replace the gear, No. 2 synchronizer ring or No. 2 transmission clutch hub.



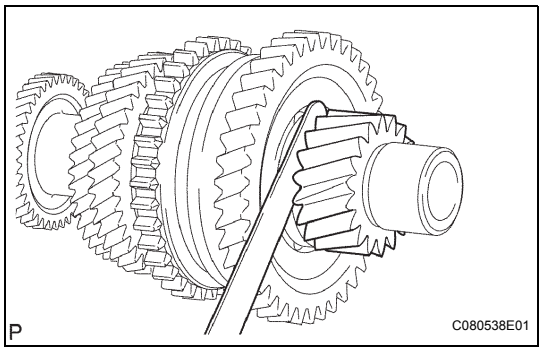
13. INSPECT 4TH GEAR THRUST CLEARANCE
(a) Using a feeler gauge, measure the thrust clearance.
Standard clearance:
0.1 to 0.55 mm (0.0039 to 0.0217 in.)
If the clearance is not within the specification, replace the gear or input shaft rear radial ball bearing.

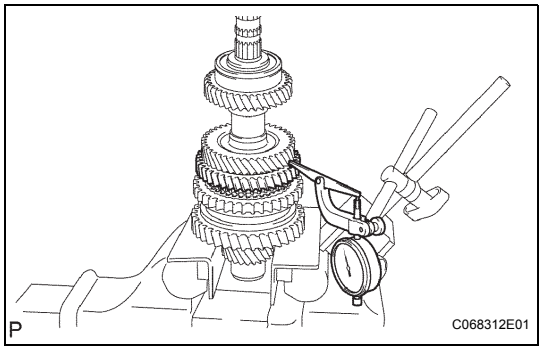
OUTPUT SHAFT

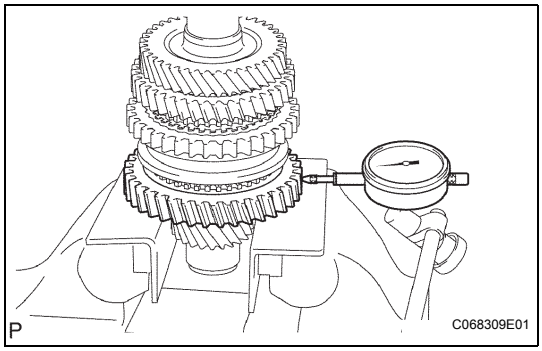
COMPONENTS

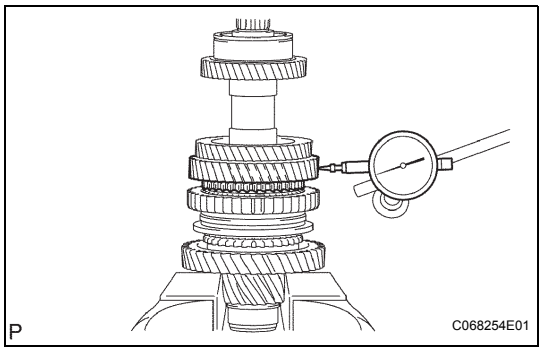


MX









DISASSEMBLY

1. INSPECT 1ST GEAR THRUST CLEARANCE

(a) Using a feeler gauge, measure the thrust clearance.

Standard clearance:
0.10 to 0.40 mm (0.0039 to 0.0157 in.)
Maximum clearance:
0.40 mm (0.0157 in.)

If the clearance is greater than the maximum, replace the 1st gear or No. 1 transmission clutch hub.

2. INSPECT 2ND GEAR THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance.

Standard clearance:
0.10 to 0.45 mm (0.0039 to 0.0177 in.)
Maximum clearance:
0.45 mm (0.0177 in.)

If the clearance is greater than the maximum, replace the No. 1 transmission clutch hub, 2nd gear or 3rd driven gear.

3. INSPECT 1ST GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the radial clearance between the gear and shaft.

Standard clearance

Item	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

Maximum clearance

Item	Specified Condition
KOYO made	0.058 mm (0.0023 in.)
NSK made	0.056 mm (0.0022 in.)

If the clearance is greater than the maximum, replace the gear, needle roller bearing or shaft.

4. INSPECT 2ND GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the radial clearance.

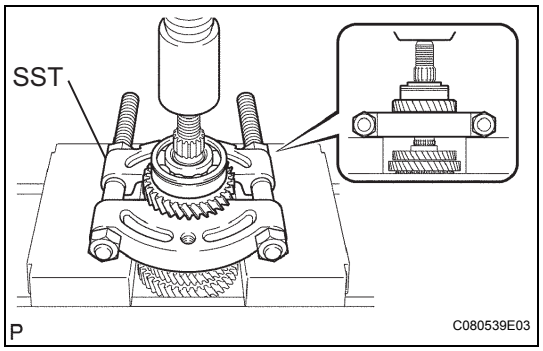
Standard clearance

Item	Specified Condition
KOYO made	0.015 to 0.058 mm (0.0006 to 0.0023 in.)
NSK made	0.015 to 0.056 mm (0.0006 to 0.0022 in.)

Maximum clearance

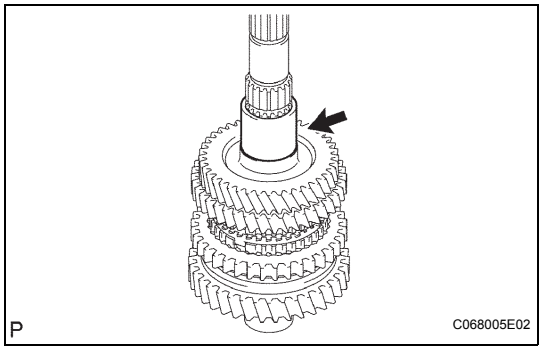
Item	Specified Condition
KOYO made	0.058 mm (0.0023 in.)
NSK made	0.056 mm (0.0022 in.)

If the clearance is greater than the maximum, replace the 2nd gear needle roller bearing.



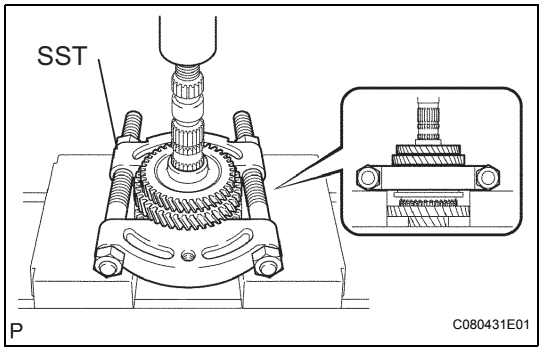
5. REMOVE 4TH DRIVEN GEAR

(a) Using SST and a press, press out the output shaft rear bearing and 4th driven gear from the output shaft.
SST 09950-00020



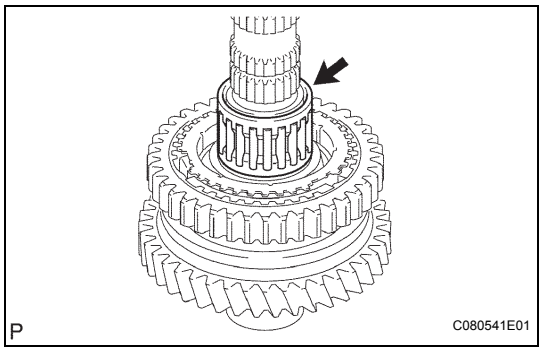
6. REMOVE OUTPUT GEAR SPACER

(a) Remove the output gear spacer from the output shaft.



7. REMOVE 2ND GEAR

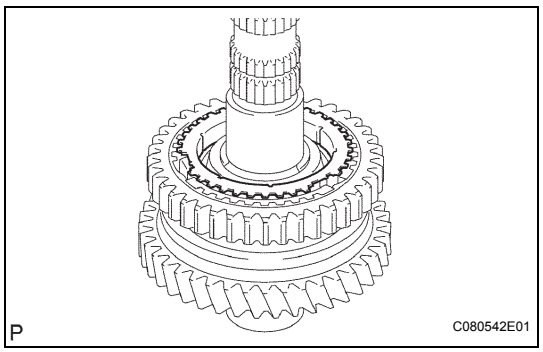
(a) Using SST and a press, press out the 3rd driven gear with 2nd gear from the output shaft.
SST 09950-00020



8. REMOVE 2ND GEAR NEEDLE ROLLER BEARING

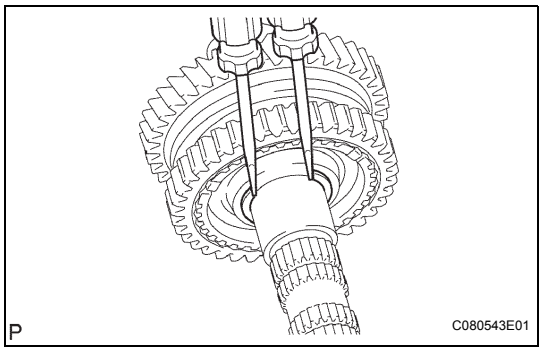
(a) Remove the 2nd gear needle roller bearing and 2nd gear bearing spacer from the output shaft.

MX



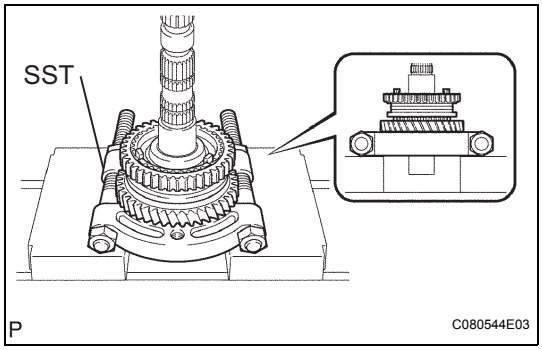
9. REMOVE NO. 1 SYNCHRONIZER RING (for 2nd Gear)

(a) Remove the No. 1 synchronizer ring from the output shaft.

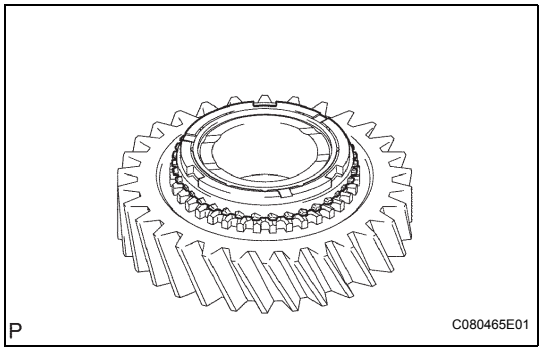


10. REMOVE 1ST GEAR

(a) Using 2 screwdrivers and a hammer, remove the snap ring from the output shaft.
NOTICE:
Use a cloth to keep the snap ring from springing away.



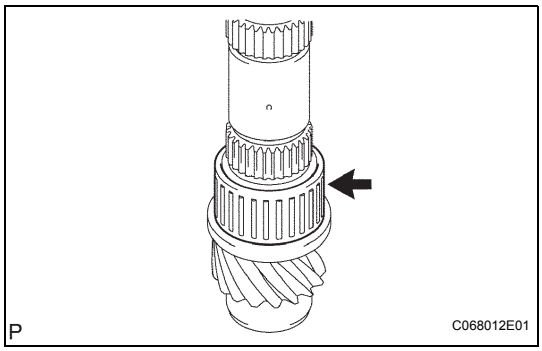
(b) Using SST and a press, press out the No. 1 clutch hub and 1st gear from the output shaft.
SST 09950-00020
NOTICE:
- **Do not tighten SST excessively.**
- **Support the input shaft by hand so that it will not drop.**



11. REMOVE NO. 1 SYNCHRONIZER RING (for 1st Gear)

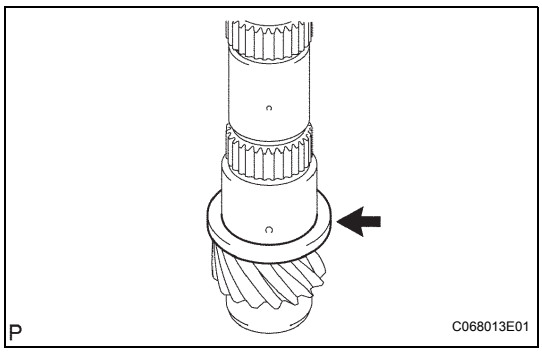
(a) Remove the No. 1 synchronizer ring from the 1st gear.

MX



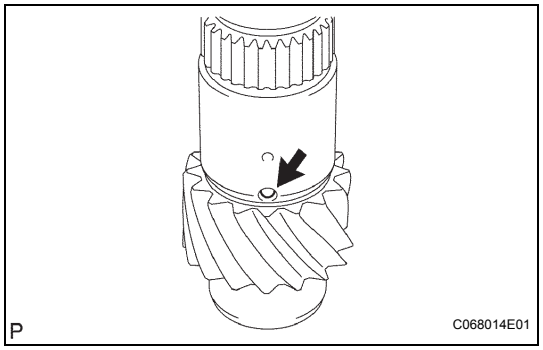
12. REMOVE 1ST GEAR NEEDLE ROLLER BEARING

(a) Remove the 1st gear needle roller bearing from the output shaft.



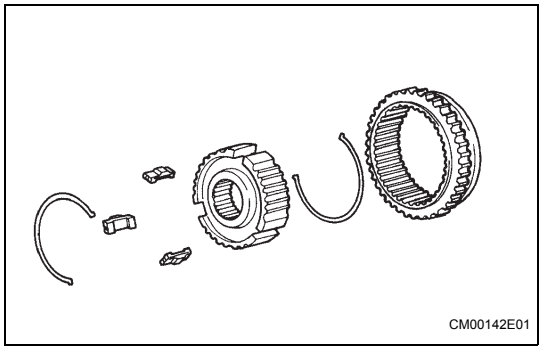
13. REMOVE 1ST GEAR THRUST WASHER

(a) Remove the 1st gear thrust washer from the output shaft.



14. REMOVE 1ST GEAR THRUST WASHER BALL

(a) Remove the 1st gear thrust washer ball from the output shaft.



15. REMOVE REVERSE GEAR

(a) Remove the reverse gear, 3 No. 1 synchromesh shifting keys and 2 No. 1 synchromesh shifting key springs from the No. 1 transmission clutch hub.

NOTICE:

Use a cloth to keep the shifting key and shifting key spring from springing away.

INSPECTION

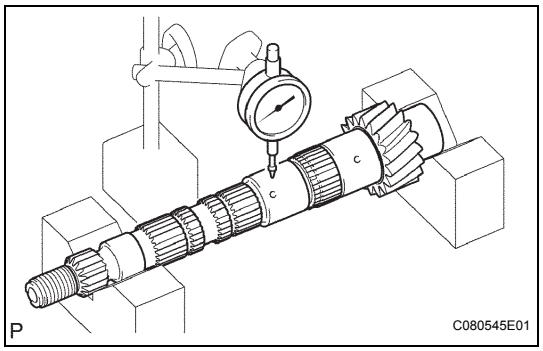
1. INSPECT OUTPUT SHAFT

(a) Using a dial indicator and 2 V-blocks, measure the output shaft runout.

Maximum runout:

0.015 mm (0.0006 in.)

If the runout is greater than the maximum, replace the output shaft.

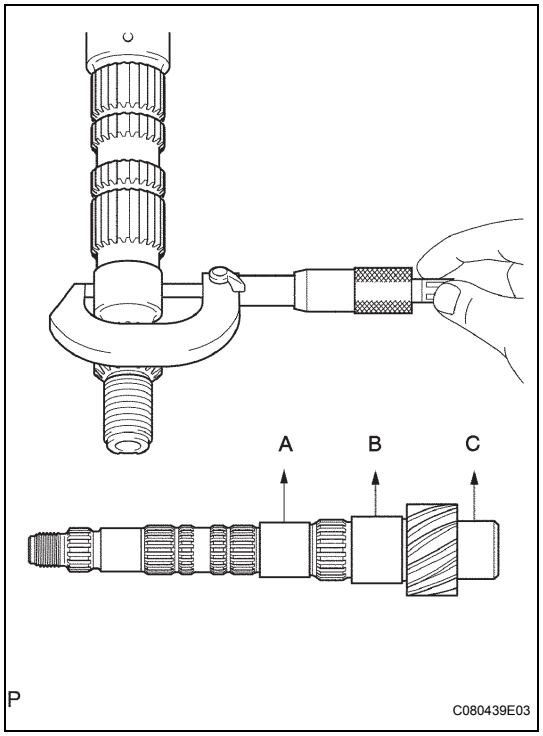


(b) Using a micrometer, measure the diameter of the output shaft journal surface.

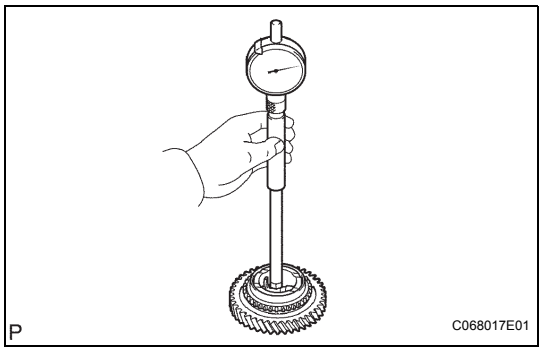
Standard diameter

Journal Position	Specified Condition
A	31.985 to 32.000 mm (1.2592 to 1.2598 in.)
B	37.985 to 38.000 mm (1.4955 to 1.4961 in.)
C	32.985 to 33.000 mm (1.2986 to 12.992 in.)

If the diameter is less than the minimum, replace the output shaft.



MX

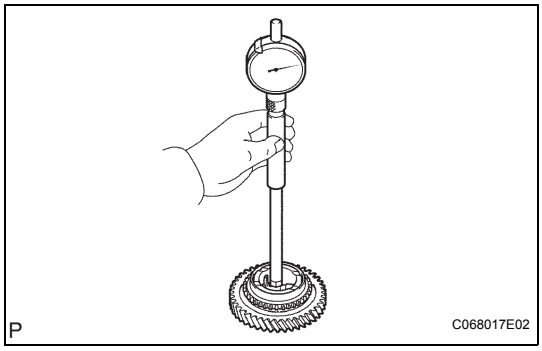


2. INSPECT 2ND GEAR

(a) Using a cylinder gauge, measure the inside diameter.

Standard inside diameter:
38.015 to 38.031 mm (1.4967 to 1.4972 in.)
Maximum inside diameter:
38.031 mm (1.4972 in.)

If the inside diameter is greater than the maximum, replace the 2nd gear.

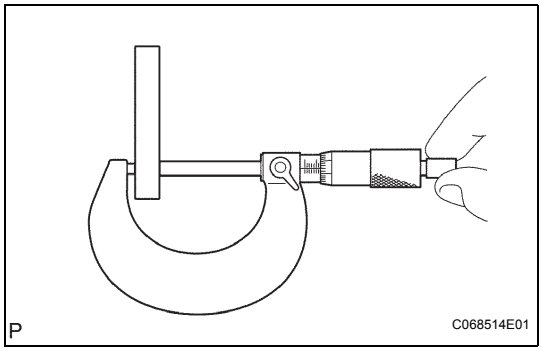


3. INSPECT 1ST GEAR

(a) Using a cylinder gauge, measure the inside diameter.

Standard inside diameter:
44.015 to 44.031 mm (1.7328 to 1.7335 in.)
Maximum inside diameter:
44.031 mm (1.7335 in.)

If the inside diameter is greater than the maximum, replace the 1st gear.



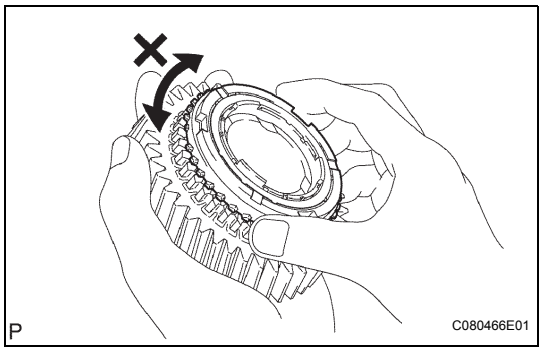
4. INSPECT 1ST GEAR THRUST WASHER

(a) Using a micrometer, measure the thickness.

Standard thickness:
5.975 to 6.025 mm (0.2352 to 0.2372 in.)
Minimum thickness:
5.975 mm (0.2352 in.)

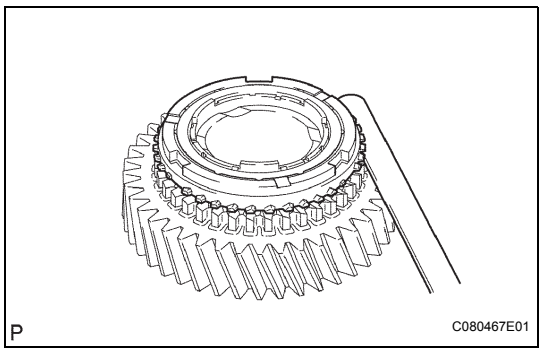
If the thickness is less than the minimum, replace the 1st gear thrust washer.

MX



5. INSPECT NO. 1 SYNCHRONIZER RING (for 2nd Gear)

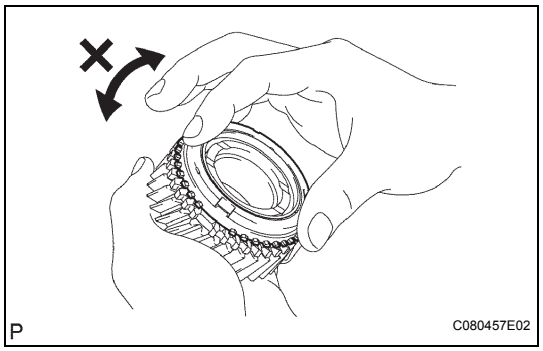
(a) Coat the 2nd gear cone with gear oil. Turn the synchronizer ring in one direction while pushing it against 2nd gear cone. Check that the ring locks. If the synchronizer ring does not lock, replace the ring or 2nd gear.



(b) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

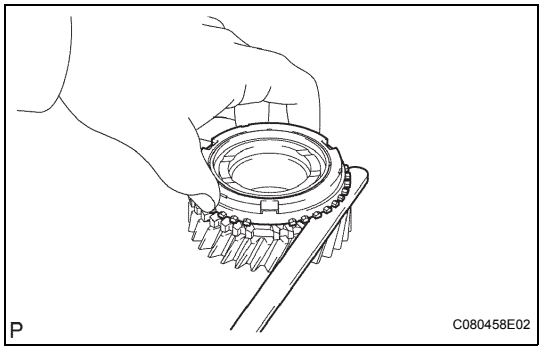
Standard clearance:
0.75 to 1.65 mm (0.0295 to 0.0650 in.)
Minimum clearance:
0.75 mm (0.0295 in.)

If the clearance is less than the minimum, replace the synchronizer ring.



6. INSPECT NO. 1 SYNCHRONIZER RING (for 1st Gear)

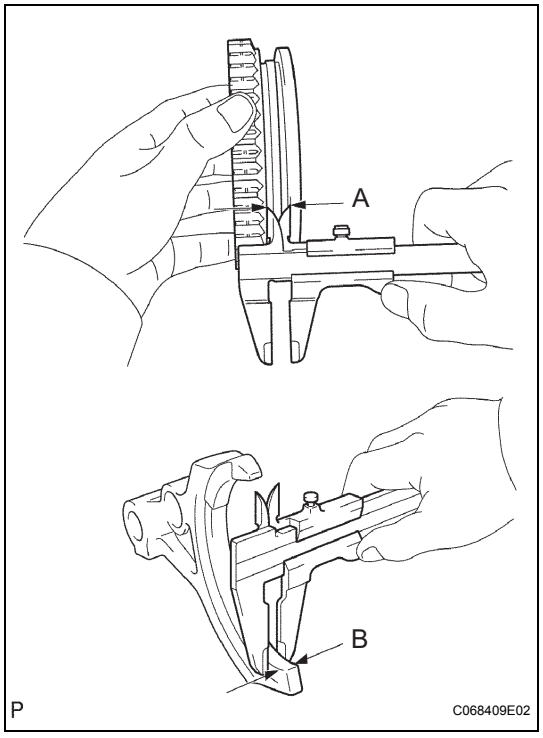
(a) Coat the 1st gear cone with gear oil. Turn the synchronizer ring in one direction while pushing it against the 1st gear cone. Check that the ring locks. If the synchronizer ring does not lock, replace the ring or 1st gear.



(b) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

Standard clearance:
0.75 to 1.65 mm (0.0295 to 0.0650 in.)
Minimum clearance:
0.75 mm (0.0295 in.)

If the clearance is less than the minimum, replace the synchronizer ring.

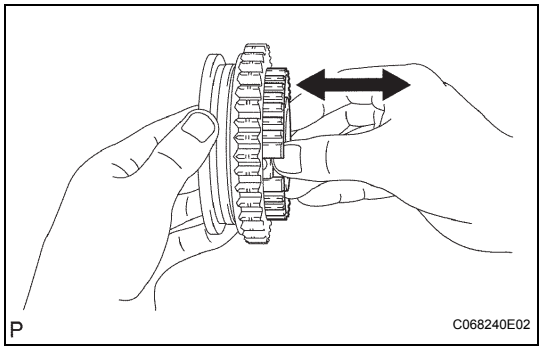


7. INSPECT REVERSE GEAR

(a) Using a vernier caliper, measure the width of the reverse gear groove (A) and the thickness of the claw part on the reverse shift fork (B), and calculate the clearance.

Standard clearance:
A - B = 0.15 to 0.35 mm (0.0059 to 0.0138 in.)

(b) Check that the spline gear edges of the reverse gear are not worn down.

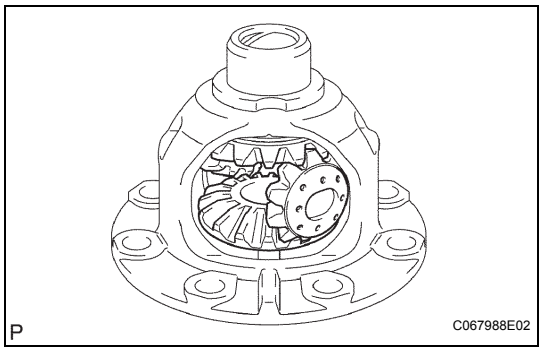


8. INSPECT NO. 1 TRANSMISSION CLUTCH HUB

(a) Check that the No. 1 transmission clutch hub and reverse gear slide smoothly.

(b) Check that the spline gear edges of the reverse gear are not worn down.

MX



REASSEMBLY

1. INSTALL FRONT DIFFERENTIAL SIDE GEAR

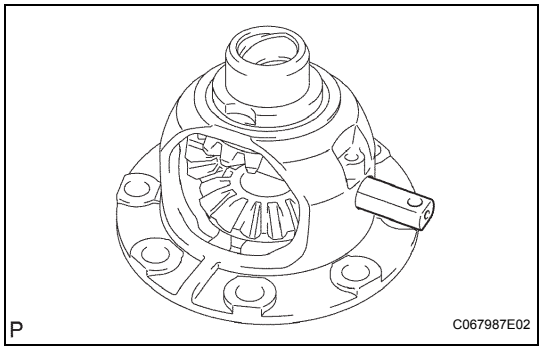
(a) Coat the sliding and rotating surface of the front differential side gear with gear oil.

(b) Install the 2 front No. 1 differential side gear thrust washers to the 2 front differential side gears.

(c) Install the 2 front differential side gears, 2 front differential pinions and 2 front differential pinion thrust washers to the front differential case.

HINT:

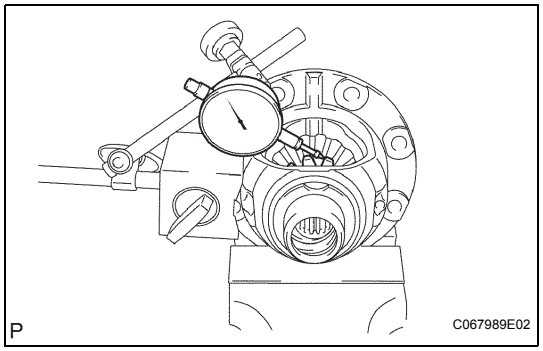
Revolving the front differential side gear, install the 2 front differential pinions and 2 front differential pinion thrust washers.



2. INSTALL FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Coat the front No. 1 differential pinion shaft with MP grease.

(b) Install the front No. 1 differential pinion shaft to the front differential case so that the hole for the front differential pinion shaft straight pin is aligned with the hole in the front differential case.



3. ADJUST FRONT DIFFERENTIAL SIDE GEAR BACKLASH

(a) Fix the front differential pinion to the front differential case side. Using a dial indicator, measure the gear backlash.

Standard backlash:

0.05 to 0.20 mm (0.0020 to 0.0079 in.)

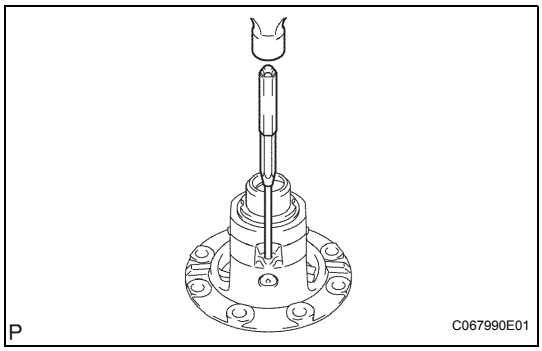
If the backlash is not within specification, replace the side gear thrust washer.

Standard thrust washer thickness

Part No.	Thickness mm (in.)
41361 - 22140	0.95 (0.0374 in.)
41361 - 22020	1.00 (0.0394 in.)
41361 - 22150	1.05 (0.0413 in.)
41361 - 22030	1.10 (0.0433 in.)
41361 - 22160	1.15 (0.0452 in.)
41361 - 22040	1.20 (0.0472 in.)

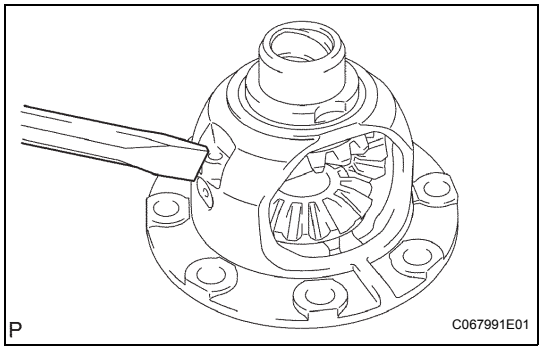
HINT:

- Because the thrust washer does not have any marks for distinction, measure the thickness with a micrometer to select a proper thrust washer.
- Select washers of the same thickness for both the right and left side.

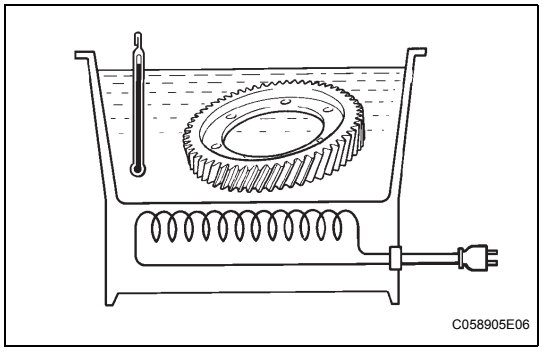


4. INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a 3 mm pin punch and hammer, tap in the front differential pinion shaft straight pin to the front differential case.



(b) Using a chisel and hammer, stake the front differential case hole.

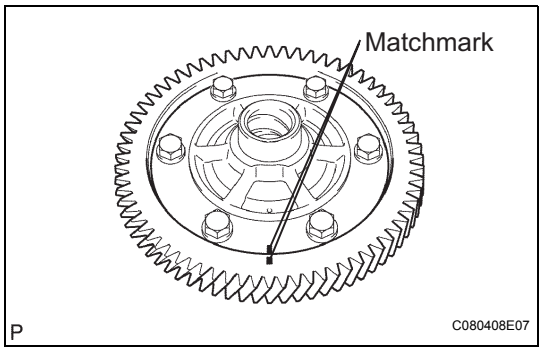


5. INSTALL FRONT DIFFERENTIAL RING GEAR

(a) Clean the contact surface of the front differential case and ring gear.

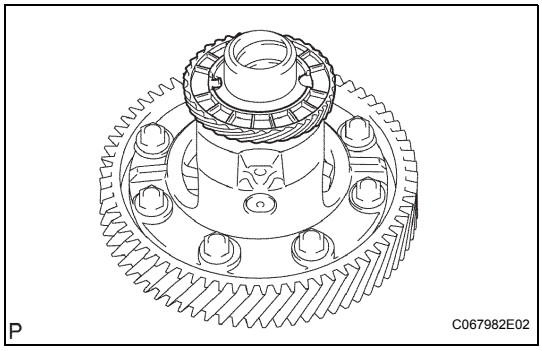
(b) Using a heater, heat the front differential ring gear to 90 to 110°C (194 to 230°F).

(c) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.



(d) Aligning both matchmarks, quickly install the front differential ring gear to the front differential case.

(e) Install the 8 bolts.
Torque: 77 N*m (790 kgf*cm, 57 ft.*lbf)



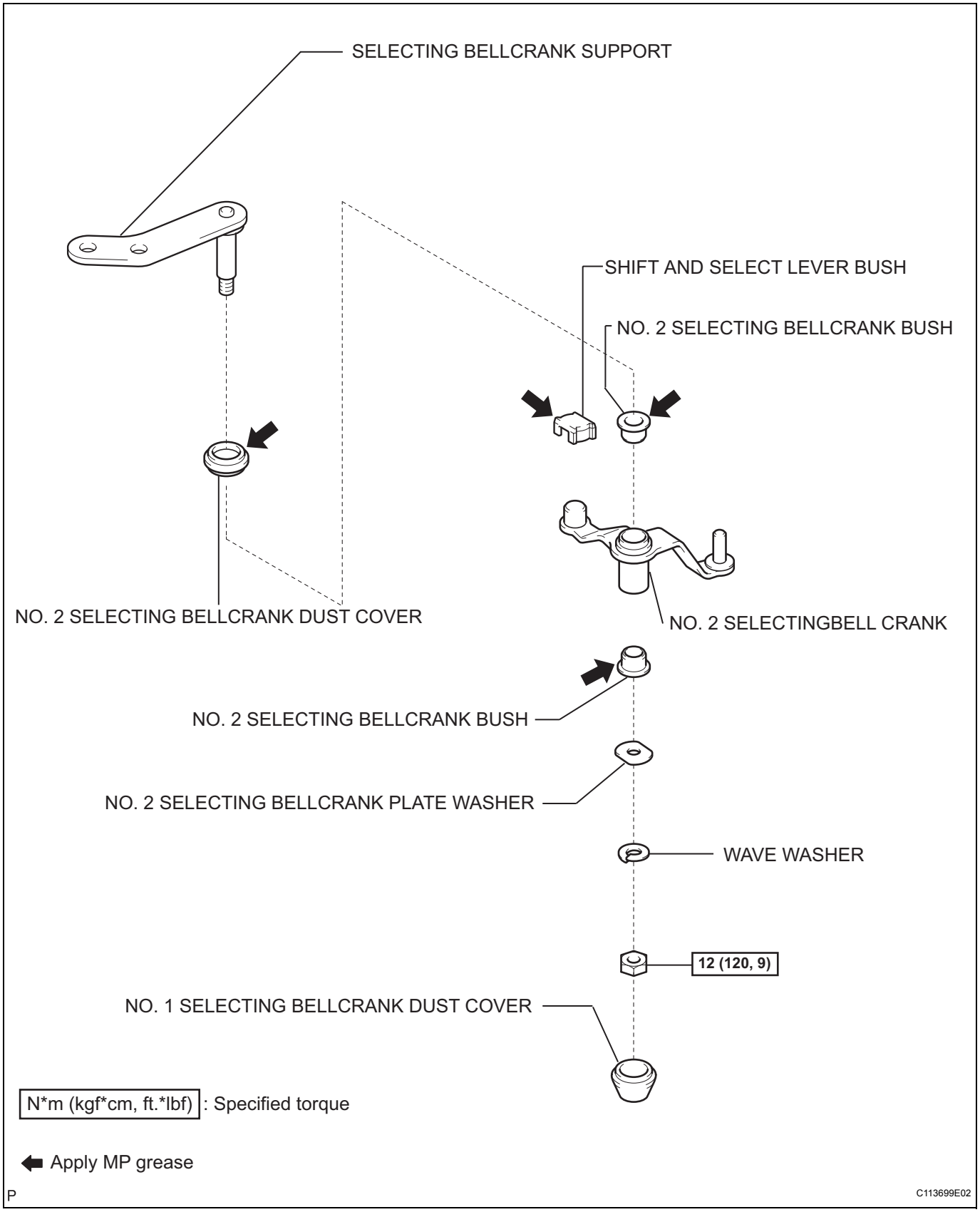
6. INSTALL SPEEDOMETER DRIVE GEAR

(a) Install the drive gear to the front differential case.

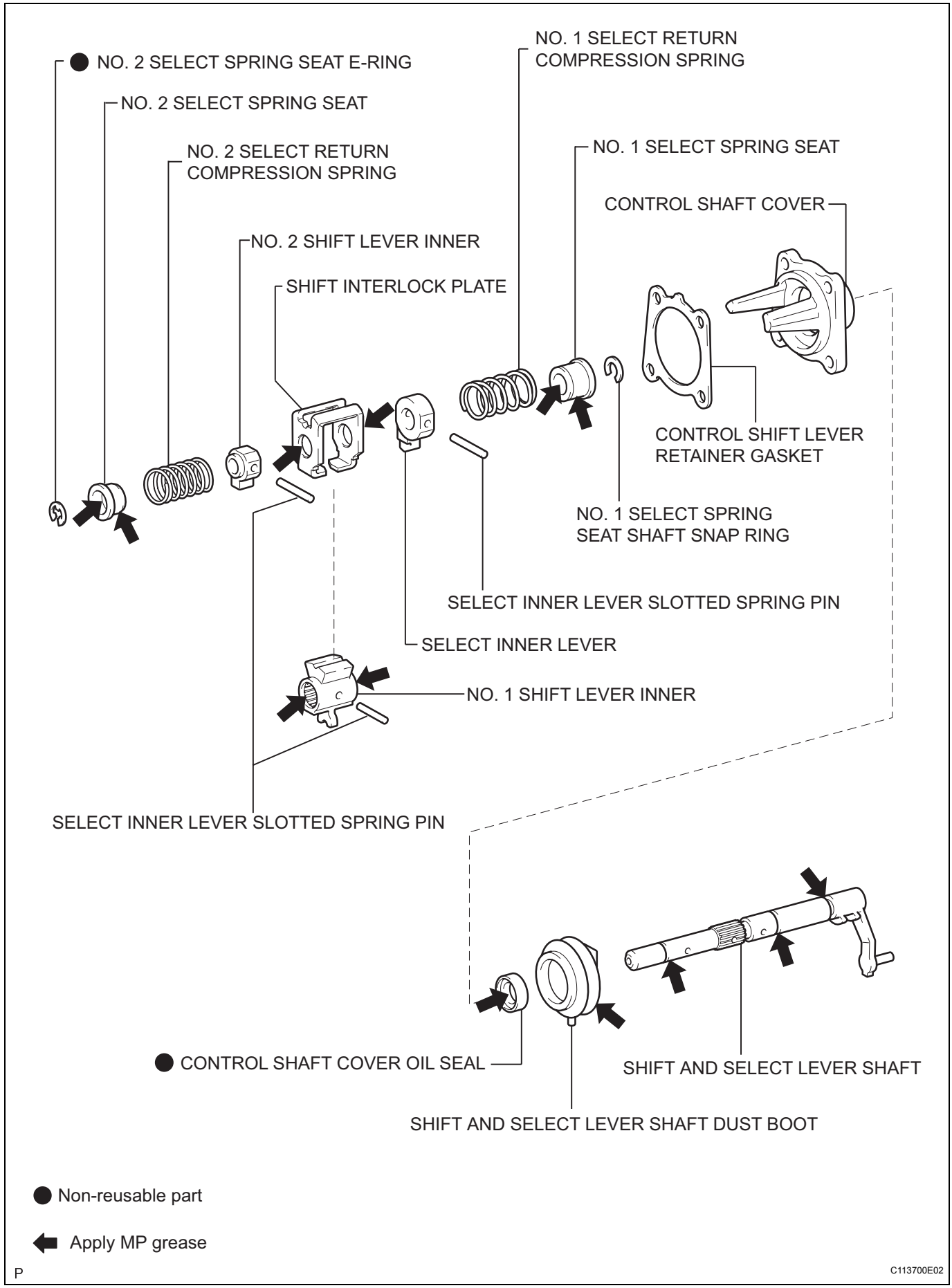
MX

SHIFT AND SELECT LEVER SHAFT

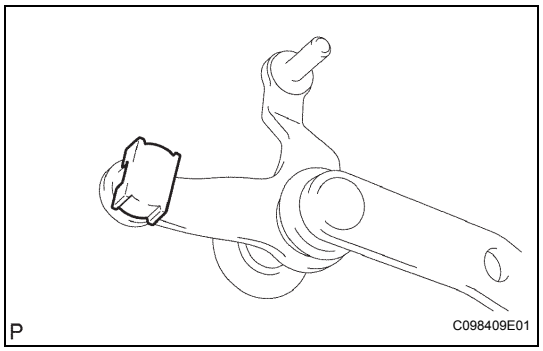
COMPONENTS



MX


NO. 2 SELECT SPRING SEAT E-RING
NO. 2 SELECT SPRING SEAT
NO. 2 SELECT RETURN COMPRESSION SPRING
NO. 2 SHIFT LEVER INNER
SHIFT INTERLOCK PLATE
NO. 1 SELECT RETURN COMPRESSION SPRING
NO. 1 SELECT SPRING SEAT
CONTROL SHAFT COVER
CONTROL SHIFT LEVER RETAINER GASKET
NO. 1 SELECT SPRING SEAT SHAFT SNAP RING
SELECT INNER LEVER SLOTTED SPRING PIN
SELECT INNER LEVER
NO. 1 SHIFT LEVER INNER
SELECT INNER LEVER SLOTTED SPRING PIN
CONTROL SHAFT COVER OIL SEAL
SHIFT AND SELECT LEVER SHAFT
SHIFT AND SELECT LEVER SHAFT DUST BOOT
Non-reusable part
Apply MP grease
P
C113700E02

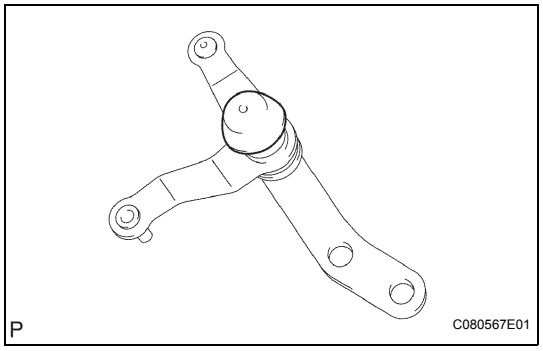
MX



DISASSEMBLY

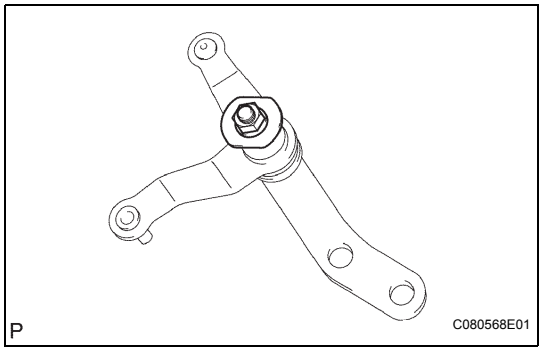
1. REMOVE SHIFT AND SELECT LEVER BUSH

(a) Remove the bush from the selecting bellcrank.



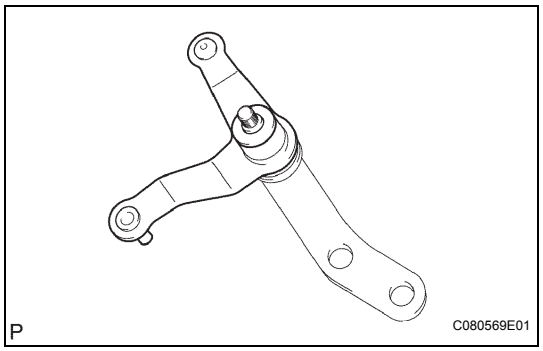
2. REMOVE NO. 1 SELECTING BELLCRANK DUST COVER

(a) Remove the dust cover from the selecting bellcrank.

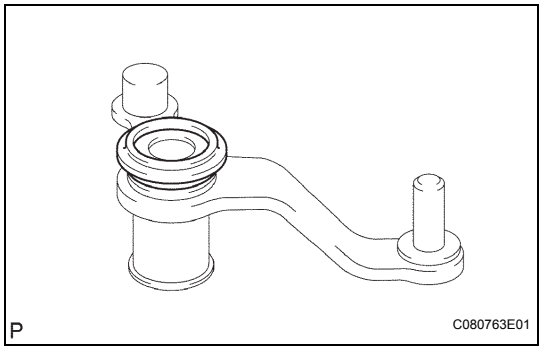


3. REMOVE NO. 2 SELECTING BELLCRANK

(a) Remove the nut, wave washer and No. 2 selecting bellcrank plate washer.



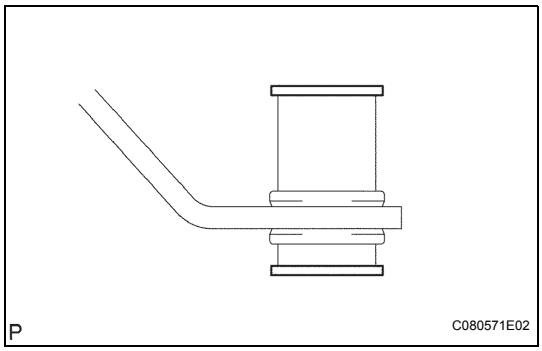
(b) Remove the No. 2 selecting bellcrank from the selecting bellcrank support.



4. REMOVE NO. 2 SELECTING BELLCRANK DUST COVER

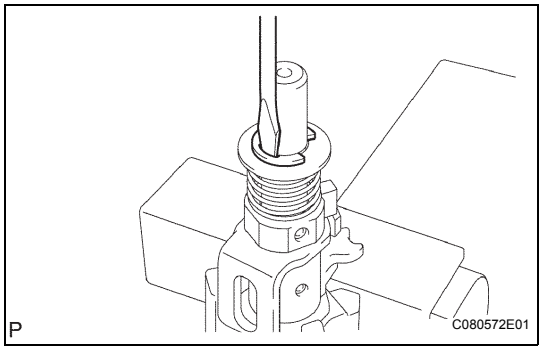
(a) Remove the dust cover from the selecting bellcrank support.

MX



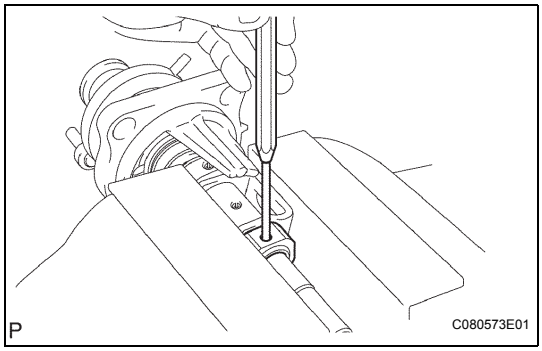
5. REMOVE NO. 2 SELECTING BELLCRANK BUSH

(a) Remove the 2 bushes from the No. 2 selecting bellcrank.



6. REMOVE NO. 2 SELECT SPRING SEAT

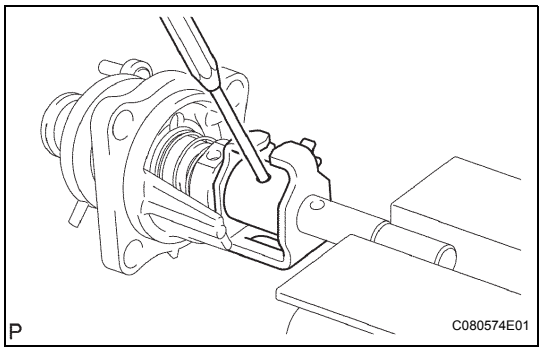
(a) Using a screwdriver, pry out the seat E-ring, No. 2 select spring seat and No. 2 select return compression spring from the shift and select lever shaft.



7. REMOVE NO. 2 SHIFT LEVER INNER

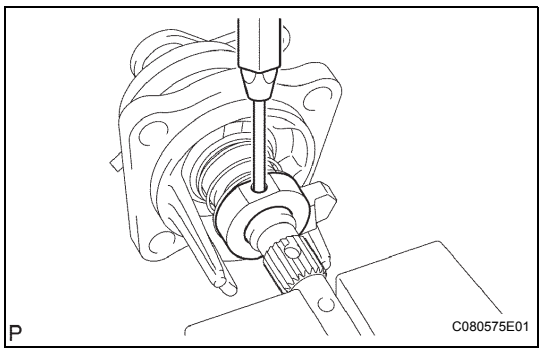
(a) Using a 5 mm pin punch and hammer, tap out the shift inner lever slotted spring pin and No. 2 shift lever inner from the shift and select lever shaft.
HINT:
Make sure of the orientation of the No. 2 shift lever inner.

MX



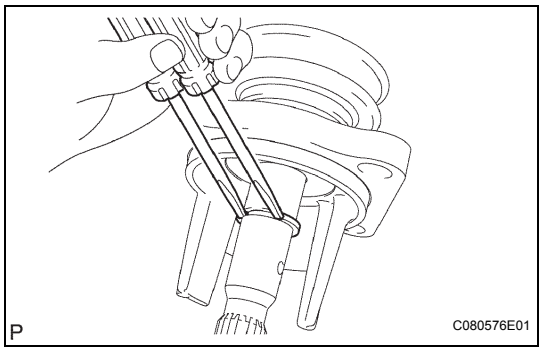
8. REMOVE NO. 1 SHIFT LEVER INNER

(a) Using a 5 mm pin punch and hammer, tap out the shift inner lever slotted spring pin, No. 1 shift lever inner and shift interlock plate from the shift and select lever shaft.
HINT:
Make sure of the orientation of the No. 1 shift lever inner.



9. REMOVE SELECT INNER LEVER

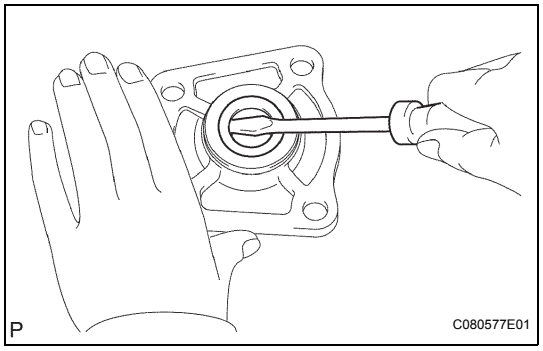
(a) Using a 5 mm pin punch and hammer, tap out the select inner lever slotted spring pin, select inner lever, No. 1 select return compression spring and No. 1 select spring seat from the shift and select lever shaft.
HINT:
Make sure of the orientation of the select inner lever.



10. REMOVE CONTROL SHAFT COVER

(a) Using 2 screwdrivers and hammer, tap out the No. 1 select spring seat shaft snap ring.
HINT:
Use a cloth to prevent the shaft snap ring from springing away.

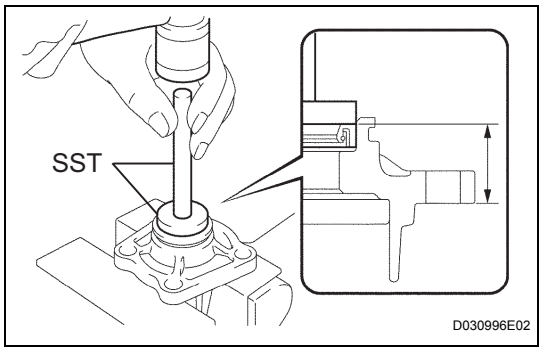
(b) Remove the control shaft cover, control shift lever retainer gasket and shift and select lever shaft dust boot from the shift and select lever shaft.



11. REMOVE CONTROL SHAFT COVER OIL SEAL

(a) Using a screwdriver, pry out the oil seal from the control shaft cover.

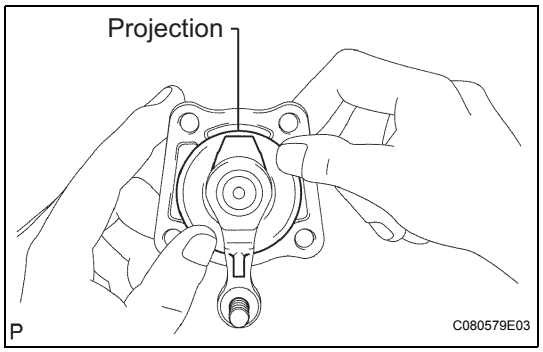
REASSEMBLY



1. INSTALL CONTROL SHAFT COVER OIL SEAL

(a) SST and a hammer, tap in a new oil seal to the control shaft cover.
Standard depth:
25.0 to 26.0 mm (0.984 to 1.0236 in.)

(b) Coat the control shaft cover oil seal with MP grease.

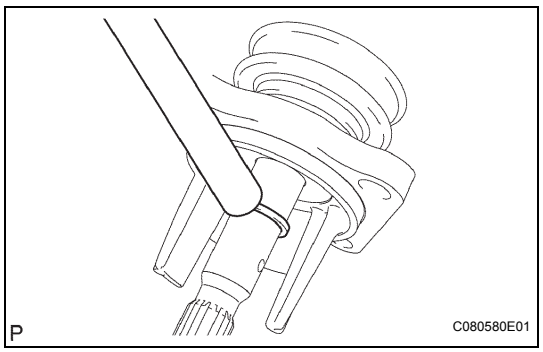


2. INSTALL CONTROL SHAFT COVER

(a) Coat the shift and select lever shaft dust boot with MP grease.

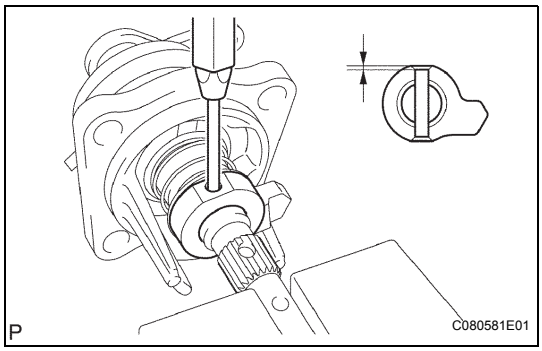
(b) Install the shift and select lever shaft dust boot to the control shaft cover.
HINT:
Install the boot with the projection facing upward and the hole side facing downward.

(c) Install the control shaft cover to the shift and select lever.



(d) Coat the shift and select lever shaft with MP grease. Using a brass bar and hammer, tap in the shift and select lever shaft and snap ring.

MX



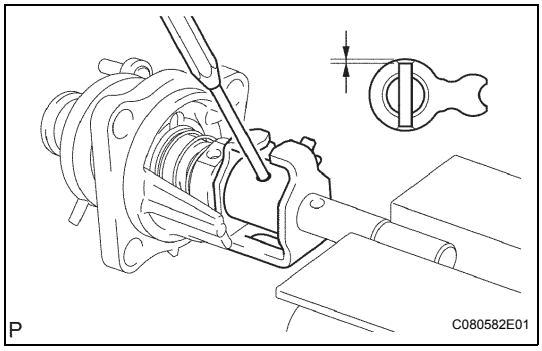
3. INSTALL SELECT INNER LEVER

(a) Coat the No. 1 select spring seat with MP grease.

(b) Using a 5 mm pin punch and hammer, install the No. 1 select spring seat, No. 1 select return compression spring, select inner lever and select inner lever slotted spring pin to the shift and select lever shaft.

Standard depth:

3.0 to 4.0 mm (0.1181 to 0.1575 in.)



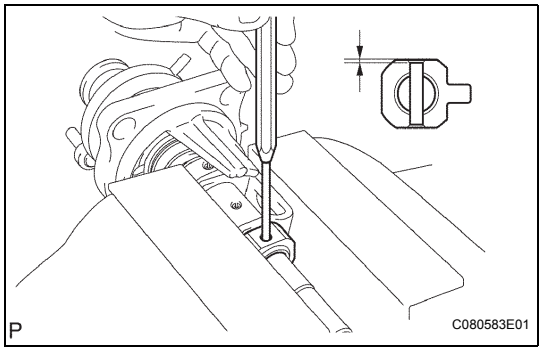
4. INSTALL NO. 1 SHIFT LEVER INNER

(a) Coat the shift interlock plate and No. 1 shift lever inner with MP grease.

(b) Using a 5mm pin punch and hammer, tap in the shift interlock plate, No. 1 shift lever inner and shift inner lever slotted spring pin to the shift and select lever shaft.

Standard depth:

-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)



5. INSTALL NO. 2 SHIFT LEVER INNER

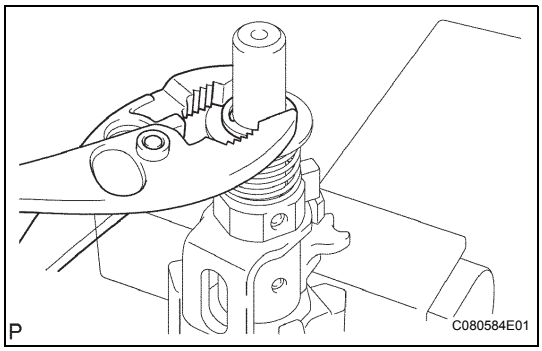
(a) Coat the No. 2 shift lever inner with MP grease.

(b) Using a 5 mm pin punch and hammer, install the No. 2 shift lever inner and shift inner lever slotted spring pin to the shift and select lever shaft.

Standard depth:

-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

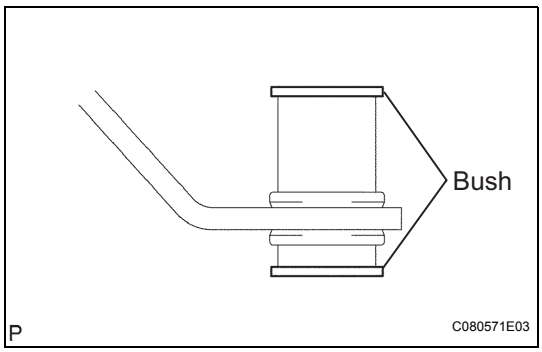
MX



6. INSTALL NO. 2 SELECT SPRING SEAT

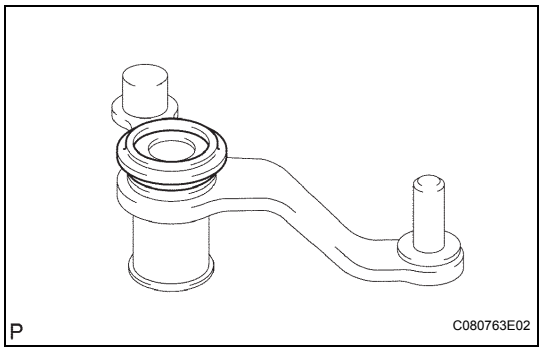
(a) Coat the No. 2 select spring seat with MP grease.

(b) Install the No. 2 select spring seat and No. 2 select return compression spring. Using pliers, install a new seat E-ring to the shift and select lever shaft.



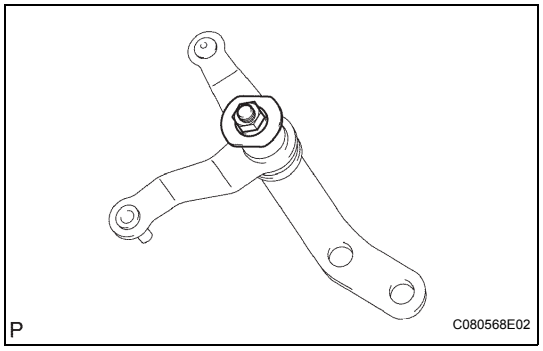
7. INSTALL NO. 2 SELECTING BELLCRANK BUSH

(a) Coat the 2 bushes with MP grease, and install them to the No. 2 selecting bellcrank.



8. INSTALL NO. 2 SELECTING BELLCRANK DUST COVER

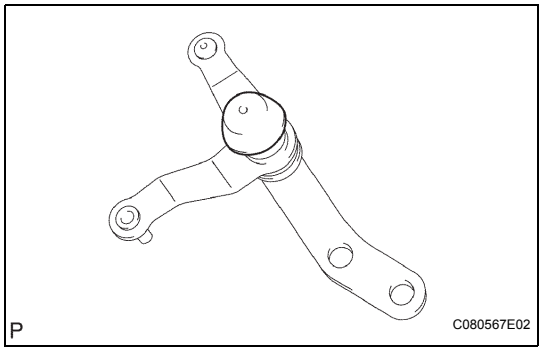
(a) Coat the dust cover with MP grease, and install it to the selecting bellcrank support.



9. INSTALL NO. 2 SELECTING BELLCRANK

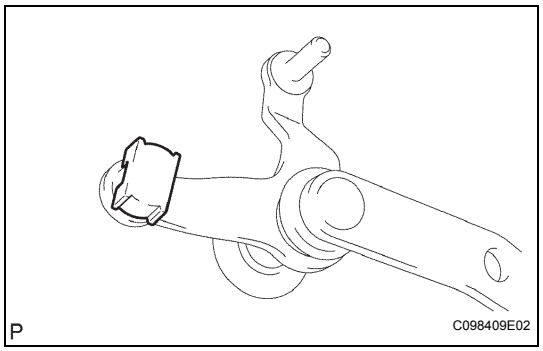
(a) Install the selecting bellcrank support, No. 2 selecting bellcrank plate washer, wave washer and nut.

Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



10. INSTALL NO. 1 SELECTING BELLCRANK DUST COVER

(a) Install the dust cover to the selecting bellcrank.

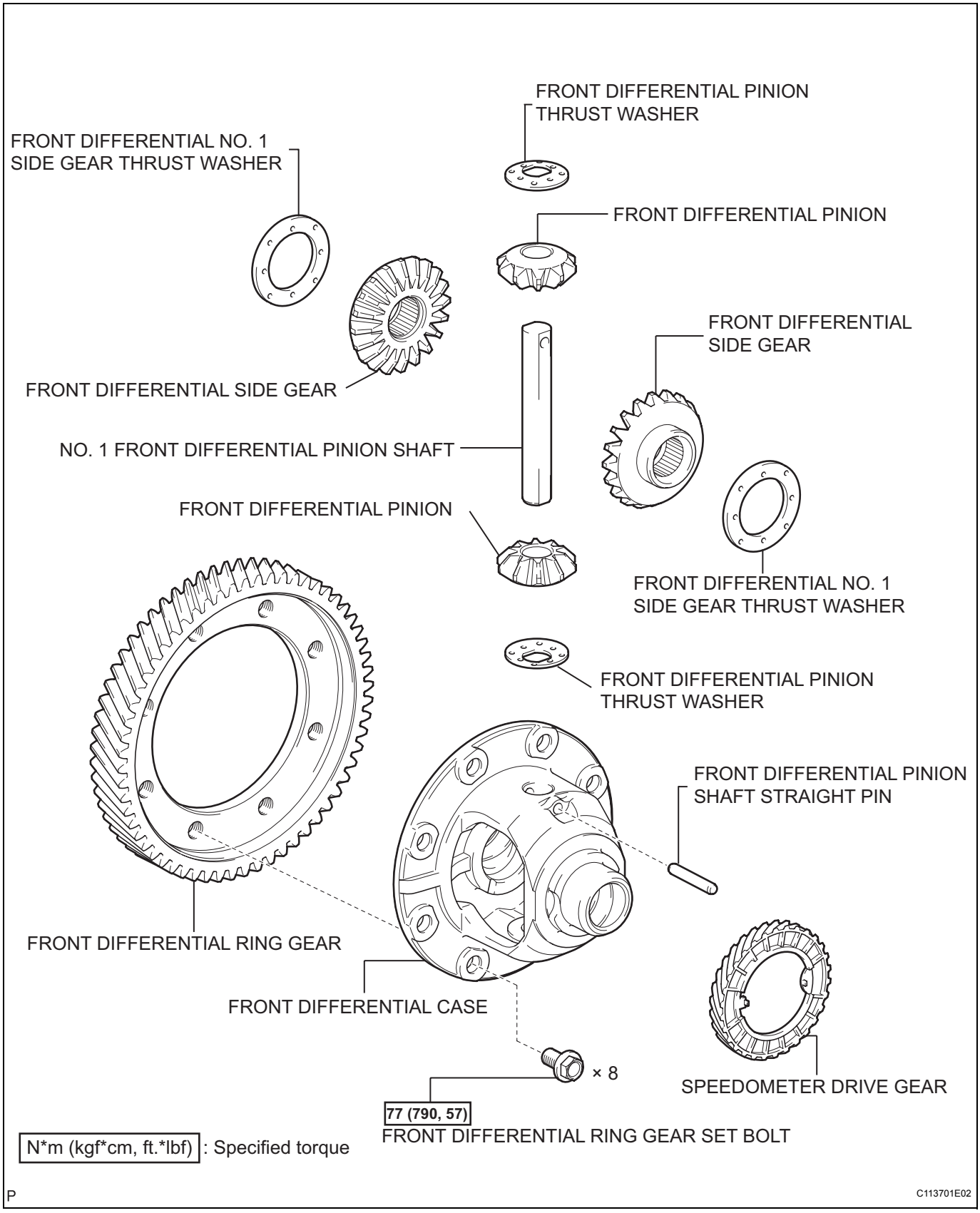


11. INSTALL SHIFT AND SELECT LEVER BUSH

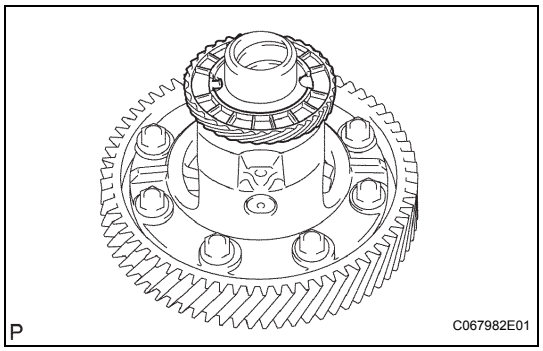
(a) Install the bush to the selecting bellcrank.

DIFFERENTIAL CASE

COMPONENTS



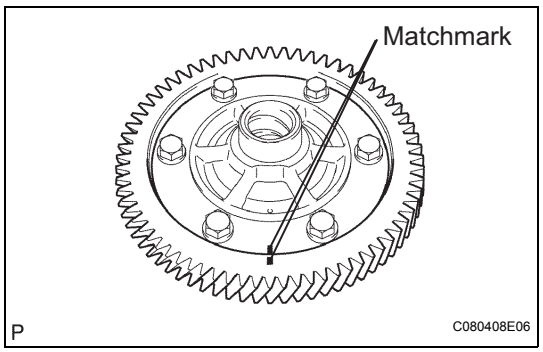
MX



DISASSEMBLY

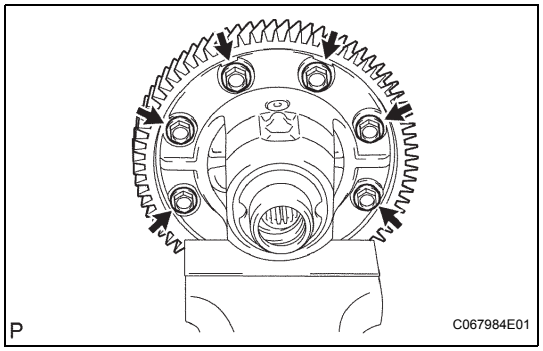
1. REMOVE SPEEDOMETER DRIVE GEAR

(a) Remove the drive gear from the front differential case.



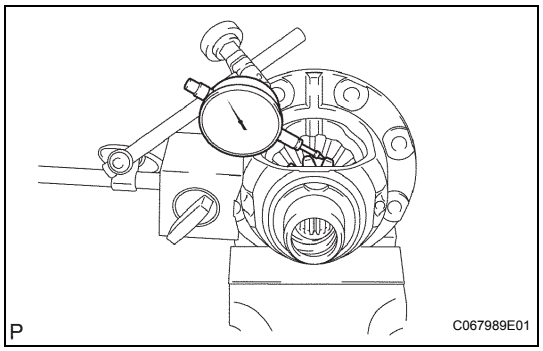
2. REMOVE FRONT DIFFERENTIAL RING GEAR

(a) Put matchmarks on the gear and front differential case.



(b) Remove the 8 bolts.

(c) Using a hammer, tap out the front differential ring gear from the case.



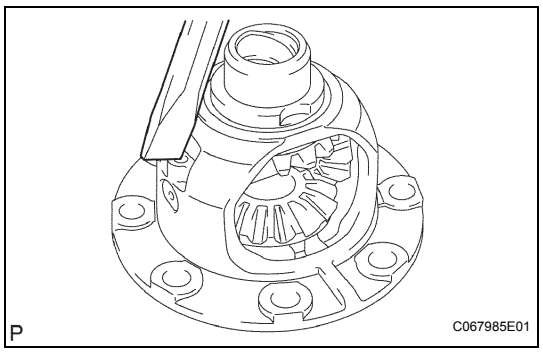
3. INSPECT FRONT DIFFERENTIAL SIDE GEAR BACKLASH

(a) Fix the front differential pinion to the front differential case side. Using a dial indicator, measure the gear backlash.

Standard backlash:

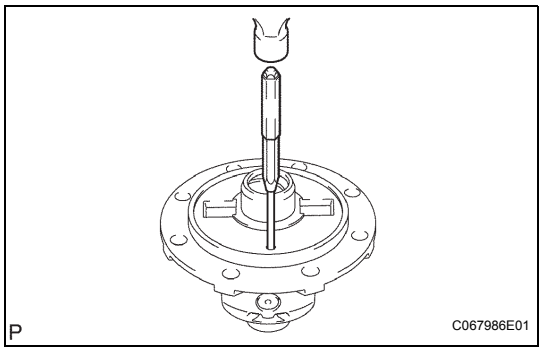
0.05 to 0.20 mm (0.0020 to 0.0079 in.)

If the backlash is not as specified, replace the pinion thrust washer and side gear thrust washers.

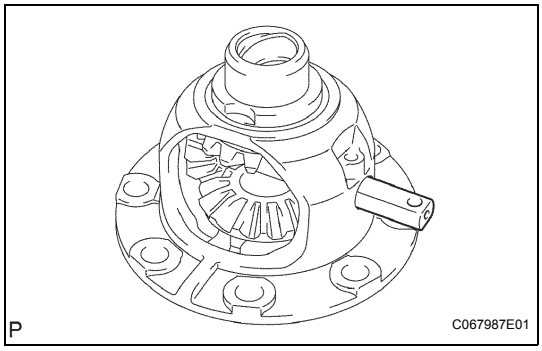


4. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a chisel and hammer, loosen the staked part of the front differential case.

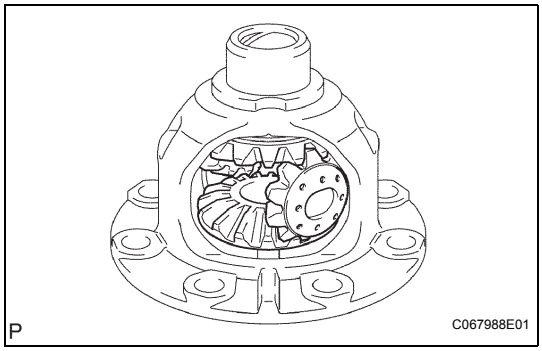


(b) Using a 3 mm pin punch and hammer, tap out the front differential pinion shaft straight pin from the front differential case.



5. REMOVE NO. 1 FRONT DIFFERENTIAL PINION SHAFT

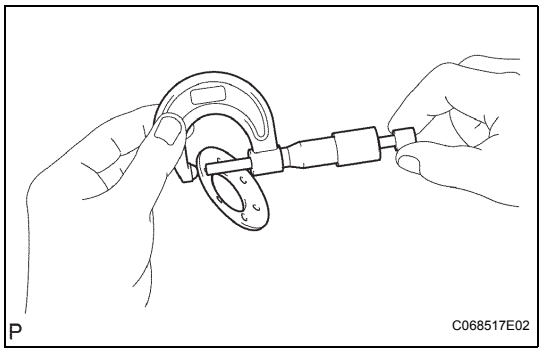
(a) Remove the front differential pinion shaft No. 1 from the front differential case.



6. REMOVE FRONT DIFFERENTIAL SIDE GEAR

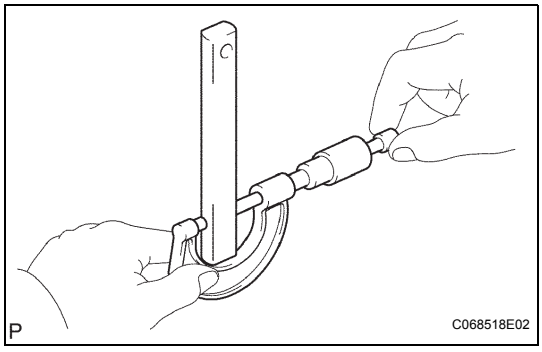
(a) Remove the 2 front differential pinions, 2 front differential pinion thrust washers, 2 front differential No. 1 side gear thrust washers and 2 front differential side gears from the front differential case.
HINT:
Revolving the front differential pinion, remove the 2 pinions and 2 side gears.

INSPECTION



1. INSPECT FRONT DIFFERENTIAL PINION THRUST WASHER

(a) Using a micrometer, measure the thickness.
Minimum thickness:
0.94 mm (0.03701 in.)
If the thickness is less than the minimum, replace the front differential pinion thrust washer.



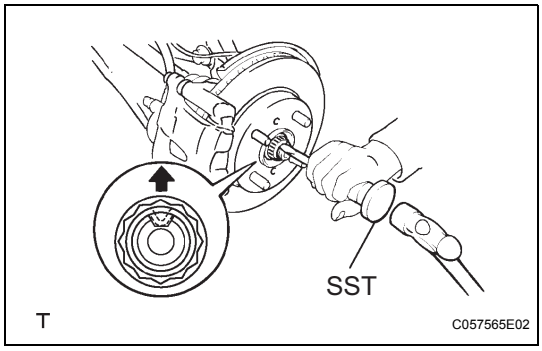
2. REMOVE FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Using a micrometer, measure the diameter of the front No. 1 differential pinion shaft.
Minimum diameter:
16.982 mm (0.6685 in.)
If the diameter is less than the minimum, replace the front No. 1 differential pinion shaft.

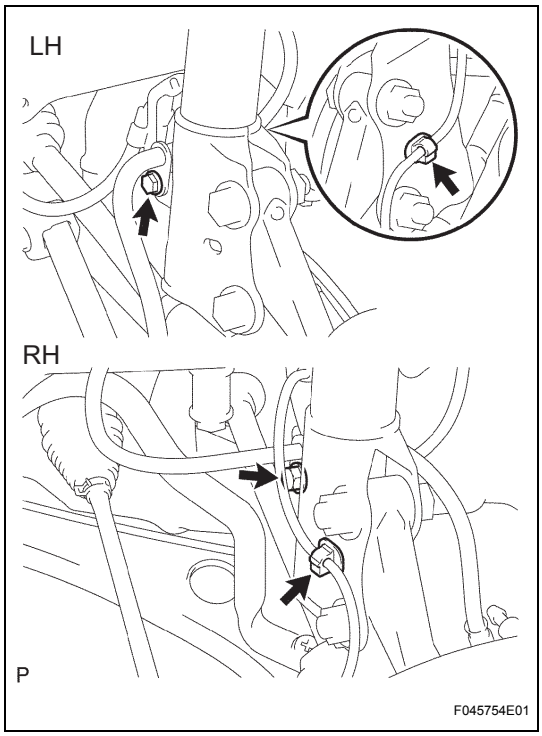
REMOVAL

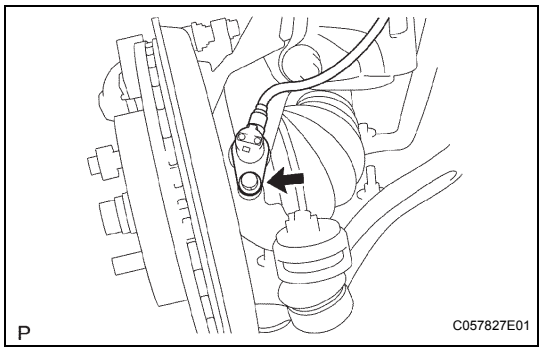
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle)**
   Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
2. **DRAIN AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)**
   Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
3. **REMOVE FRONT WHEEL**
4. **REMOVE ENGINE UNDER COVER LH**
5. **REMOVE FRONT AXLE HUB NUT**
   (a) Using SST and a hammer, pry up the retaining tab(s) of the hub nut.
   SST 09930-00010
   NOTICE:
   Loosen the staked part of the nut completely, otherwise the screw of the drive shaft may be damaged.
   (b) While applying the brakes, remove the hub nut.

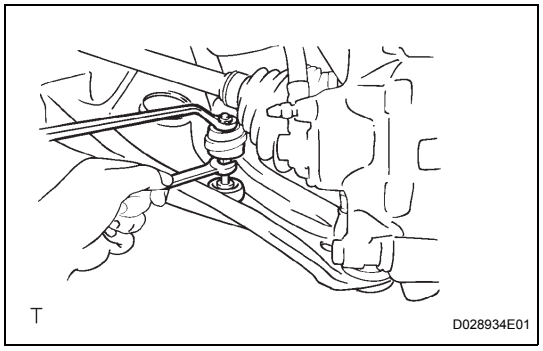


6. **DISCONNECT FRONT SPEED SENSOR**
   (a) Remove the bolt and clip, and disconnect the front speed sensor and flexible hose from the front shock absorber.
   HINT:
   The positions of the bolt and clip on the right side differ from those on the left side.

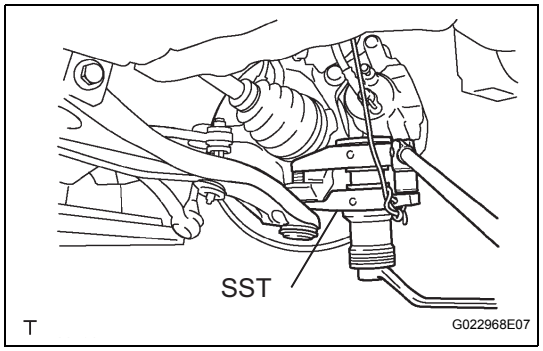




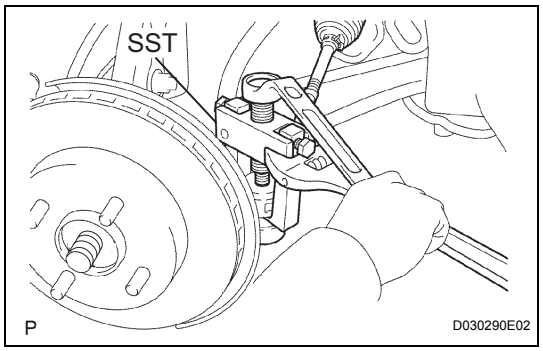
(b) Remove the bolt and disconnect the front speed sensor from the steering knuckle.
NOTICE:
- **Be careful not to damage the speed sensor.**
- **Prevent foreign matter from adhering to the speed sensor.**



7. DISCONNECT FRONT STABILIZER BAR
(a) Hold the bolt with a wrench and remove the nut.
(b) Remove the 2 cushion retainers and 2 cushions, and disconnect the front stabilizer bar.

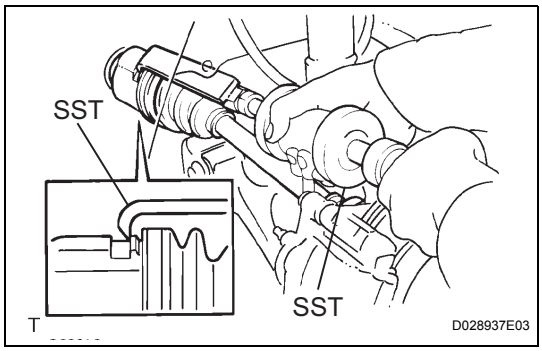


8. DISCONNECT FRONT NO. 1 SUSPENSION LOWER ARM SUB-ASSEMBLY
(a) Remove the clip and nut.
(b) Using SST, disconnect the front suspension lower arm from the steering knuckle.
SST 09628-00011



9. DISCONNECT TIE ROD END SUB-ASSEMBLY
(a) Remove the cotter pin and nut.
(b) Using SST, disconnect the tie rod end from the steering knuckle.
SST 09628-62011

10. DISCONNECT FRONT DRIVE SHAFT ASSEMBLY
(a) Using a plastic-faced hammer, tap the drive shaft and disconnect it.
NOTICE:
- **Be careful not to damage the boot.**
- **Be careful not to damage the speed sensor rotor.**



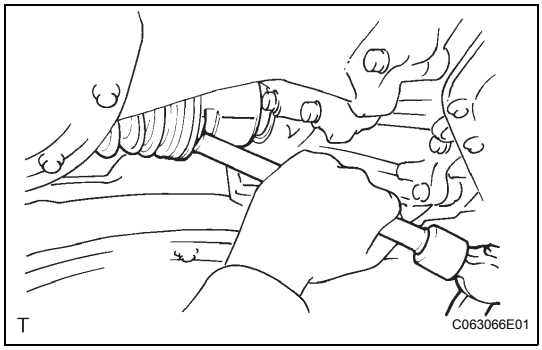
11. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

(a) Using SST, tap out the front drive shaft assembly LH.

SST 09520-01010, 09520-24010 (09520-32040)

NOTICE:

- **Be careful not to damage the oil seal and boot.**
- **Be careful not to drop the drive shaft assembly.**

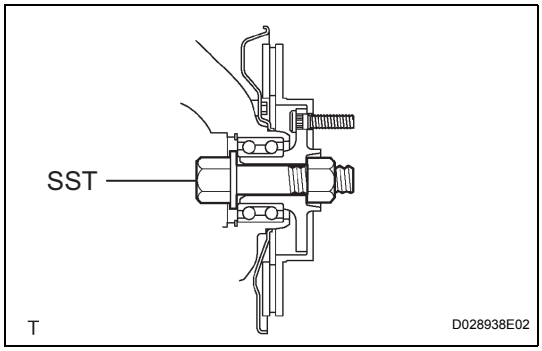


12. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

(a) Using a brass bar and hammer, tap out the front drive shaft.

NOTICE:

- **Be careful not to damage the oil seal and boot.**
- **Be careful not to drop the drive shaft assembly.**

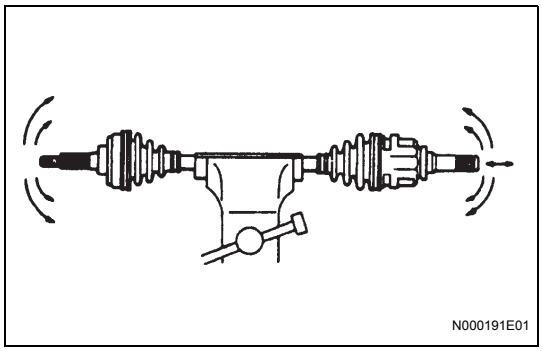


13. FIX FRONT AXLE ASSEMBLY LH

NOTICE:

The hub bearing could be damaged if it is subjected to the vehicle's weight, such as when moving the vehicle with the drive shaft removed. Therefore, if it is necessary to place the vehicle's weight on the hub bearing, first support it with SST.

SST 09608-16042 (09608-02021, 09608-02041)



14. INSPECT FRONT DRIVE SHAFT ASSEMBLY

NOTICE:

Keep the drive shaft assembly level during inspection.

(a) Check that there is no remarkable play in the radial direction of the outboard joint.

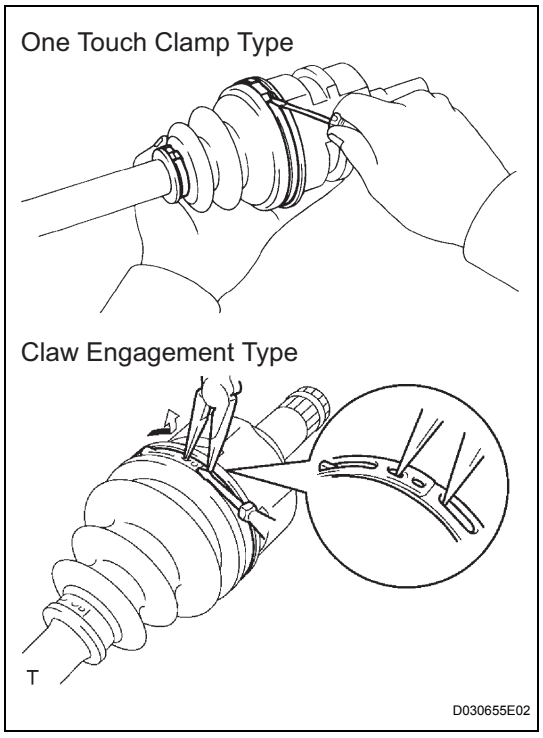
(b) Check that the inboard joint slides smoothly in the thrust direction.

(c) Check that there is no remarkable play in the radial direction of the inboard joint.

(d) Check the boots for damage.

DISASSEMBLY

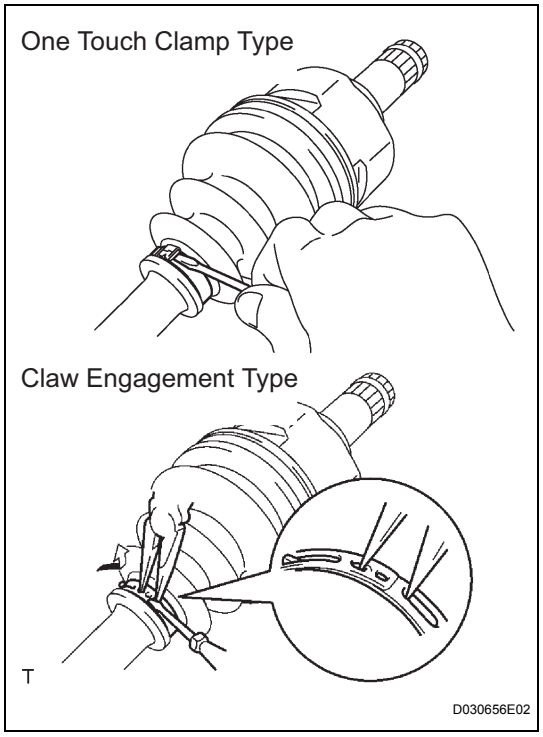
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. REMOVE FRONT NO. 2 AXLE INBOARD JOINT BOOT CLAMP

(a) One touch clamp type:
Using a screwdriver, remove the inboard joint boot clamp as shown in the illustration.

(b) Claw engagement type:
Using needle nose pliers, remove the inboard joint boot clamp as shown in the illustration.



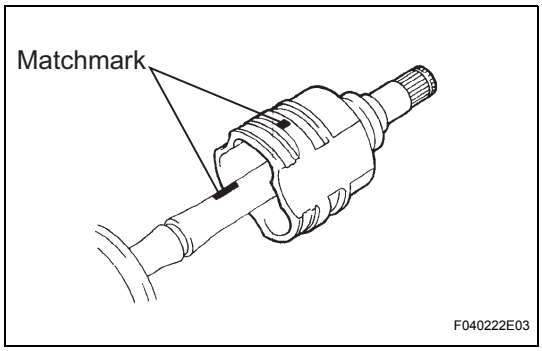
2. REMOVE FRONT AXLE INBOARD JOINT BOOT CLAMP

(a) One touch clamp type:
Using a screwdriver, remove the inboard joint boot clamp as shown in the illustration.

(b) Claw engagement type:
Using needle nose pliers, remove the inboard joint boot clamp as shown in the illustration.

3. REMOVE FRONT DRIVE SHAFT INBOARD JOINT BOOT

(a) Disconnect the inboard joint boot from the inboard joint.

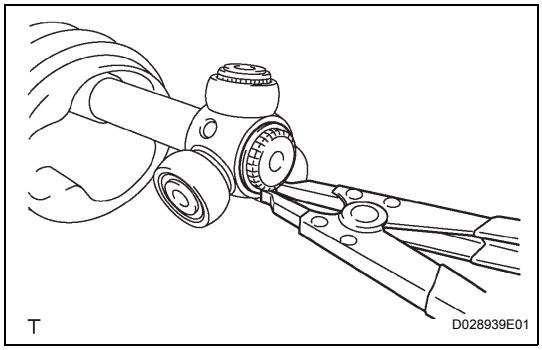


4. REMOVE FRONT DRIVE INBOARD JOINT ASSEMBLY

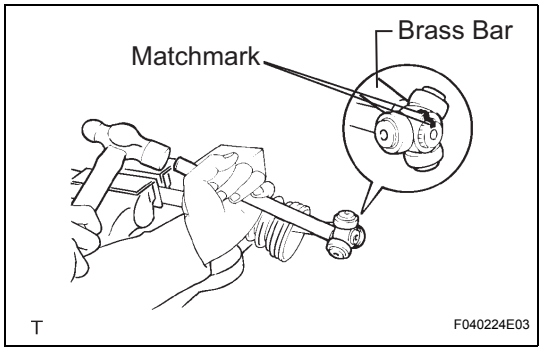
(a) Remove the old grease from the inboard joint.

(b) Put matchmarks on the inboard joint and outboard joint shaft.
NOTICE:
Do not use a punch for marking.

(c) Remove the inboard joint from the outboard joint shaft.



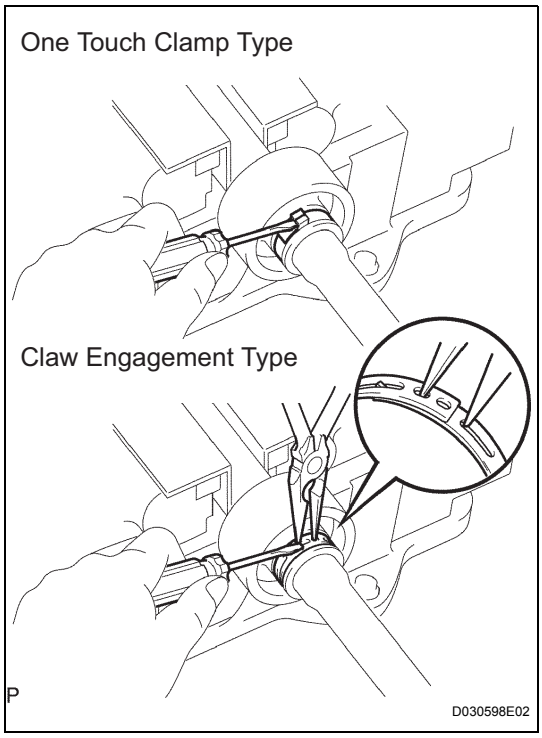
(d) Using a snap ring expander, remove the inner shaft snap ring.



(e) Put matchmarks on the outboard joint shaft and tripod joint.
NOTICE:
Do not use a punch for marking.

(f) Using a brass bar and hammer, tap out the tripod joint from the outboard joint shaft.
NOTICE:
Do not tap the roller.

(g) Remove the No. 2 inboard joint boot clamp, inboard joint boot and inboard joint boot clamp.



5. REMOVE DRIVE SHAFT DAMPER SETTING CLAMP (RH DRIVE SHAFT)

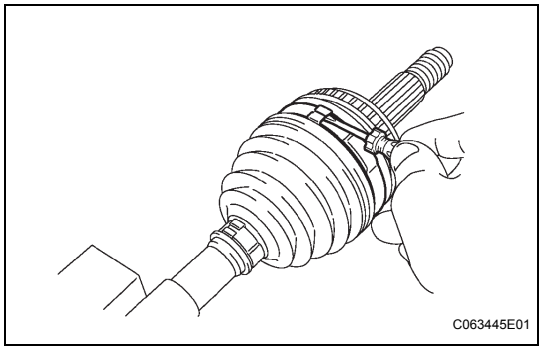
(a) One touch clamp type:
Using a screwdriver, remove the damper setting clamp as shown in the illustration.

(b) Claw engagement type:
Using needle nose pliers, remove the damper setting clamp as shown in the illustration.

6. REMOVE FRONT DRIVE SHAFT DAMPER RH (RH DRIVE SHAFT)

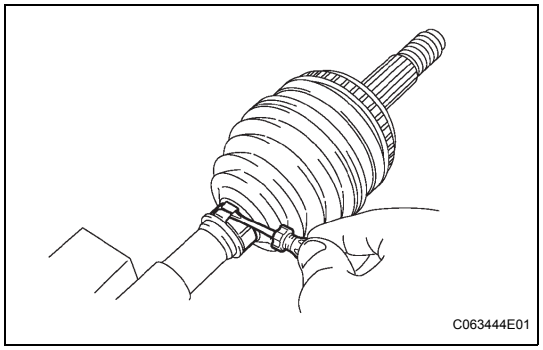
(a) Remove the drive shaft damper RH.

DS



7. REMOVE FRONT NO. 2 AXLE OUTBOARD JOINT BOOT CLAMP

(a) Using a screwdriver, remove the outboard joint boot clamp.



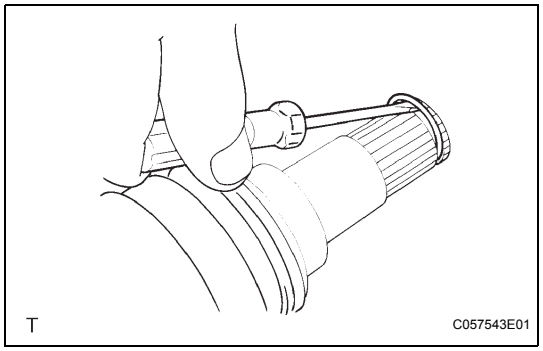
8. REMOVE FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Using a screwdriver, remove the outboard joint boot clamp.

9. REMOVE FRONT AXLE OUTBOARD JOINT BOOT

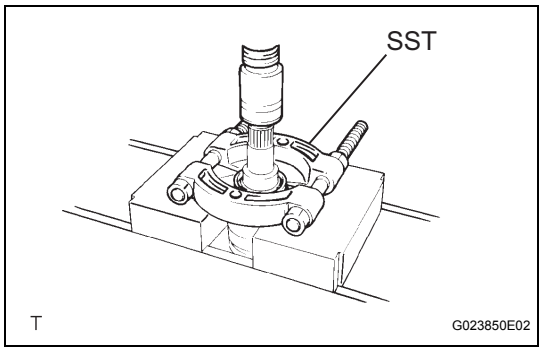
(a) Remove the outboard joint boot from the outboard joint shaft.

(b) Remove the old grease from the outboard joint.



10. REMOVE FRONT DRIVE INBOARD JOINT HOLE SNAP RING

(a) Using a screwdriver, pry off the hole snap ring.



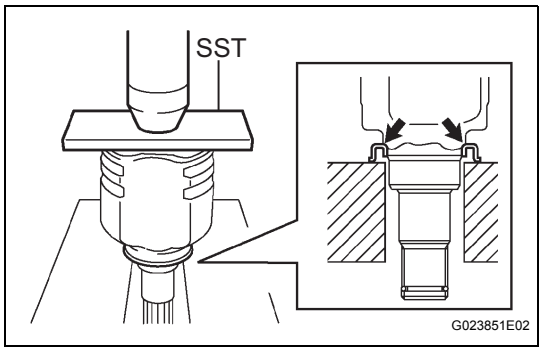
11. REMOVE FRONT DRIVE SHAFT DUST COVER

(a) Using SST and a press, press out the dust cover.
SST 09950-00020
NOTICE:
Be careful not to drop the inboard joint assembly.

DS

REASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. INSTALL FRONT DRIVE SHAFT DUST COVER LH

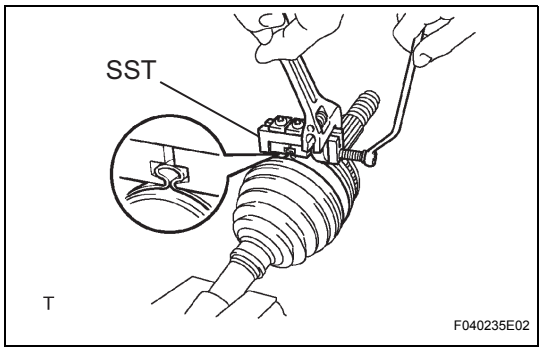
(a) Using SST and a press, press in the dust cover.
SST 09527-10011
NOTICE:
- **Be careful not to damage the dust cover.**
- **Dust cover should be installed completely.**

2. INSTALL FRONT DRIVE INBOARD JOINT HOLE SNAP RING

(a) Install a new hole snap ring.

3. INSTALL FRONT DRIVE SHAFT OUTBOARD BOOT

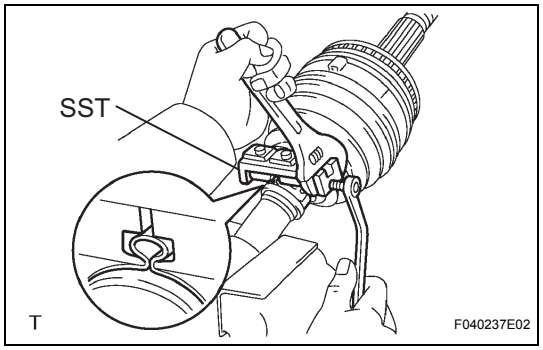
(a) Wrap the spline of the outboard joint shaft with vinyl tape to prevent the boot from being damaged.
(b) Install the new parts on the inboard joint shaft in the following order.
(1) No. 2 outboard joint boot clamp.
(2) Outboard joint boot
(3) Outboard joint boot clamp.
(c) Pack the outboard joint with grease.
Standard grease capacity:
155 to 170 g (5.5 to 6.1 oz.)
(d) Install the outboard joint boot on the outboard joint shaft.

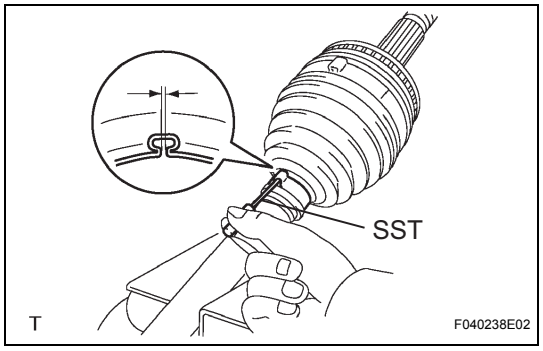


4. INSTALL FRONT NO. 2 AXLE OUTBOARD JOINT BOOT CLAMP

(a) Secure the No. 2 outboard joint boot clamp onto the outboard joint boot.
(b) Place SST onto the No. 2 outboard joint boot clamp.
SST 09521-24010
(c) Tighten the SST so that the No. 2 outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.
(d) Using SST, measure the clearance of the No. 2 outboard joint boot clamp.
SST 09240-00020 (09242-00080)
Standard clearance:
0.8 mm (0.031 in.) or less
NOTICE:
When the measured value exceeds the specified value, retighten the clamp.

DS





5. INSTALL FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Mount drive shaft in a soft vise.

(b) Secure the outboard joint boot clamp onto the outboard joint boot.

(c) Place SST onto the outboard joint boot clamp.
SST 09521-24010

(d) Tighten the SST so that the outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.

(e) Using SST, measure the clearance of the outboard joint boot clamp.
SST 09240-00020 (09242-00080)
NOTICE:
When the measured value exceeds the specified value, retighten the clamp.

6. INSTALL FRONT DRIVE SHAFT DAMPER RH (RH DRIVE SHAFT)

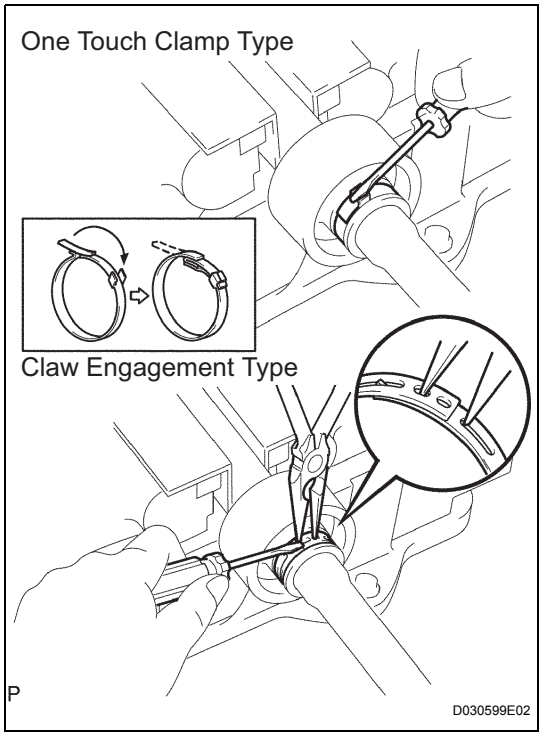
(a) Install the drive shaft damper RH on the outboard joint shaft.

7. INSTALL DRIVE SHAFT DAMPER SETTING CLAMP (RH DRIVE SHAFT)

(a) Install the damper setting clamp to the shaft.
NOTICE:
Be sure to install the clamp in the correct position.

(b) One touch clamp type:
Using a screwdriver, install the damper setting clamp as shown in the illustration.

(c) Claw engagement type:
Using needle nose pliers, install the damper setting clamp as shown in the illustration.

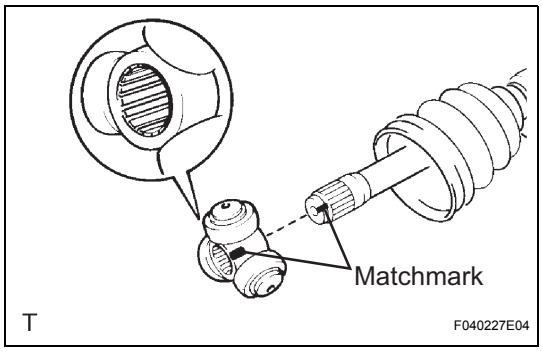


8. INSTALL FRONT DRIVE INBOARD JOINT ASSEMBLY

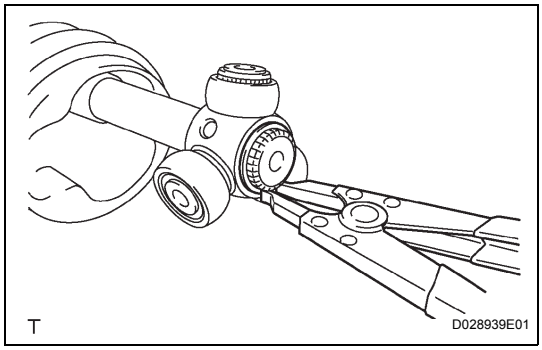
HINT:
Before installing the boot, wrap the spline of the drive shaft with vinyl tape to prevent the boot from being damaged.

(a) Install the new parts on the outboard joint shaft in the following order.
(1) Inboard joint boot clamp
(2) Inboard joint boot
(3) No. 2 inboard joint boot clamp

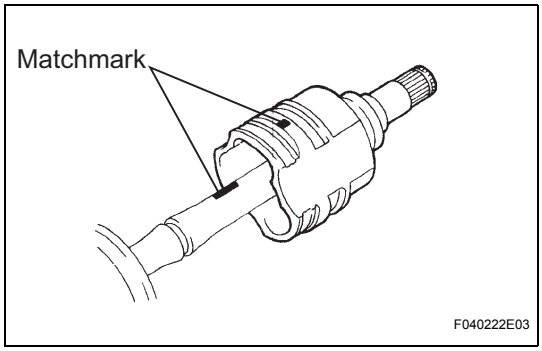
DS



(b) Align the matchmarks and tap in the tripod joint to the outboard joint.
(c) Using a brass bar and hammer, install the tripod joint.
NOTICE:
- **Do not tap the roller.**
- **Be sure to install the tripod joint in the correct direction.**



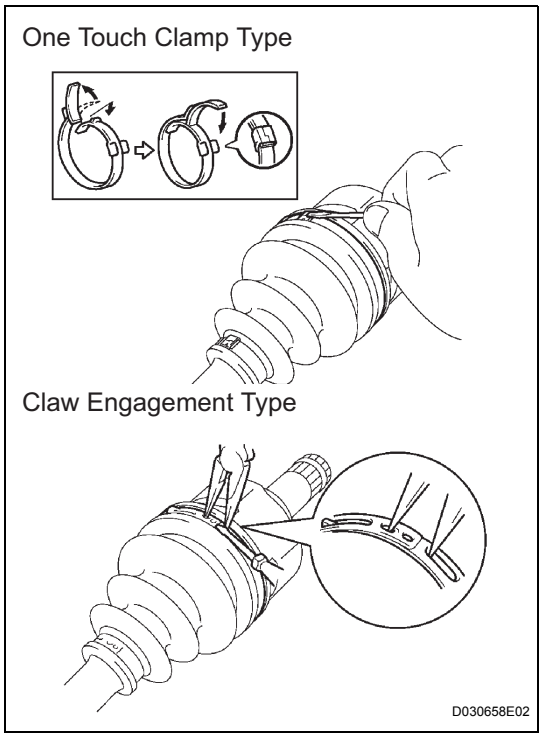
(d) Using a snap ring expander, install a new inner shaft snap ring.
(e) Apply grease to the inboard joint.
Standard grease capacity:
125 to 135 g (4.5 to 4.8 oz.)



(f) Align the matchmarks and install the inboard joint on the outboard joint shaft.

9. INSTALL FRONT DRIVE SHAFT INBOARD JOINT BOOT

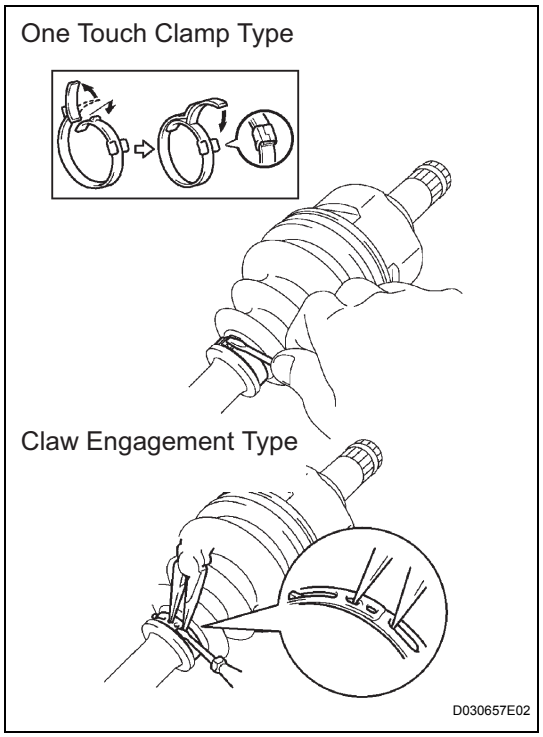
(a) Install the inboard joint boot on the inboard joint and outboard joint shaft.



10. INSTALL FRONT NO. 2 AXLE INBOARD JOINT BOOT CLAMP

(a) One touch clamp type:
Using a screwdriver, install the inboard joint boot clamp as shown in the illustration.
(b) Claw engagement type:
Using needle nose pliers, install the inboard joint boot clamp as shown in the illustration.

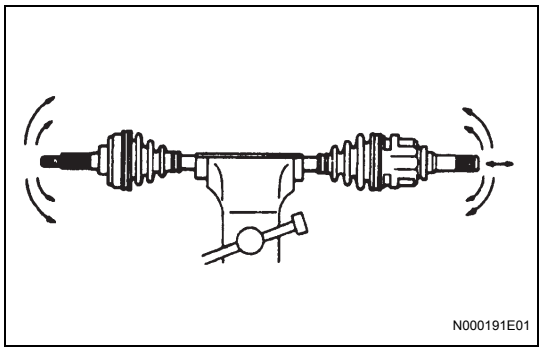
DS



11. INSTALL FRONT AXLE INBOARD JOINT BOOT CLAMP

(a) One touch clamp type:
Using a screwdriver, install the inboard joint boot clamp as shown in the illustration.

(b) Claw engagement type:
Using needle nose pliers, install the inboard joint boot clamp as shown in the illustration.



12. INSPECT FRONT DRIVE SHAFT

(a) Check that there is no remarkable play in the outboard joint.

(b) Check that the inboard joint slides smoothly in the thrust direction.

(c) Check that there is no remarkable play in the radial direction of the inboard joint.

(d) Check the boots for damage.

DRIVE SHAFT SYSTEM

PROBLEM SYMPTOMS TABLE

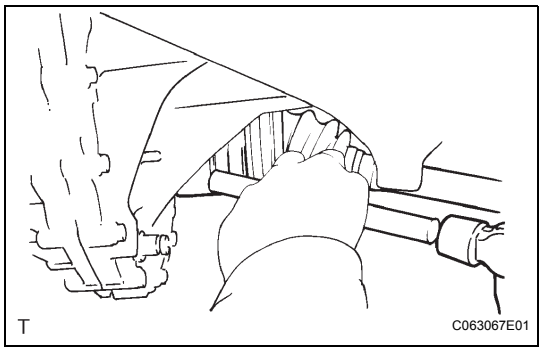
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Drive shaft system

Symptom	Suspected area	See page
Front wheel shimmy	Front drive shaft (worn)	DS-12

INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

(a) Manual transaxle:
Coat the spline of the inboard joint shaft with gear oil.

(b) Automatic transaxle:
Coat the spline of the inboard joint shaft with ATF.

(c) Align the shaft splines and tap in the drive shaft with a brass bar and hammer.
HINT:
Whether the inboard joint shaft is in contact with the pinion shaft or not can be known from the sound or feeling when driving it in.
NOTICE:
- **Set the hole snap ring with the opening side facing downward.**
- **Be careful not to damage the boot and oil seal.**

2. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

HINT:
Use the same procedure for the LH side.

3. CONNECT FRONT DRIVE SHAFT ASSEMBLY

(a) Connect the drive shaft to the front axle.
NOTICE:
- **Be careful not to damage the outboard joint boot.**
- **Be careful not to damage the speed sensor rotor.**
- **Do not excessively push the front axle assembly.**

4. CONNECT TIE ROD END SUB-ASSEMBLY

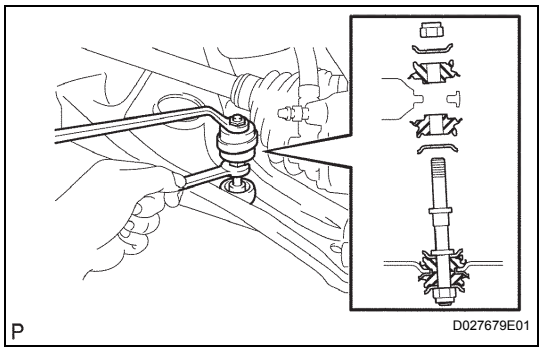
(a) Connect the tie rod end to the steering knuckle with the nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

(b) Install a new cotter pin.
NOTICE:
If the holes for the cotter pin are not aligned, tighten the nut an additional 60°.

5. CONNECT FRONT NO. 1 SUSPENSION LOWER ARM SUB-ASSEMBLY

(a) Connect the front suspension lower arm to the steering knuckle with the nut.
Torque: 98 N*m (999 kgf*cm, 72 ft.*lbf)

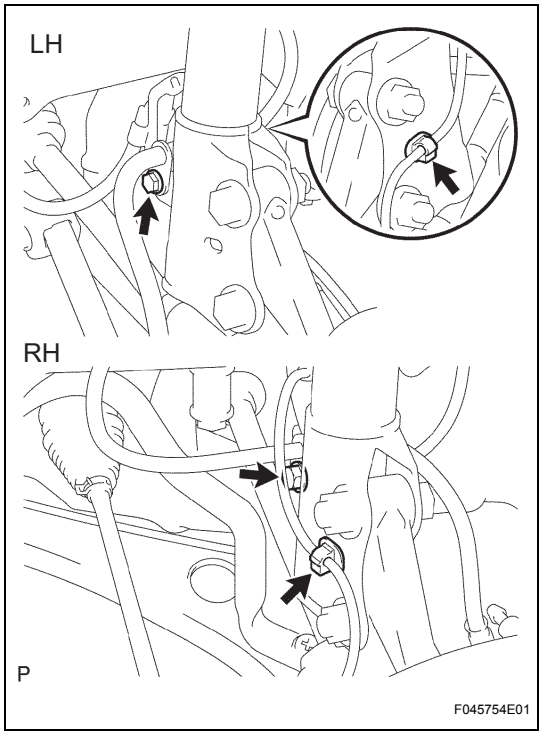
(b) Install a new clip.
NOTICE:
If the holes for the clip are not aligned, tighten the nut an additional 60°.



6. CONNECT FRONT STABILIZER BAR

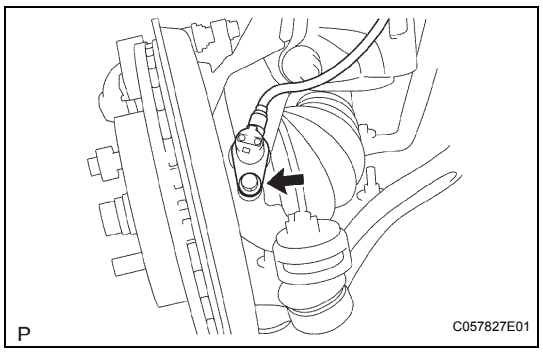
(a) Connect the front stabilizer bar with the 2 cushion retainers, 2 cushions and nut, as shown in the illustration.
NOTICE:
Be sure to install the cushion and retainer in the correct direction.

(b) Hold the bolt with a wrench and install the nut.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

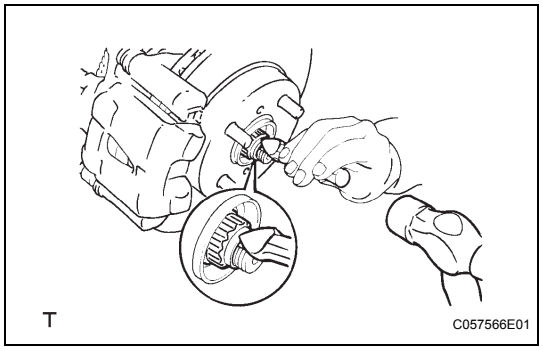


7. INSTALL FRONT SPEED SENSOR

(a) Install the speed sensor and flexible hose on the shock absorber with the bolt and clip.
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)
HINT:
The positions of the bolt and clip on the right side differ from those of the left side.



(b) Install the speed sensor on the steering knuckle with the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
- **Be careful not to damage the speed sensor.**
- **Keep the speed sensor clean.**
- **Do not twist the sensor wire when installing the speed sensor.**



8. INSTALL FRONT AXLE HUB NUT

(a) Install a new hub nut.
Torque: 216 N*m (2,200 kgf*cm, 159 ft.*lbf)

(b) Using a chisel and hammer, stake the hub nut.

9. INSTALL ENGINE UNDER COVER LH

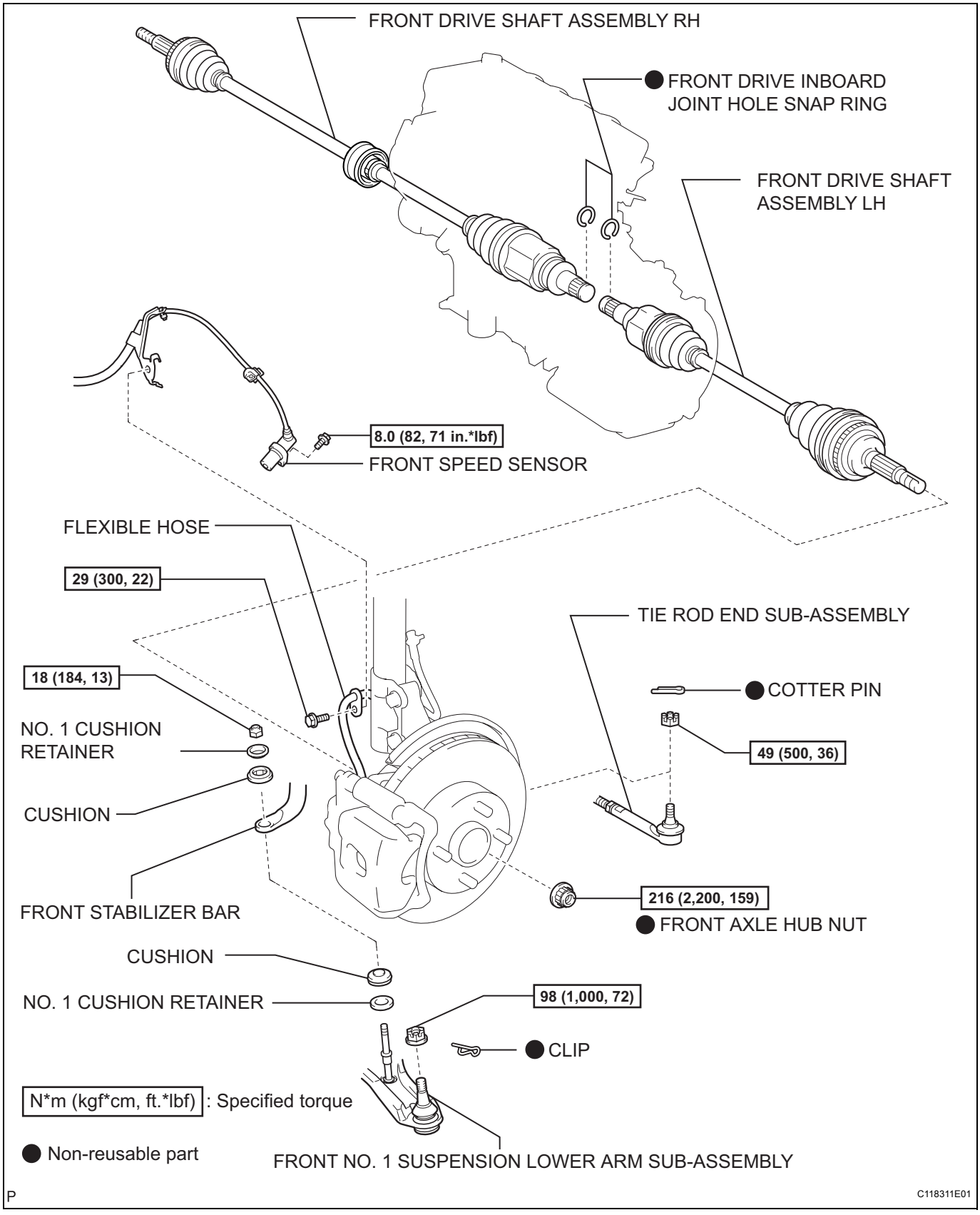
10. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

11. ADD MANUAL TRANSAXLE OIL (for Manual Transaxle)

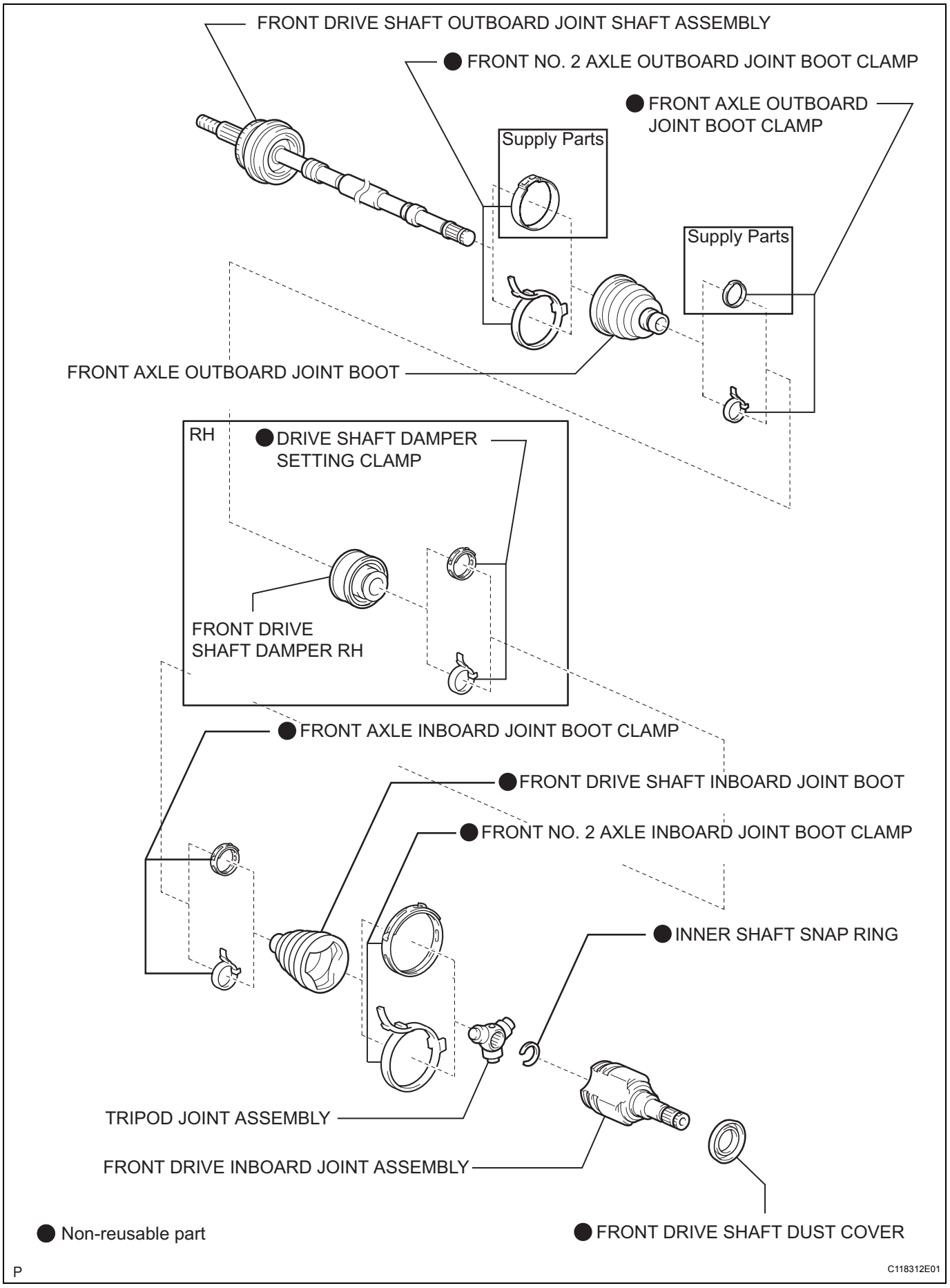
12. **INSPECT AND ADJUST MANUAL TRANSAXLE OIL LEVEL (for Manual Transaxle)**
    (a) Inspect and adjust the manual transaxle oil level (see page MX-2).
13. **ADD AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)**
14. **INSPECT AND ADJUST AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)**
    (a) Inspect and adjust the automatic transaxle fluid (see page AX-82).
15. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    (a) Inspect and adjust the front wheel alignment (see page SP-2).
16. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) Check the ABS speed sensor signal (see page BC-5).

FRONT DRIVE SHAFT ASSEMBLY

COMPONENTS



DS


FRONT DRIVE SHAFT OUTBOARD JOINT SHAFT ASSEMBLY
FRONT NO. 2 AXLE OUTBOARD JOINT BOOT CLAMP
FRONT AXLE OUTBOARD JOINT BOOT CLAMP
Supply Parts
Supply Parts
FRONT AXLE OUTBOARD JOINT BOOT
RH
DRIVE SHAFT DAMPER SETTING CLAMP
FRONT DRIVE SHAFT DAMPER RH
FRONT AXLE INBOARD JOINT BOOT CLAMP
FRONT DRIVE SHAFT INBOARD JOINT BOOT
FRONT NO. 2 AXLE INBOARD JOINT BOOT CLAMP
INNER SHAFT SNAP RING
TRIPOD JOINT ASSEMBLY
FRONT DRIVE INBOARD JOINT ASSEMBLY
Non-reusable part
FRONT DRIVE SHAFT DUST COVER
P
C118312E01

DS

REMOVAL

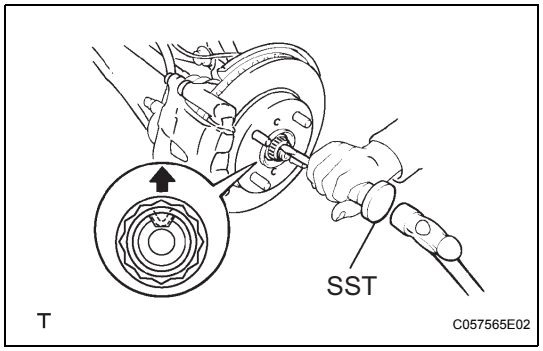
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE FRONT WHEEL

2. REMOVE FRONT AXLE HUB NUT

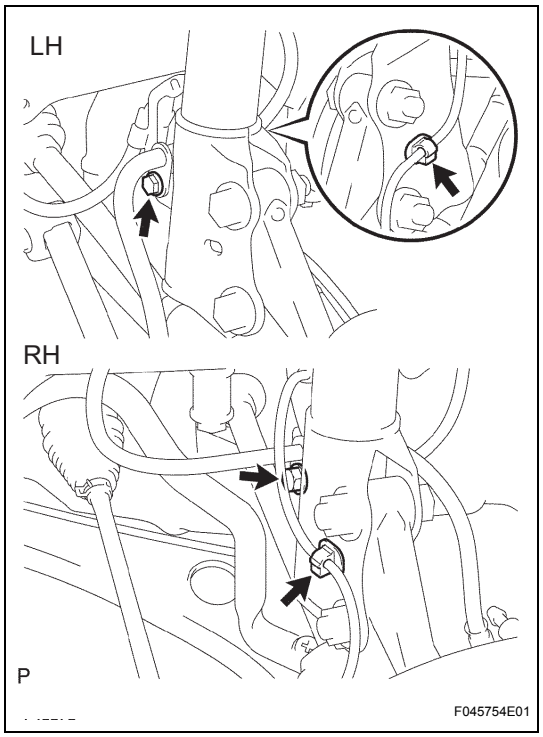
(a) Using SST and a hammer, pry up the retaining tab(s) of the hub nut.
SST 09930-00010
NOTICE:
Loosen the staked part of the nut completely, otherwise the screw of the drive shaft may be damaged.

(b) While applying the brakes, remove the hub nut.



3. DISCONNECT FRONT SPEED SENSOR

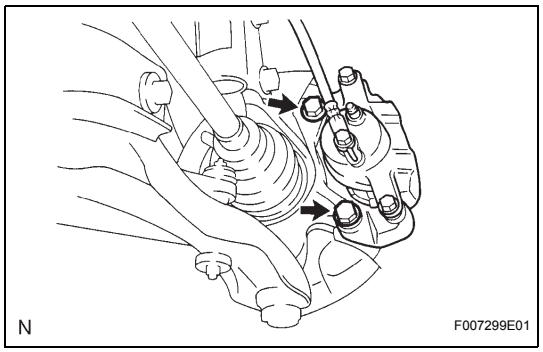
(a) Remove the bolt and clip, and disconnect the front speed sensor and flexible hose from the front shock absorber.
HINT:
The positions of the bolt and clip on the right side differ from those on the left side.



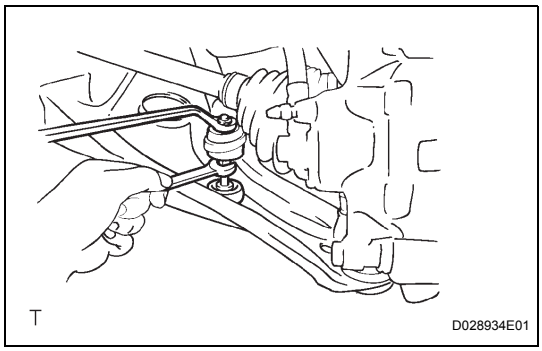
4. DISCONNECT FRONT DISC BRAKE CYLINDER ASSEMBLY

(a) Remove the 2 bolts, and separate the brake cylinder from the steering knuckle.
NOTICE:
Use a string or other device to keep the brake cylinder from hanging down.

5. REMOVE FRONT DISC

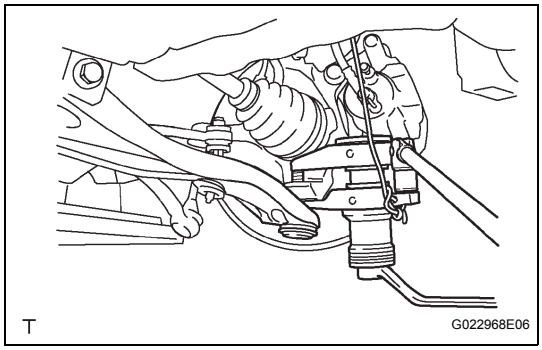


AH



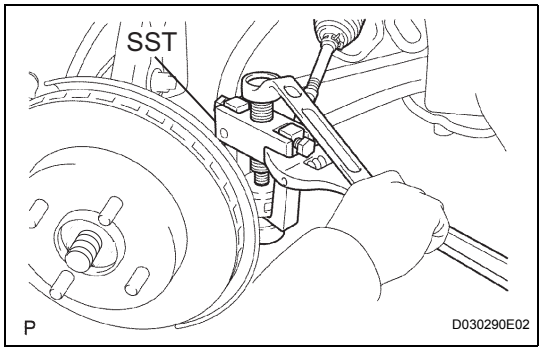
6. DISCONNECT FRONT STABILIZER BAR

(a) Hold the bolt with a wrench and remove the nut.
(b) Remove the 2 cushion retainers and 2 cushions, and disconnect the front stabilizer bar.



7. DISCONNECT FRONT NO. 1 SUSPENSION LOWER ARM SUB-ASSEMBLY

(a) Remove the clip and nut.
(b) Using SST, disconnect the front suspension lower arm from the steering knuckle.
SST 09628-00011

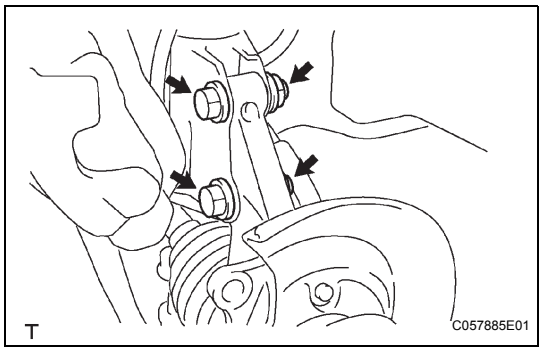


8. DISCONNECT TIE ROD END SUB-ASSEMBLY

(a) Remove the cotter pin and nut.
(b) Using SST, disconnect the tie rod end from the steering knuckle.
SST 09628-62011

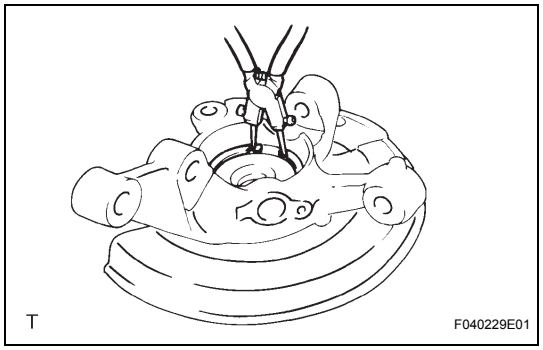
9. DISCONNECT FRONT DRIVE SHAFT ASSEMBLY

(a) Using a plastic-faced hammer, tap the drive shaft and disconnect it.
NOTICE:
- **Be careful not to damage the boot.**
- **Be careful not to damage the speed sensor rotor.**



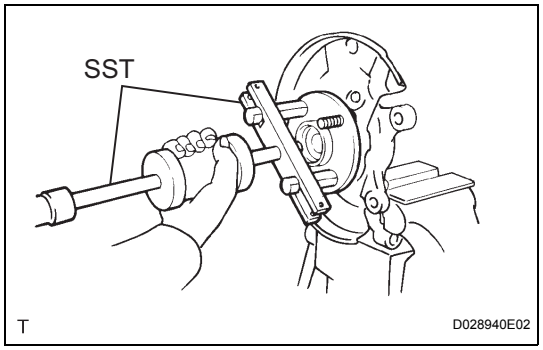
10. REMOVE FRONT AXLE ASSEMBLY

(a) Remove the 2 bolts and 2 nuts, and remove the front axle from the front shock absorber.



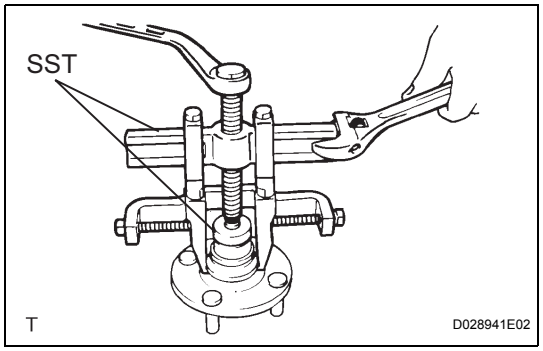
11. REMOVE FRONT AXLE HUB HOLE SNAP RING

(a) Using snap ring pliers, remove the hole snap ring.



12. REMOVE FRONT AXLE HUB SUB-ASSEMBLY

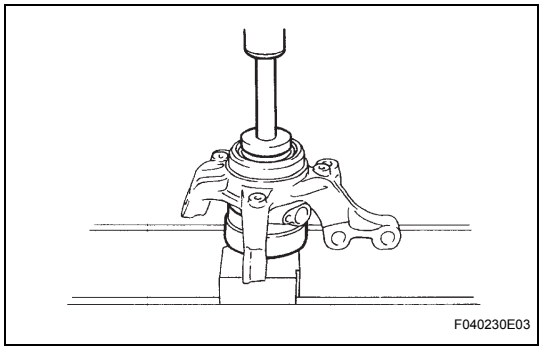
(a) Using SST, tap out the axle hub.
SST 09520-00031



(b) Using SST, remove the inner race of the hub bearing from the axle hub.
SST 09950-60010 (09951-00370), 09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04011, 09957-04010, 09958-04011)

13. REMOVE FRONT DISC BRAKE DUST COVER

(a) Remove the 3 bolts and front dust cover.



14. REMOVE FRONT AXLE HUB BEARING

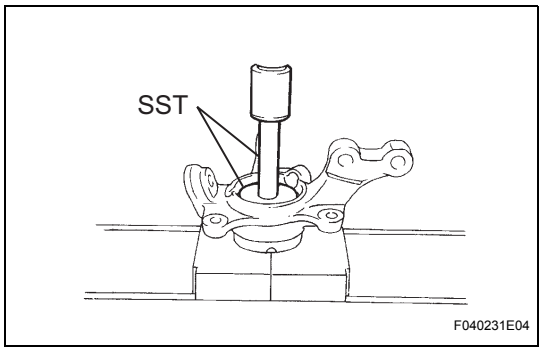
(a) Place the inner race of the hub bearing on the outer race of the hub bearing.

(b) Using SST and a press, press out the hub bearing from the steering knuckle.
SST 09527-17011, 09950-60010 (09951-00600), 09950-70010 (09951-07100)
NOTICE:
Be sure to position the steering knuckle horizontally.

AH

INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. INSTALL FRONT AXLE HUB BEARING

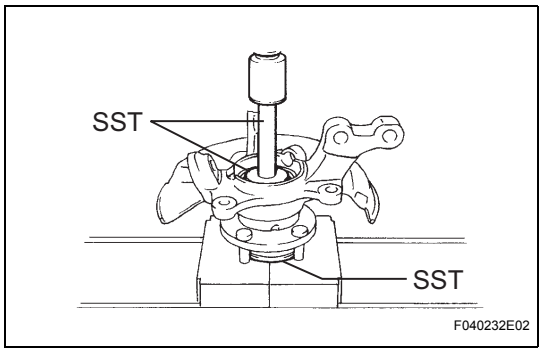
(a) Using SST and a press, press a new hub bearing in the steering knuckle.

SST 09950-60020 (09951-00680), 09950-70010 (09951-07100)

2. INSTALL FRONT DISC BRAKE DUST COVER

(a) Install the front dust cover with the 3 bolts.

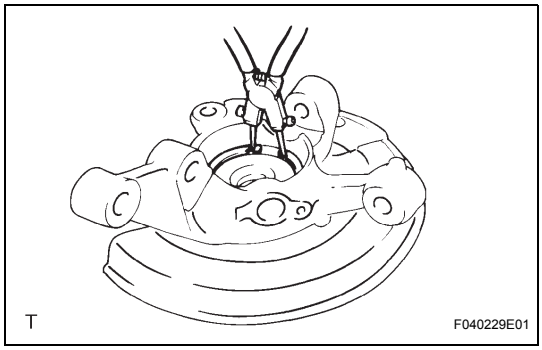
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)



3. INSTALL FRONT AXLE HUB SUB-ASSEMBLY

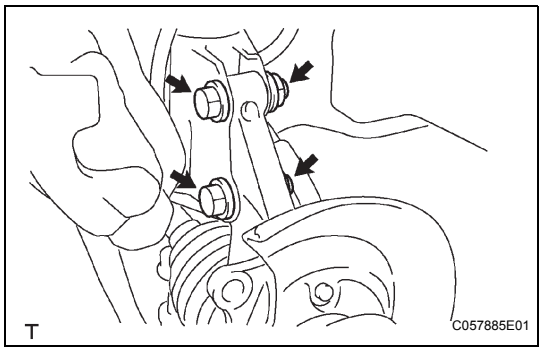
(a) Using SST and a press, press the axle hub in the steering knuckle.

SST 09950-60020 (09951-00680), 09950-70010 (09951-07100), 09608-32010



4. INSTALL FRONT AXLE HUB HOLE SNAP RING

(a) Using snap ring pliers, install a new hole snap ring.



5. INSTALL FRONT AXLE ASSEMBLY

(a) Install the front axle to the front shock absorber with the 2 bolts and 2 nuts.

Torque: 132 N*m (1,,350 kgf*cm, 97 ft.*lbf)

NOTICE:

Only when reusing the bolts and nuts, apply a small amount of engine oil to the screw part of the nuts.

6. CONNECT FRONT DRIVE SHAFT ASSEMBLY

(a) Install the drive shaft to the front axle.

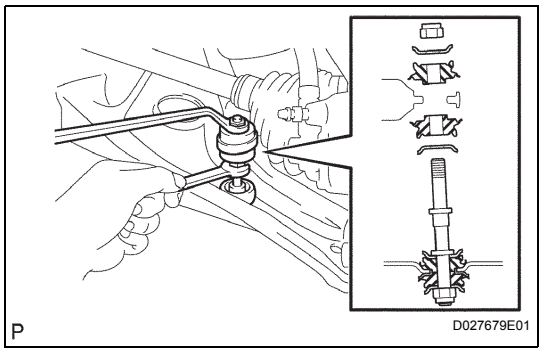
NOTICE:

- **Be careful not to damage the outboard joint boot.**
- **Be careful not to damage the speed sensor rotor.**

- **Do not excessively push the front axle assembly.**

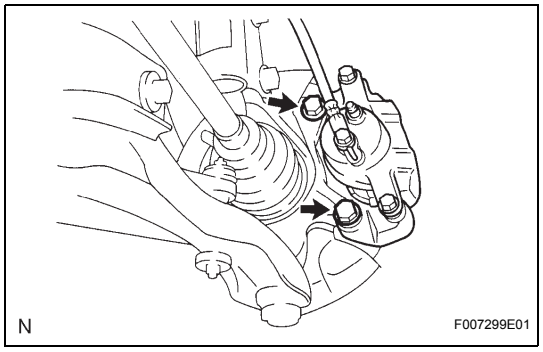
7. **CONNECT TIE ROD END SUB-ASSEMBLY**
   (a) Connect the tie rod end to the steering knuckle with the nut.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
   (b) Install a new cotter pin.
   NOTICE:
   If the holes for the cotter pin are not aligned, tighten the nut an additional 60°.

8. **CONNECT FRONT NO. 1 SUSPENSION LOWER ARM SUB-ASSEMBLY**
   (a) Connect the front suspension lower arm to the steering knuckle with the nut.
   Torque: 98 N*m (999 kgf*cm, 72 ft.*lbf)
   (b) Install a new clip.
   NOTICE:
   If the holes for the clip are not aligned, tighten the nut an additional 60°.



9. **CONNECT FRONT STABILIZER BAR**
   (a) Connect the front stabilizer bar with the 2 cushion retainers, 2 cushions and nut, as shown in the illustration.
   NOTICE:
   Be sure to install the cushion and retainer in the correct direction.
   (b) Hold the bolt with a wrench spanner and install the nut.
   Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

10. **INSTALL FRONT DISC**



11. **CONNECT FRONT DISC BRAKE CYLINDER ASSEMBLY**
   (a) Install the brake cylinder with the 2 bolts to the steering knuckle.
   Torque: 88 N*m (897 kgf*cm, 65 ft.*lbf)

12. **INSTALL FRONT AXLE HUB NUT**
   (a) Install a new hub nut.
   Torque: 216 N*m (2,200 kgf*cm, 159 ft.*lbf)

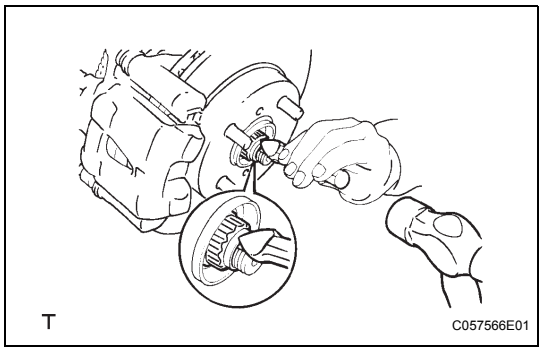
13. **DISCONNECT FRONT DISC BRAKE CYLINDER ASSEMBLY**
   NOTICE:
   Use a string or other device to keep the brake caliper from hanging down.

14. **REMOVE FRONT DISC**

15. **INSPECT FRONT AXLE DEVIATION AND BACKLASH**
   (a) Inspect the front axle deviation and backlash (see page AH-6).

16. **INSTALL FRONT DISC**

17. **CONNECT FRONT DISC BRAKE CYLINDER ASSEMBLY**

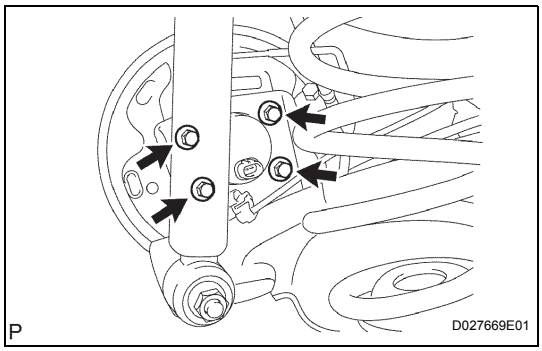


18. **INSTALL FRONT SPEED SENSOR**
    (a) Install the front speed sensor (see page BC-168).
19. **STAKE FRONT AXLE HUB NUT**
    (a) Using a chisel and hammer, stake the hub nut.
20. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
21. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    (a) Inspect and adjust the front wheel alignment (see page SP-2).
22. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) Check the ABS speed sensor signal (see page BC-8).

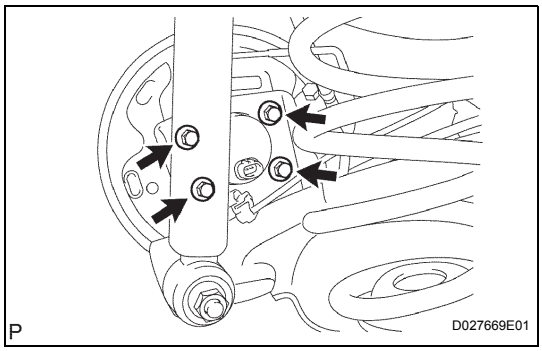
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **REMOVE REAR WHEEL**
2. **REMOVE REAR BRAKE DRUM SUB-ASSEMBLY**
3. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY**
   (a) Disconnect the skid control sensor connector.
   (b) Remove the 4 bolts, hub and bearing assembly.



INSTALLATION



1. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY**
   (a) Install the hub and bearing assembly with the 4 bolts.
   Torque: 61 N*m (622 kgf*cm, 45 ft.*lbf)
   (b) Connect the skid control sensor connector.
   NOTICE:
   Do not twist the sensor wire when connecting it.
2. **INSPECT REAR AXLE DEVIATION AND BACKLASH**
   (a) Inspect the rear axle deviation and backlash (see page AH-15).
3. **INSTALL REAR BRAKE DRUM SUB-ASSEMBLY**
4. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
5. **CHECK ABS SPEED SENSOR SIGNAL**
   (a) Check the ABS speed sensor signal (see page BC-8).

AXLE SYSTEM

PROBLEM SYMPTOMS TABLE

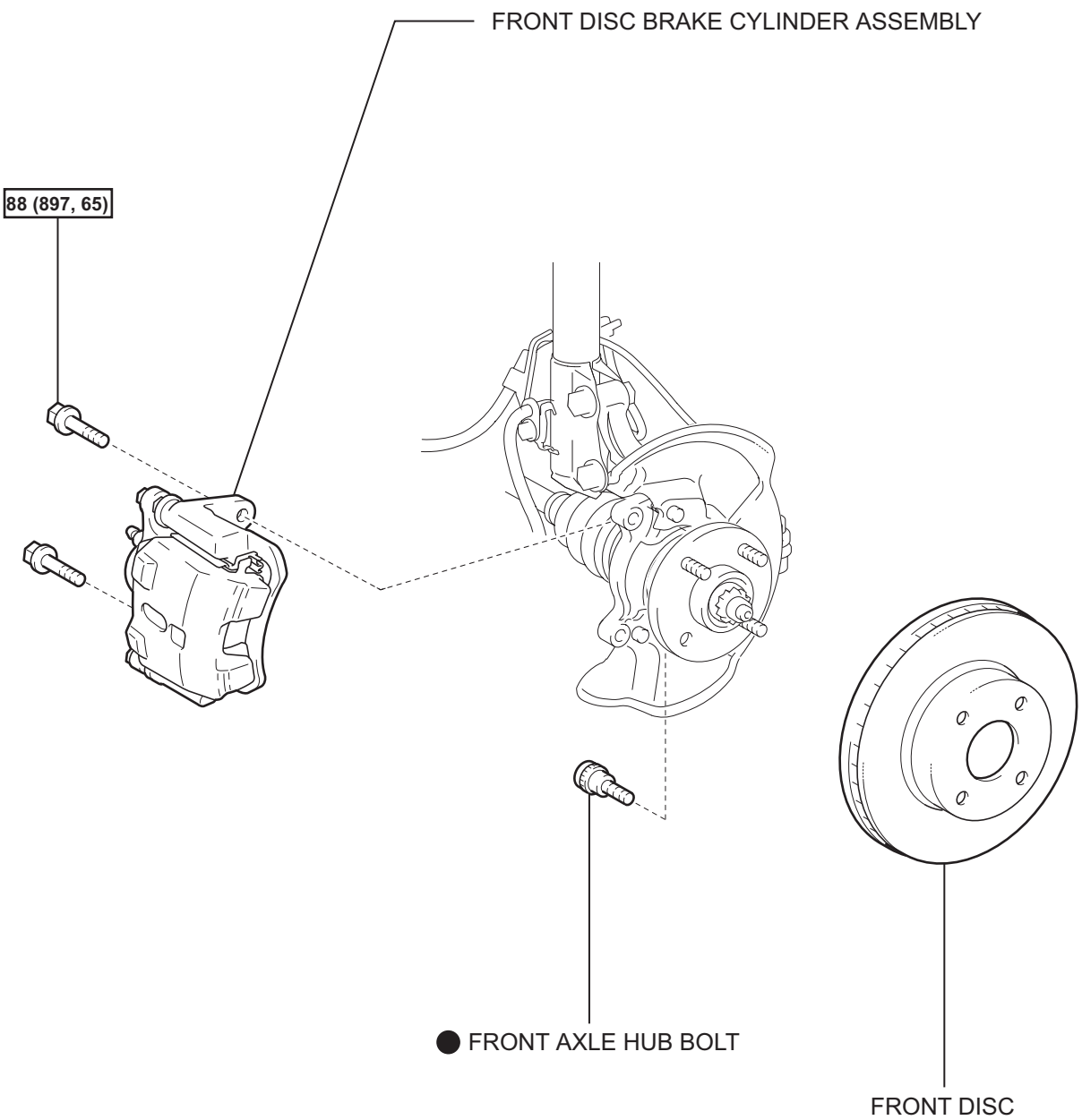
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Axle system

Symptom	Suspected area	See page
Wander or pulls	1. Tires (worn or improperly inflated)	TW-3
	2. Wheel alignment (incorrect)	SP-2
	3. Hub bearings (loose or worn)	AH-6
	4. Steering gear (adjustment required or broken)	PS-25
	5. Suspension parts (worn out) for automatic transaxle	SP-17
	6. Suspension parts (worn out) for manual transaxle	SP-21
Front wheel shimmy	1. Tires (worn or improperly inflated)	TW-3
	2. Wheels (out of balance)	TW-3
	3. Shock absorber (worn out)	SP-12
	4. Wheel alignment (incorrect)	SP-2
	5. Ball joint (worn) for automatic transaxle	SP-17
	6. Ball joint (worn) for manual transaxle	SP-21
	7. Hub bearings (loose or worn)	AH-6
	8. Steering gear	PS-25
Rear wheel shimmy	1. Tires (worn or improperly inflated)	TW-3
	2. Wheels (out of balance)	TW-3
	3. Shock absorber (worn out)	SP-31
	4. Wheel alignment (incorrect)	SP-8
	5. Axle bearings (loose or worn)	AH-15

FRONT AXLE HUB BOLT

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

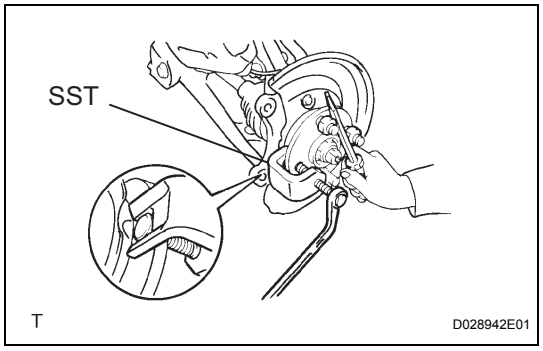
● Non-reusable part

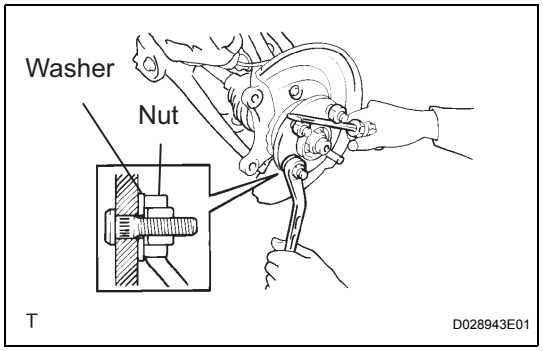
P

C118315E01

REPLACEMENT

1. **REMOVE FRONT WHEEL**
2. **DISCONNECT FRONT DISC BRAKE CYLINDER ASSEMBLY**
   (a) Disconnect the front disc brake cylinder assembly (see page BR-23).
3. **REMOVE FRONT DISC**
4. **REMOVE FRONT AXLE HUB BOLT**
   (a) Using SST and a screwdriver or an equivalent to hold the axle hub, remove the hub bolt.
   SST 09628-10011

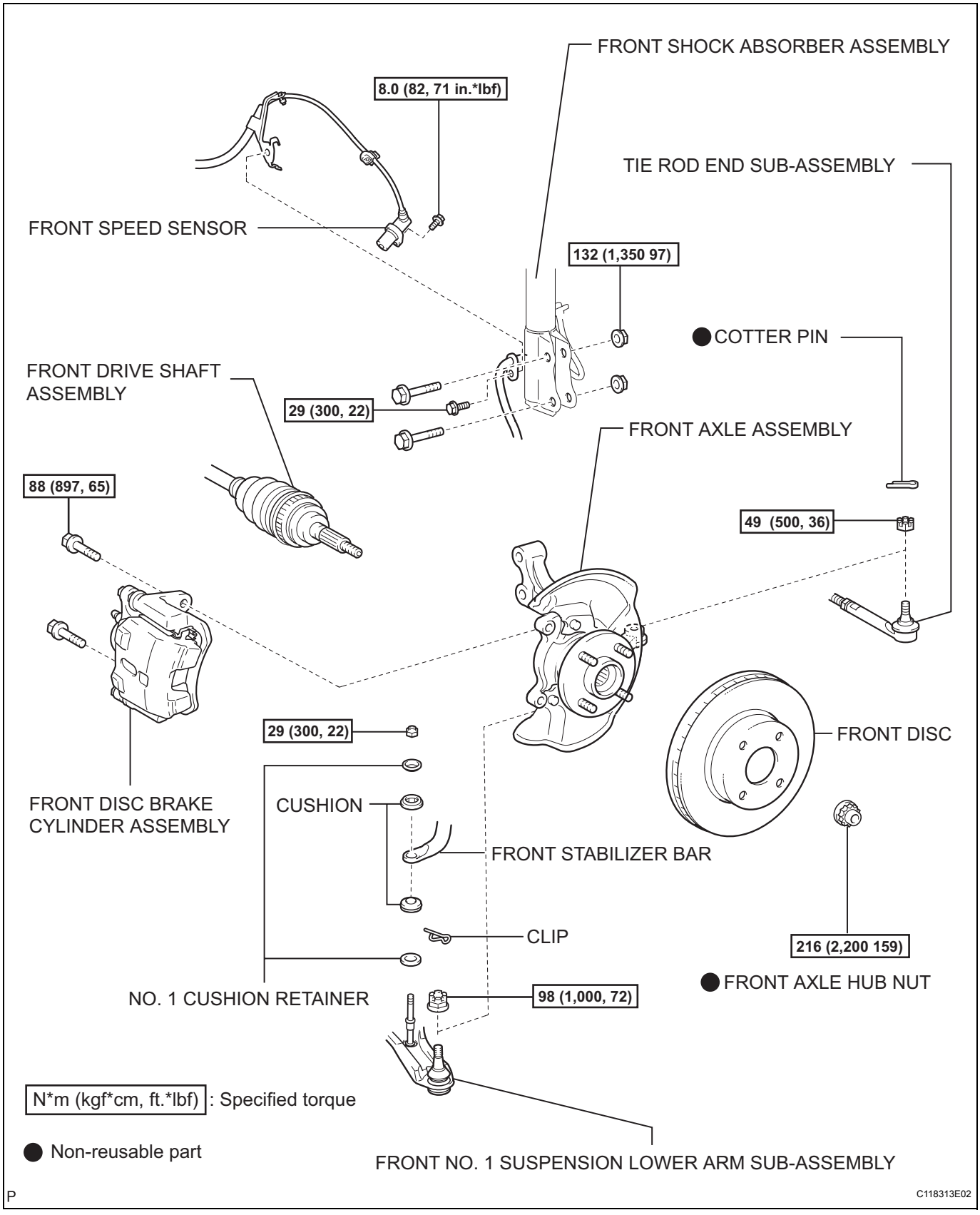




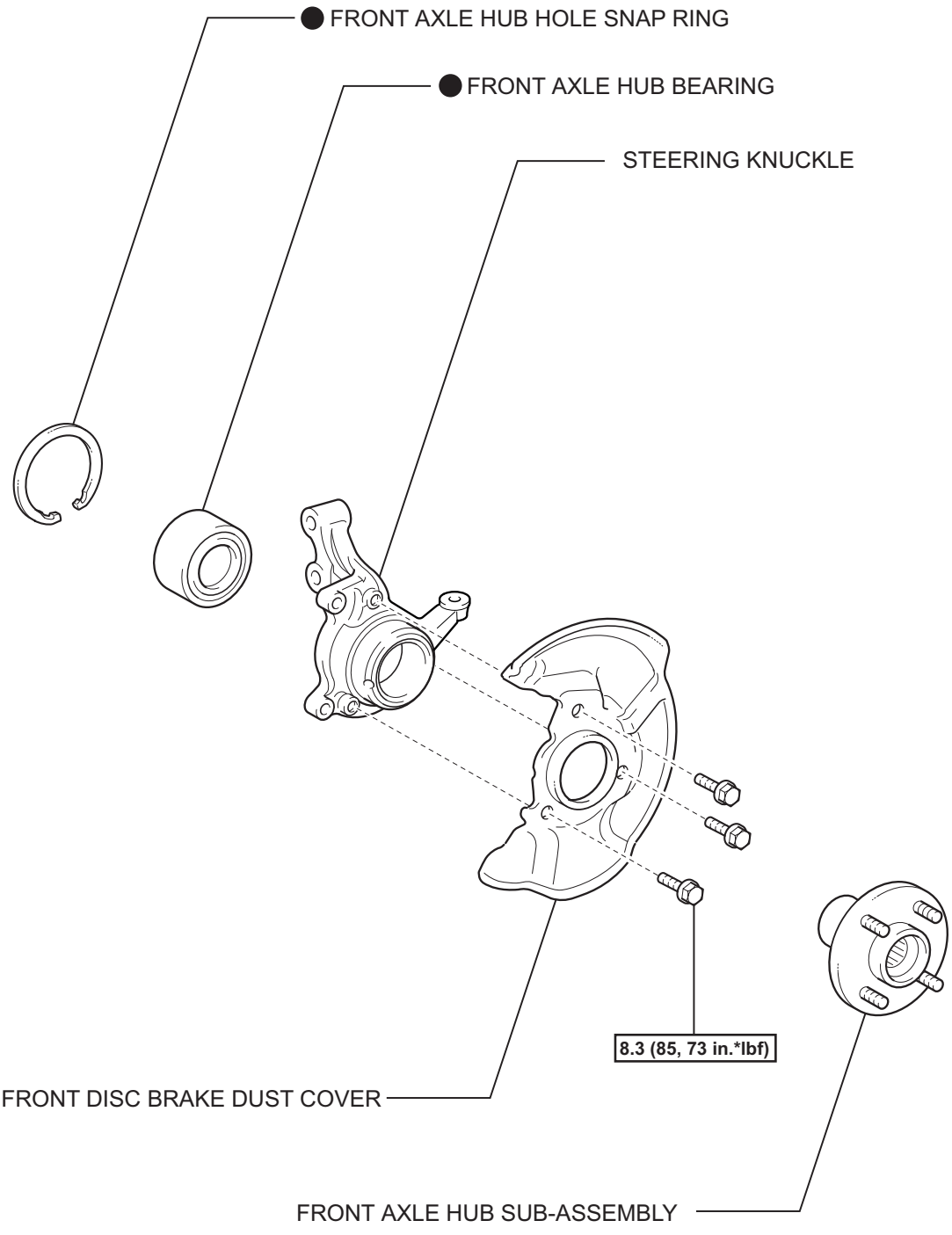
5. **INSTALL FRONT AXLE HUB BOLT**
   (a) Install the washer and nut to a new hub bolt as shown in the illustration.
   (b) Using a screwdriver or an equivalent to hold the axle hub, install the hub bolt by tightening the nut.
6. **INSTALL FRONT DISC**
7. **CONNECT FRONT DISC BRAKE CYLINDER ASSEMBLY**
   (a) Connect the front disc brake cylinder assembly (see page BR-27).
8. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

FRONT AXLE HUB

COMPONENTS



AH



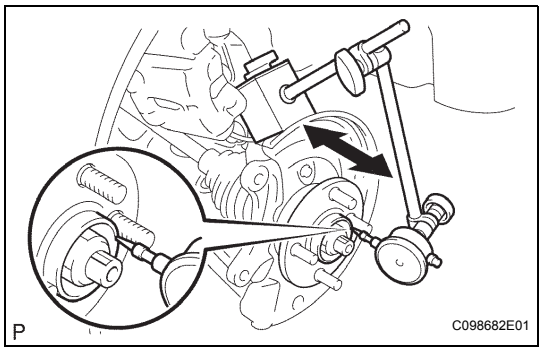
AH

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

C118314E01



ON-VEHICLE INSPECTION

1. CHECK FRONT AXLE HUB BEARING

(a) Remove the front wheel.

(b) Disconnect the front disc brake cylinder (see page BR-24).

(c) Remove the front disc.

(d) Inspect the axle hub backlash.

(1) Using a dial indicator, measure the backlash near the center of the axle hub.

Maximum backlash:

0.05 mm (0.0020 in.)

If the backlash is greater than the maximum, replace the bearing.

(e) Inspect the axle hub deviation.

(1) Using a dial indicator, measure the deviation on the surface of the axle hub.

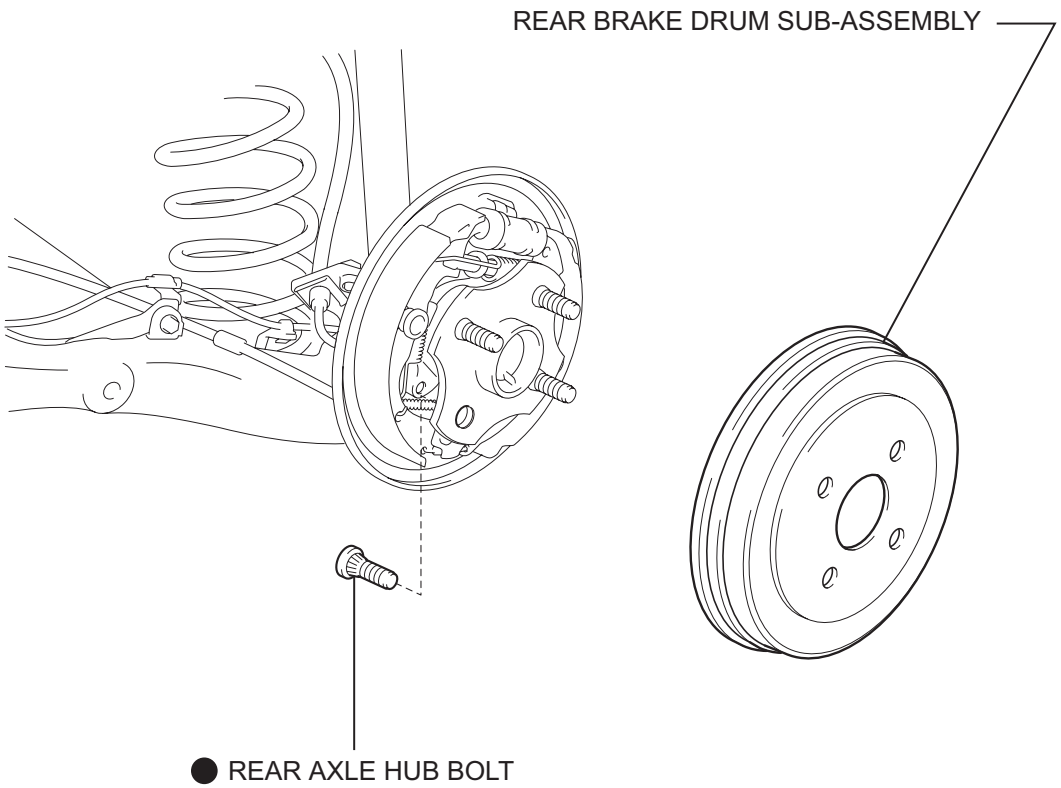
Maximum deviation:

0.05 mm (0.0020 in.)

If the deviation is greater than the maximum, replace the bearing.

REAR AXLE HUB BOLT

COMPONENTS



● Non-reusable part

P

C118317E01

REPLACEMENT

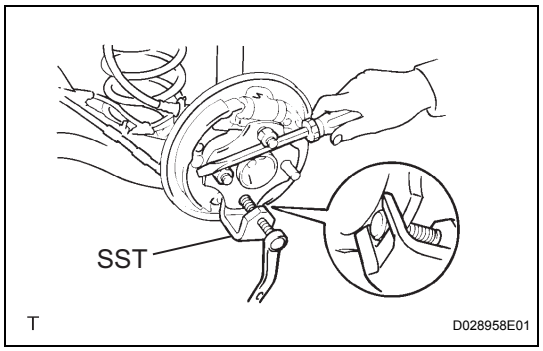
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE REAR WHEEL

2. REMOVE REAR BRAKE DRUM SUB-ASSEMBLY

3. REMOVE REAR AXLE HUB BOLT

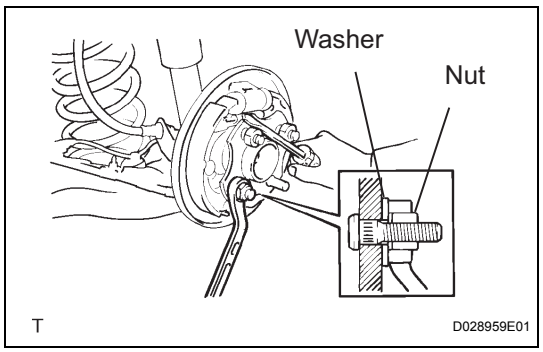
(a) Using SST and a screwdriver or an equivalent, remove the hub bolt.
SST 09628-10011



4. INSTALL REAR AXLE HUB BOLT

(a) Install the washer and nut to a new hub bolt as shown in the illustration.

(b) Using a screwdriver or an equivalent to hold the hub and bearing assembly, install the hub bolt by tightening the nut.

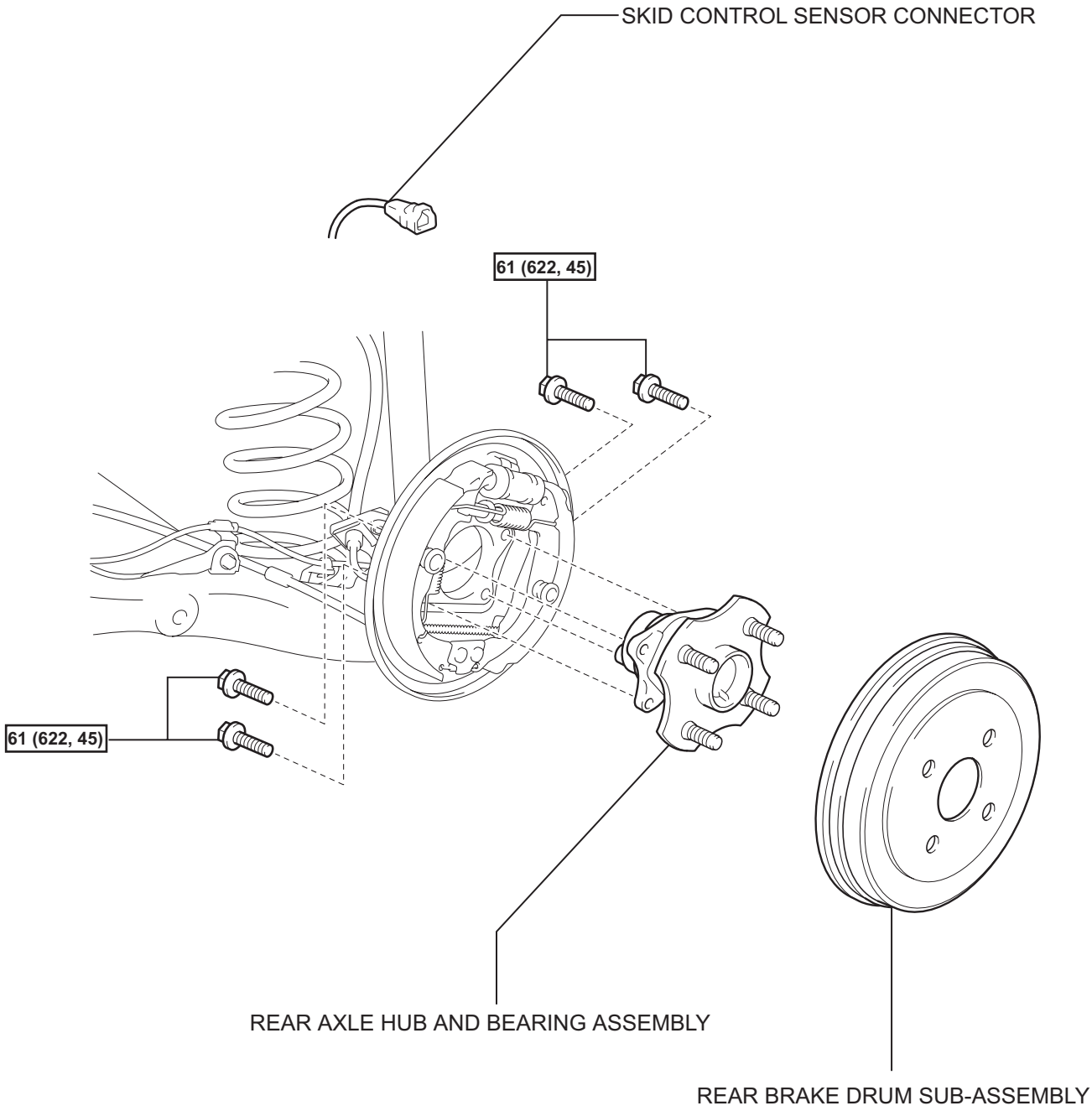


5. INSTALL REAR BRAKE DRUM SUB-ASSEMBLY

6. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REAR AXLE HUB

COMPONENTS

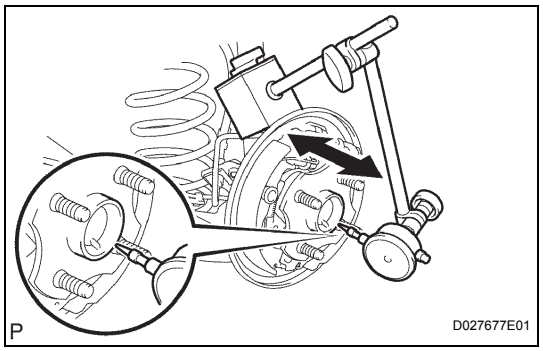


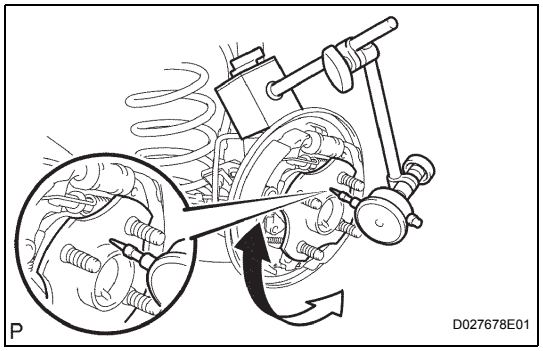
N*m (kgf*cm, ft.*lbf) : Specified torque

P

C118316E01

AH





ON-VEHICLE INSPECTION

1. CHECK REAR AXLE BEARING

(a) Remove the rear wheel.

(b) Remove the rear brake drum sub-assembly.

(c) Inspect the bearing backlash.

(1) Using a dial indicator, check for backlash near the center of the axle hub.

Maximum backlash:

0.05 mm (0.0020 in.)

If the backlash exceeds the maximum, replace the rear axle hub and bearing assembly.

(d) Inspect the axle hub deviation.

(1) Using a dial indicator, check for deviation in the surface of the axle hub inside the hub bolt.

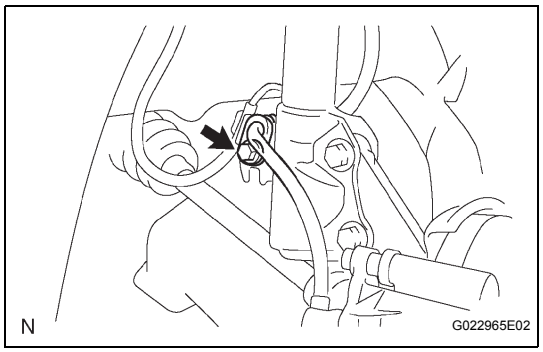
Maximum deviation:

0.07 mm (0.0028 in.)

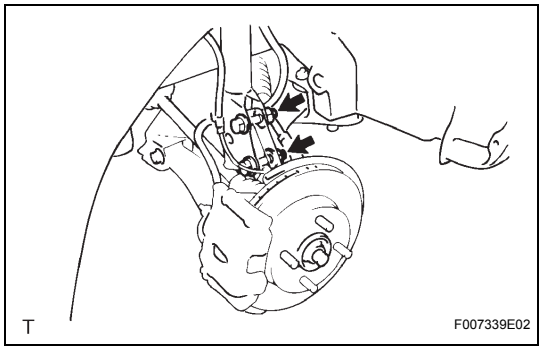
If the deviation exceeds the maximum, replace the rear axle hub and bearing assembly.

REMOVAL

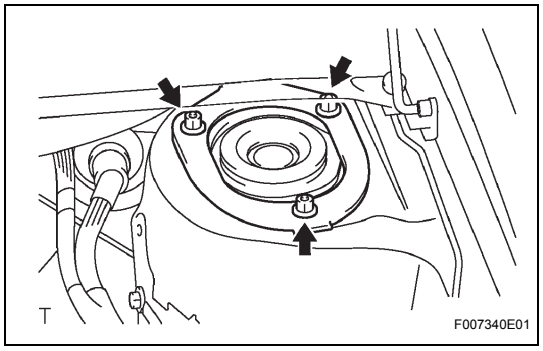
1. **REMOVE FRONT WIPER ARM HEAD CAP**
2. **REMOVE FRONT WIPER ARM LH**
3. **REMOVE FRONT WIPER ARM RH**
4. **REMOVE HOOD TO COWL TOP SEAL**
5. **REMOVE COWL TOP VENTILATOR LOUVER LH**
6. **REMOVE COWL TOP VENTILATOR LOUVER RH**
7. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
8. **REMOVE COWL TOP PANEL OUTER**
   (a) Disconnect the hose and wire harness for wiper.
   (b) Remove the cowl top panel outer with the 8 bolts.
9. **REMOVE FRONT WHEEL**
10. **DISCONNECT FLEXIBLE HOSE**
    (a) Remove the bolt, and disconnect the flexible hose and ABS speed sensor wire harness clamp from the shock absorber bracket.



11. **REMOVE FRONT SHOCK ABSORBER WITH COIL SPRING**
    (a) Remove the 2 nuts and 2 bolts, and disconnect the shock absorber from the steering knuckle.

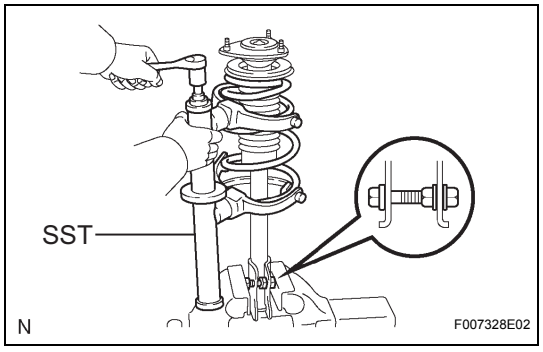


    (b) Remove the 3 nuts and shock absorber.
    (c) Remove the No. 2 suspension support.

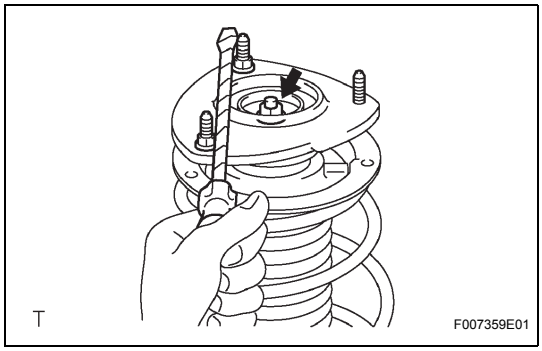


DISASSEMBLY

1. **FIX FRONT SHOCK ABSORBER WITH COIL SPRING**
   (a) Install the 2 nuts and bolt on the bracket at the lower side of the shock absorber and secure it in a vise.
   (b) Using SST, compress the coil spring.
   SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)
   NOTICE:
   Do not use an impact wrench. It will damage the SST.



SP



2. **REMOVE FRONT SUSPENSION SUPPORT DUST COVER LH**
   (a) Remove the dust cover from the suspension support.

3. **REMOVE FRONT SUPPORT TO FRONT SHOCK ABSORBER LH NUT**
   (a) Using the 2 nuts and a screwdriver or an equivalent to secure the shock absorber, remove the center nut.
   NOTICE:
   Be careful not to damage the suspension support stud bolts.
   HINT:
   Use the screwdriver tip before use.

4. **REMOVE FRONT SUSPENSION SUPPORT SUB-ASSEMBLY LH**

5. **REMOVE FRONT SUSPENSION SUPPORT LH DUST SEAL**

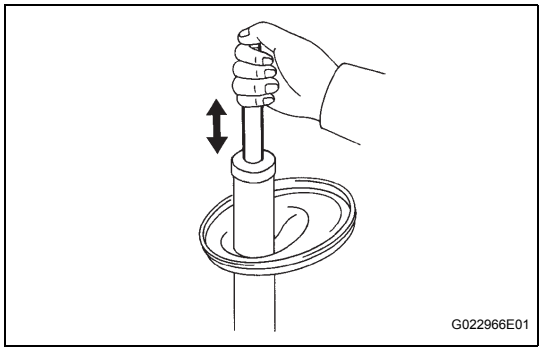
6. **REMOVE FRONT COIL SPRING SEAT UPPER LH**

7. **REMOVE FRONT COIL SPRING INSULATOR UPPER LH**

8. **REMOVE FRONT COIL SPRING LH**

9. **REMOVE FRONT SPRING BUMPER LH**

10. **REMOVE FRONT SHOCK ABSORBER ASSEMBLY LH**



INSPECTION

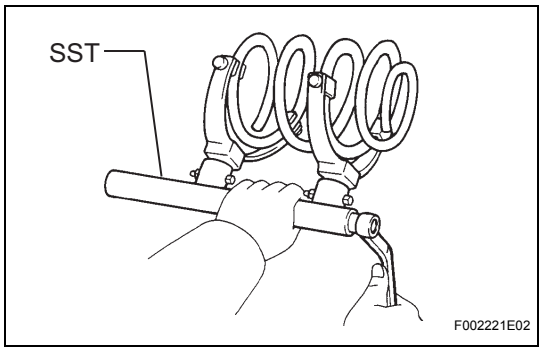
1. **INSPECT FRONT SHOCK ABSORBER ASSEMBLY LH**
   (a) Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual sound during operation.
   If there is any abnormality, replace the shock absorber with a new one.
   NOTICE:
   When disposing of the shock absorber, see DISPOSAL (see page SP-14).

REASSEMBLY

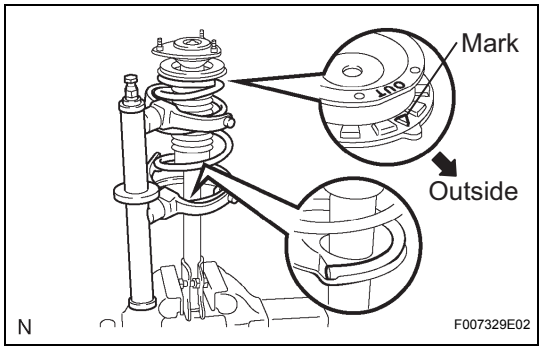
1. INSTALL FRONT SHOCK ABSORBER ASSEMBLY LH

2. INSTALL FRONT SPRING BUMPER LH

3. INSTALL FRONT COIL SPRING LH



(a) Using SST, compress the coil spring.
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)
NOTICE:
Do not use an impact wrench. It will damage the SST.



(b) Install the coil spring on the shock absorber.
HINT:
Fit the lower end of the coil spring into the gap of the spring lower seat.

4. INSTALL FRONT COIL SPRING INSULATOR UPPER LH

(a) Install the upper insulator with the mark facing the outside of the vehicle.

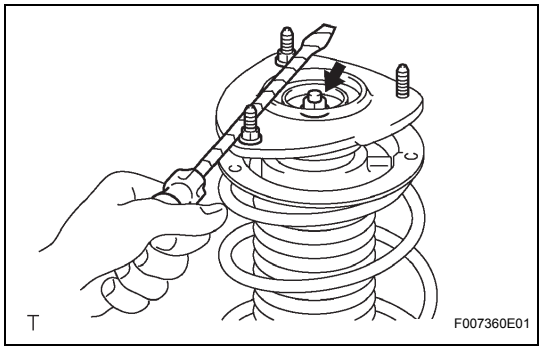
5. INSTALL FRONT COIL SPRING SEAT UPPER LH

(a) Install the spring upper seat with the "OUT" mark facing the outside of the vehicle.

6. INSTALL FRONT SUSPENSION SUPPORT LH DUST SEAL

7. INSTALL FRONT SUSPENSION SUPPORT SUB-ASSEMBLY LH

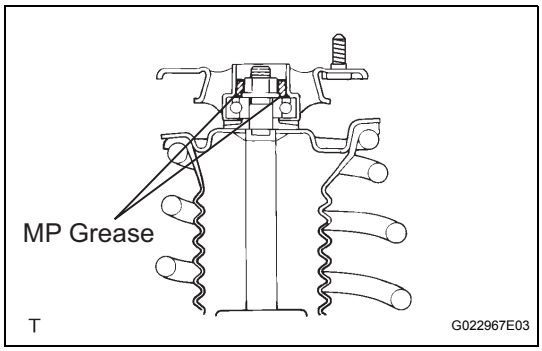
8. INSTALL FRONT SUPPORT TO FRONT SHOCK ABSORBER LH NUT



(a) Using the 2 nuts and a screwdriver or an equivalent to secure the shock absorber, install a new center nut.
Torque: 33 N*m (340 kgf*cm, 25 ft.*lbf)
NOTICE:
Be careful not to damage the suspension support stud bolts.
HINT:
Tape the screwdriver tip before use.

(b) Remove the SST.
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

SP



(c) Apply MP grease to the suspension support.

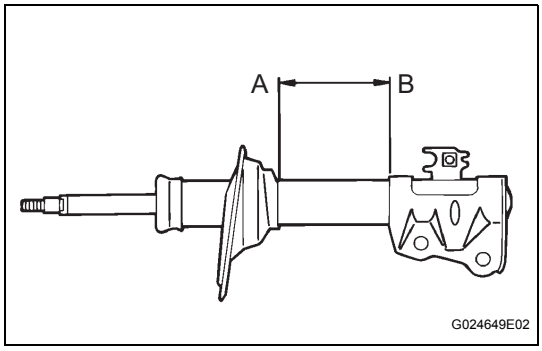
9. INSTALL FRONT SUSPENSION SUPPORT DUST COVER LH

INSTALLATION

1. **INSTALL FRONT SHOCK ABSORBER ASSEMBLY LH**
   (a) Install the No. 2 suspension support.
   (b) Install the shock absorber with the 3 nuts.
   Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)
   (c) Connect the shock absorber to the steering knuckle.
   (d) Install the 2 bolts and nut.
   Torque: 132 N*m (1,350 kgf*cm, 97 ft.*lbf)
   NOTICE:
   When installing the bolt, keep it from rotating and torque the nut.
2. **CONNECT FLEXIBLE HOSE**
   (a) Connect the flexible hose.
   Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)
3. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
4. **INSTALL COWL TOP PANEL OUTER**
   (a) Install the cowl top panel outer with the 8 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
   (b) Connect the hose and wire harness for wiper.
5. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY**
6. **INSTALL COWL TOP VENTILATOR LOUVER RH**
7. **INSTALL COWL TOP VENTILATOR LOUVER LH**
8. **INSTALL HOOD TO COWL TOP SEAL**
9. **INSTALL FRONT WIPER ARM LH**
10. **INSTALL FRONT WIPER ARM RH**
11. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    (a) Inspect and adjust the front wheel alignment (see page SP-2).

DISPOSAL

HINT:
Disposal of the RH is the same as that of the LH.



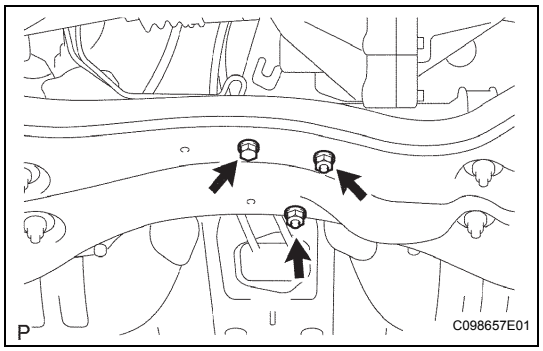
1. DISPOSE OF FRONT SHOCK ABSORBER ASSEMBLY LH

(a) Fully extend the shock absorber rod.

(b) Using a drill, make a hole in the cylinder somewhere between A and B as shown in the illustration to discharge the gas inside.

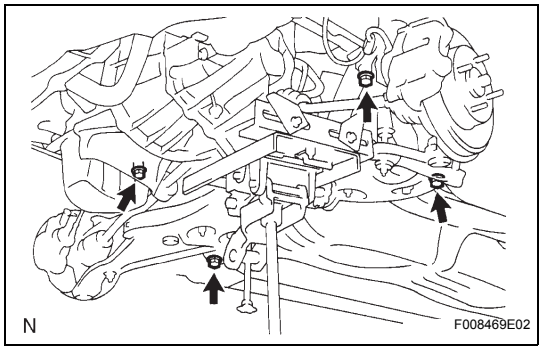
CAUTION:
Be careful when drilling because shards of metal may fly about, so always use the proper safety equipment.

HINT:
The gas is colorless, odorless and non-poisonous.



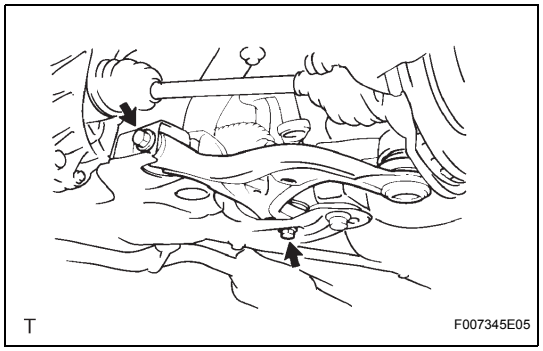
11. DISCONNECT FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Remove the bolt and 2 nuts.



(b) Support the crossmember with the jack.

(c) Remove the 4 bolts and disconnect the crossmember.

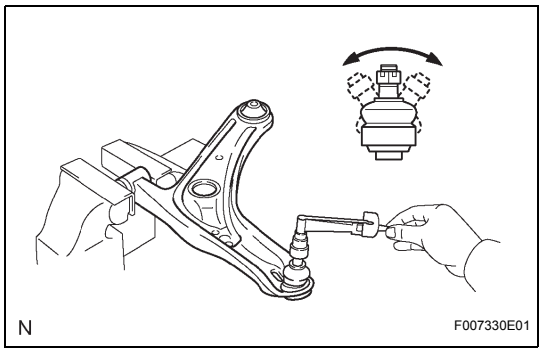


12. REMOVE FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH

(a) Remove the 2 bolts, nut and lower arm.

NOTICE:
Do not turn the nut.

INSPECTION



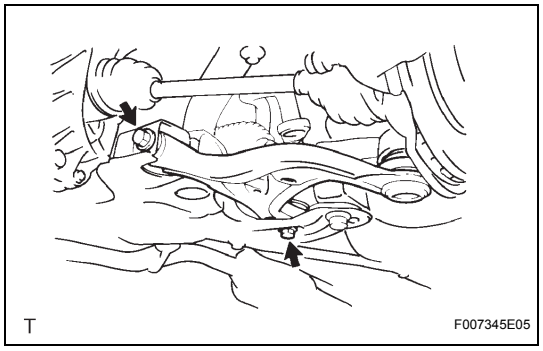
1. INSPECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH

(a) As shown in the illustration, flip the ball joint stud back and forth 5 times before installing the nut.

(b) Using a torque wrench, turn the nut continuously at a rate of 2 to 4 seconds per turn and take the torque reading on the fifth turn.

HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page SS-32).

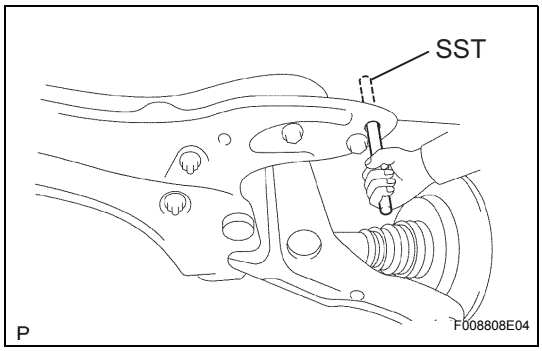
INSTALLATION



1. TEMPORARILY INSTALL FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH

(a) Temporarily install the front lower arm with the 2 bolts and nut.

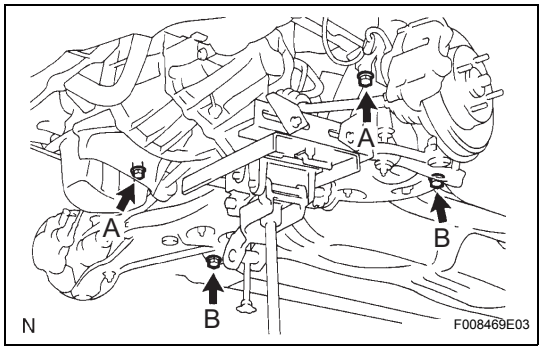
SP



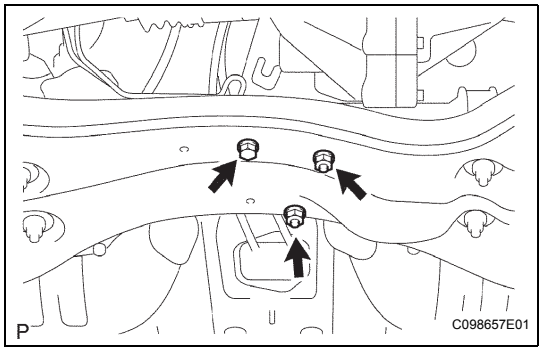
2. CONNECT FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Using SST, align the holes of the suspension member and the body.
SST 09670-00010

(b) Perform the procedure above on the other side.



(c) Install the suspension member with the 4 bolts.
Torque: 70 N*m (715 kgf*cm, 52 ft.*lbf) for bolt A
116 N*m (1,180 kgf*cm, 86 ft.*lbf) for bolt B



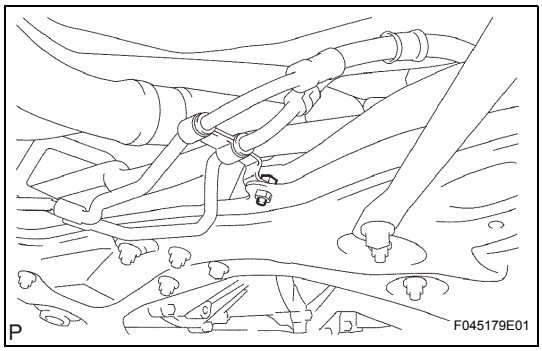
(d) Install the bolt and 2 nuts.
Torque: 80 N*m (816 kgf*cm, 59 ft.*lbf)

3. INSTALL FRONT SUSPENSION MEMBER REINFORCEMENT LH

(a) Install the reinforcement with the 2 bolts.
Torque: 47 N*m (480 kgf*cm, 35 ft.*lbf)

4. INSTALL FRONT SUSPENSION MEMBER REINFORCEMENT RH

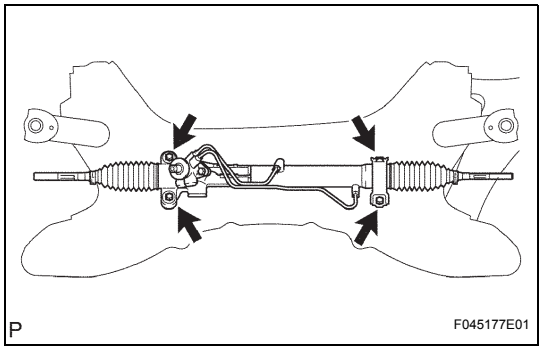
(a) Install the reinforcement with the 2 bolts.
Torque: 47 N*m (480 kgf*cm, 35 ft.*lbf)



5. CONNECT PRESSURE FEED TUBE ASSEMBLY

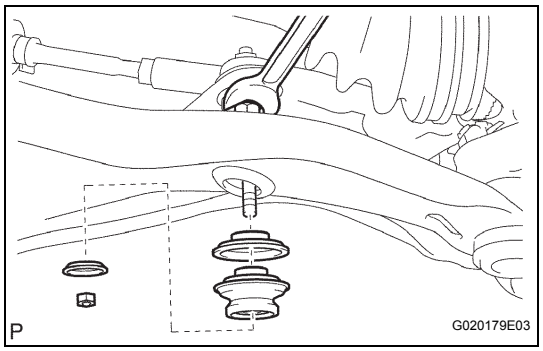
(a) Connect the pressure feed tube with the bolt.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

SP



6. CONNECT POWER STEERING LINK ASSEMBLY

(a) Install the steering link with the 4 bolts and 4 nuts.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
NOTICE:
Do not turn the nut.



7. CONNECT FRONT STABILIZER BAR

(a) Install the 2 retainers and cushion.

(b) While holding the stabilizer bolt with a wrench, install the nut.

Torque: 18 N*m (180 kgf*cm, 13 ft.*lbf)

HINT:

Support the lower arm with a jack.

(c) Perform the procedure above on the other side.

8. CONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH

(a) Connect the lower arm to the steering knuckle with the nut.

Torque: 98 N*m (1,000 kgf*cm, 72 ft.*lbf)

(b) Install a new clip.

NOTICE:

If the holes for the clip are not aligned, tighten the nut further up to 60°.

9. CONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

10. INSTALL FRONT WHEEL

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

11. FULLY TIGHTEN FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH

(a) Fully tighten the lower arm with the 2 bolts.

Torque: 88 N*m (900 kgf*cm, 65 ft.*lbf) for bolt A
132 N*m (1,350 kgf*cm, 97 ft.*lbf) for bolt B

NOTICE:

Do not turn the nut.

12. INSPECT AND ADJUST HOOD SUB-ASSEMBLY

13. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(a) Inspect and adjust the front wheel alignment (see page SP-2).

SP

SUSPENSION SYSTEM

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Suspension system

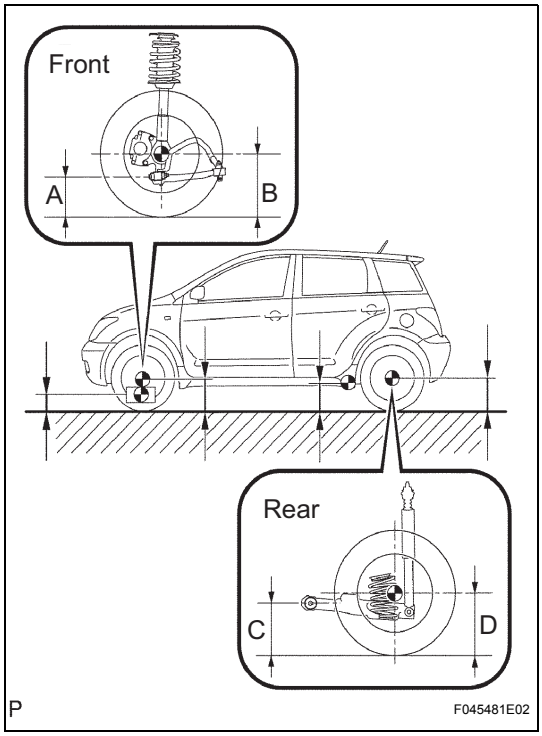
Symptom	Suspected area	See page
Wanders/pulls	1. Tire (worn or improperly inflated)	TW-3
	2. Wheel alignment for front (incorrect)	SP-2
	3. Wheel alignment for rear (incorrect)	SP-8
	4. Steering linkage (loose or worn)	-
	5. Hub bearing for front (worn)	AH-6
	6. Hub bearing for rear (worn)	AH-15
	7. Steering gear (out of adjustment or broken)	PS-23
	8. Suspension parts (worn)	-
Bottoming	1. Vehicle (overloaded)	-
	2. Spring for front (weak)	SP-11
	3. Spring for rear (weak)	SP-27
	4. Shock absorber for front (worn)	SP-10
	5. Shock absorber for rear (worn)	SP-31
Sways/pitches	1. Tire (worn or improperly inflated)	TW-3
	2. Stabilizer bar (bent or broken)	SP-24
	3. Spring for front (weak)	SP-11
	4. Spring for rear (weak)	SP-27
	5. Shock absorber for front (worn)	SP-10
	6. Shock absorber for rear (worn)	SP-31
Front wheel shimmy	1. Tire (worn or improperly inflated)	TW-3
	2. Wheel (out of balance)	TW-3
	3. Shock absorber for front (worn)	SP-10
	4. Shock absorber for rear (worn)	SP-31
	5. Wheel alignment for front (incorrect)	SP-2
	6. Wheel alignment for rear (incorrect)	SP-8
	7. Ball joint for automatic transaxle (worn)	SP-16
	8. Ball joint for manual transaxle (worn)	SP-21
	9. Hub bearing for front (worn)	AH-6
	10. Hub bearing for rear (worn)	AH-15
	11. Steering linkage (loose or worn)	-
	12. Steering gear (out of adjustment or broken)	PS-23
Abnormal tire wear	1. Tire (worn or improperly inflated)	TW-3
	2. Wheel alignment for front (incorrect)	SP-2
	3. Wheel alignment for rear (incorrect)	SP-8
	4. Shock absorber for front (worn)	SP-10
	5. Shock absorber for rear (worn)	SP-31
	6. Suspension parts (worn)	-

FRONT WHEEL ALIGNMENT

INSPECTION

1. INSPECT TIRE

(a) Inspect the tire (see page TW-3).



2. INSPECT VEHICLE HEIGHT

Standard vehicle height

Item	Specified Condition
Front A - B	91 mm (3.58 in.)
Rear D - C	19 mm (0.75 in.)

Measuring points:

A:
Ground clearance of front wheel center

B:
Ground clearance of lower suspension arm front bolt center

C:
Ground clearance of axle beam set bolt center

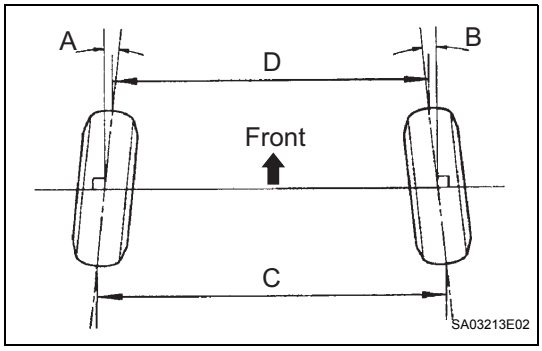
D:
Ground clearance of rear wheel center

NOTICE:

Before inspecting the wheel alignment, adjust the vehicle height to the specified value.

HINT:

Bounce the vehicle at the corners up and down to stabilize the suspension and inspect the vehicle height.



3. INSPECT TOE-IN

Standard toe-in

Item	Specified Condition
Toe-in (total)	A + B: 0° +-11' (0° +-0.19°) C - D: 0 +-2 mm (0 +-0.08 in)

HINT:

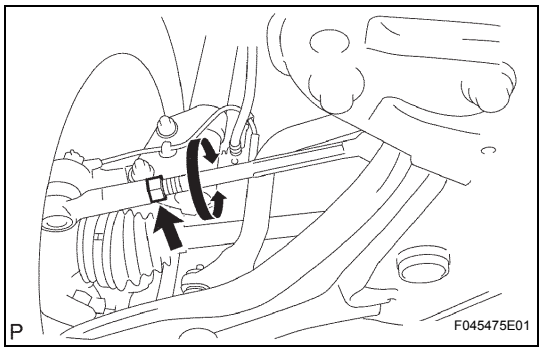
- Measure "C - D" only when "A + B" cannot be measured.
- If the toe-in is not within the specified value, adjust it at the rack ends.

4. ADJUST TOE-IN

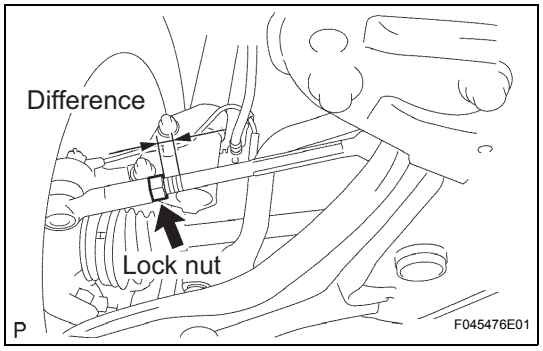
(a) Measure the thread lengths of the right and left rack ends.

Standard rack end length difference:
1.5 mm (0.059 in.) or less

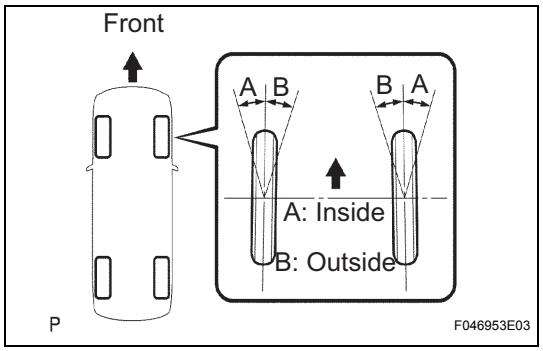
(b) Remove the rack boots set clips.



(c) Loosen the tie rod end lock nuts.
(d) Adjust the rack ends if the difference in thread length between the right and left rack ends is not within the specified range.
  (1) Extend the shorter rack end if the measured toe-in deviates toward the outer side.
  (2) Shorten the longer rack ends if the measured toe-in deviates toward the inner side.



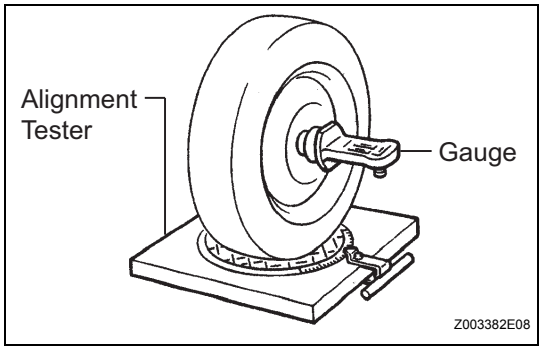
(e) Turn the right and left rack ends by an equal amount to adjust toe-in.
HINT:
Try to adjust toe-in to the center of the specified range.
(f) Make sure that the lengths of the right and left rack ends are the same.
Standard rack end length difference:
0 +-1 mm (0 +-0.0039 in.)
(g) Torque the tie rod end lock nuts.
Torque: 74 N*m (749 kgf*cm, 54 ft.*lbf)
NOTICE:
Temporarily tighten the lock nut while holding the hexagonal part of the steering rack ends so that the lock nut and the steering rack end do not turn together. Hold the width across flat of the tie rod end and tighten the lock nut.
(h) Place the boots on the seats and install the clips.
HINT:
Make sure that the boots are not twisted.



5. INSPECT WHEEL ANGLE
(a) Turn the steering wheel fully and measure the turning angle.
Standard wheel turning angle

Item	Specified Condition
Inside wheel	**33°37' +-2° (33.62°+-2°)**
Outside wheel (reference)	**29°55' (29.92°)**

If the right and left inside wheel angles differ from the specified value, check the right and left rack end lengths.



6. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION
(a) Put the front wheel on the center of the alignment tester.
(b) Remove the wheel cap.
(c) Install the camber-caster-steering axis inclination gauge at the center of the axle hub or drive shaft.

SP

(d) Adjust the camber, caster and steering axis inclination.

Standard camber, caster and steering axis inclination

Item	Specified Condition
Camber Right-left error	-0°39' +-45' (-0.65° +-0.75°) 30' (0.5°) or less
Caster Right-left error	1°47' +-45' (1.78° +-0.75°) 30' (0.5°) or less
Steering axis inclination Right-left error	10°13' +-45' (10.22° +-0.75°) 30' (0.5°) or less

NOTICE:

- **Inspect while the vehicle is empty (without the spare tire or tools).**
- **The maximum tolerance of right and left difference for the camber and caster is 30' or less.**

(e) Remove the camber-caster-steering axis inclination gauge and attachment.

(f) Install the wheel cap.

If the caster and steering axis inclination are not within the specified values after the camber has been correctly adjusted, recheck the suspension parts for any damage and/or worn-out parts.

7. ADJUST CAMBER

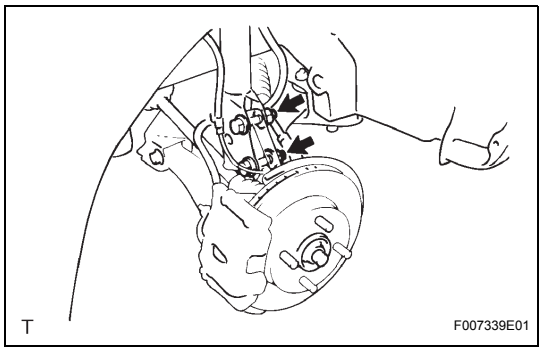
NOTICE:

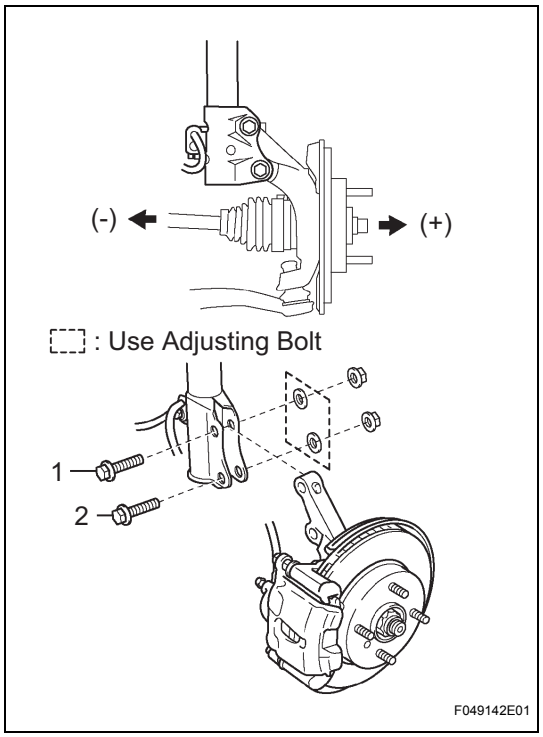
Inspect toe-in after the camber has been adjusted.

(a) Remove the front wheel.

(b) Remove the 2 nuts on the lower side of the shock absorber.

(c) Clean the installation surface of the shock absorber and the steering knuckle.





(d) Temporarily install the 2 nuts (step A).
(e) Fully push or pull the front axle hub in the direction of the required adjustment (step B).
(f) Tighten the 2 nuts.
Torque: 132 N*m (1,350 kgf*cm, 97 ft.*lbf)
NOTICE:
Keep the bolts from rotating and torque the nuts.
(g) Install the front wheel.
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
(h) Check the camber.
If the measured value is not within the specified range, calculate the required adjustment amount using the formula below.
Camber adjustment amount:
Center of the specified range - Measured value
Check installed bolts combination. Select appropriate bolts from the table below to adjust the camber to within the specified range.
Standard selection table

Item	Selection Table
Move the axle toward (+) in step B	Refer to table (1) (Move the axle toward positive side)
Move the axle toward (-) in step B	Refer to table (2) (Move the axle toward negative side)

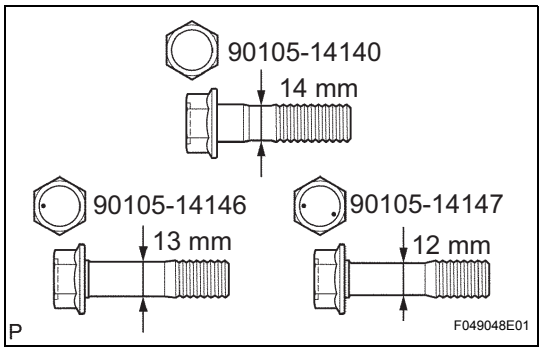
Table (1) Move the axle toward positive side

Installed Bolt / Adjusting Value		1	2	3	4	5
		90105-14140	90105-14140	90105-14140	90105-14146	90105-14147
		90105-14140	90105-14146	90105-14147	90105-14147	90105-14147
−1°00' to −0°45'						E
−0°45' to −0°30'					E	A
−0°30' to −0°15'				E	A	B
−0°15' to 0°			E	A	B	C
0°to 0°15'		A	B	C	D	
0°15' to 0°30'		B	C	D		
0°30' to 0°45'		C	D			
0°45' to 1°00'		D				

	A	B	C	D	E
1	90105-14140	90105-14140	90105-14146	90105-14147	90105-14140
2	90105-14146	90105-14147	90105-14147	90105-14147	90105-14140

SP

P C120266E02



NOTICE:

- **The body and suspension may be damaged if the camber is not correctly adjusted according to the above table.**
- **Replace the nut with a new one when replacing the bolt.**

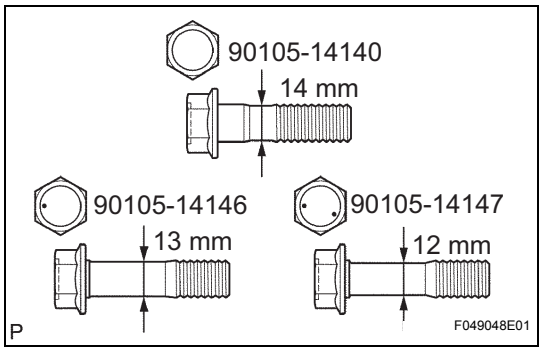
(i) Repeat the steps mentioned above. At step A, replace 1 or 2 selected bolts.
HINT:
Replace one bolt at a time when replacing 2 bolts.

Table (2) Move the axle toward negative side

Installed Bolt / Adjusting Value		1	2	3	4	5
		90105-14140	90105-14140	90105-14140	90105-14146	90105-14147
		90105-14140	90105-14146	90105-14147	90105-14147	90105-14147
−1°00' to −0°45'		D				
−0°45' to −0°30'		C	D			
−0°30' to −0°15'		B	C	D		
−0°15' to 0°		A	B	C	D	
0°to 0°15'			E	A	B	C
0°15' to 0°30'				E	A	B
0°30' to 0°45'					E	A
0°45' to 1°00'						E

	A	B	C	D	E
1	90105-14140	90105-14140	90105-14146	90105-14147	90105-14140
2	90105-14146	90105-14147	90105-14147	90105-14147	90105-14140

P C120267E02



NOTICE:

- **The body and suspension may be damaged if the camber is not correctly adjusted according to the above table.**
- **Replace the nut with a new one when replacing the bolt.**

(j) Repeat the steps mentioned above. At step A, replace 1 or 2 selected bolts.
HINT:
Replace one bolt at a time when replacing 2 bolts.

SP

REAR WHEEL ALIGNMENT

INSPECTION

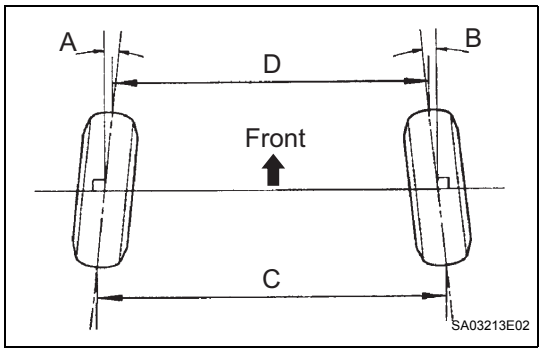
1. INSPECT TIRE

(a) Inspect the tire (see page TW-3).

2. INSPECT VEHICLE HEIGHT

(a) Inspect the vehicle height (see page SP-2).

NOTICE:
Before inspecting wheel alignment, adjust the vehicle height to the specified value.



3. INSPECT TOE-IN

Standard toe-in

Item	Specified Condition
Toe-in (total)	A - B: 0°21' +-20' (0.35° +-0.33°) C-D: 3.4 +-3.0 mm (0.13 +-0.12 in.)

If the toe-in is not within the specified value, inspect the suspension parts and replace them if necessary.

4. INSPECT CAMBER

(a) Install the camber-caster-kingpin gauge or position the vehicle on a wheel alignment tester.

(b) Inspect the camber.

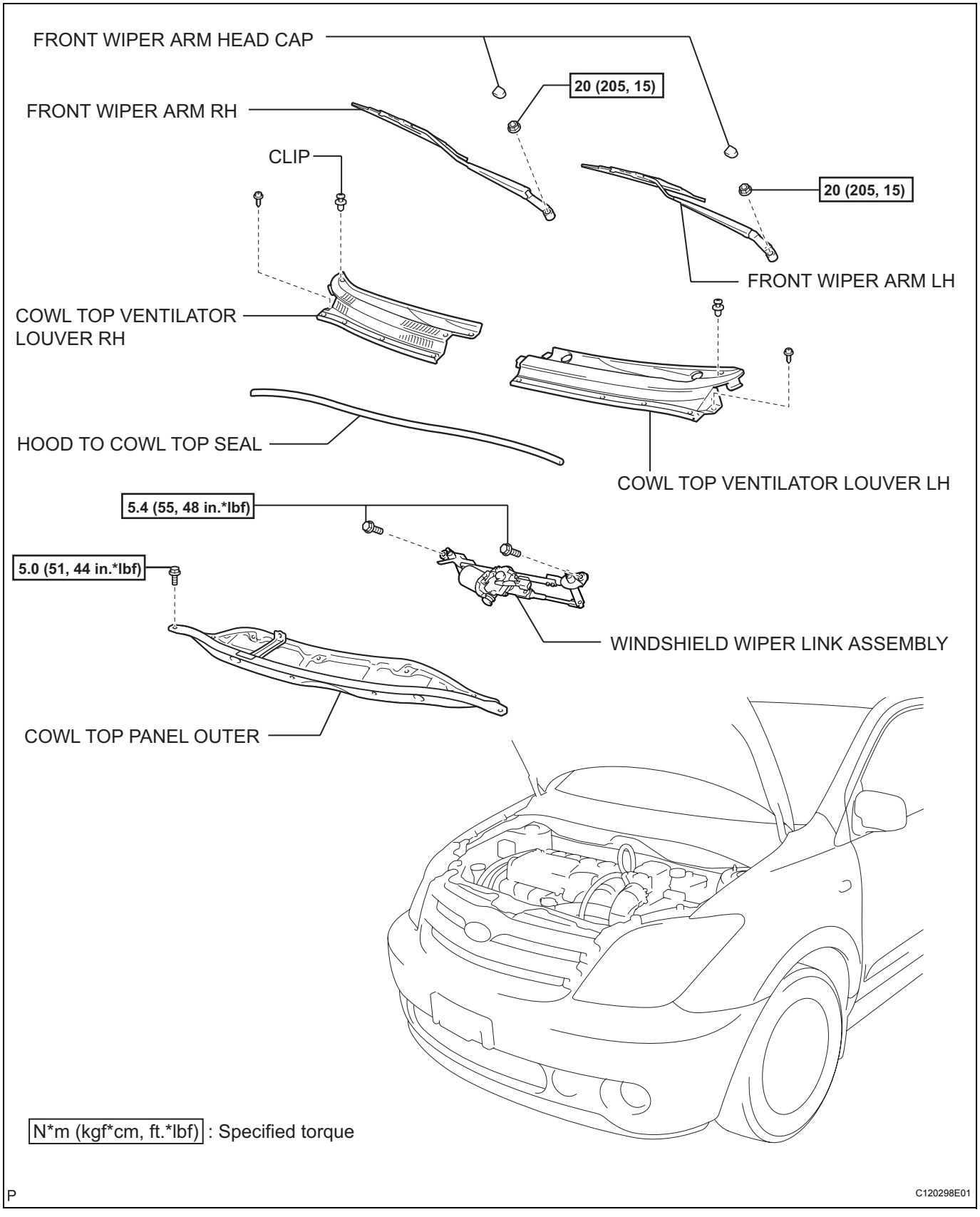
Standard camber

Item	Specified Condition
Camber	-0°+-45' (-0.95°+-0.75°)
Right-left error	30' (0.5°) or less

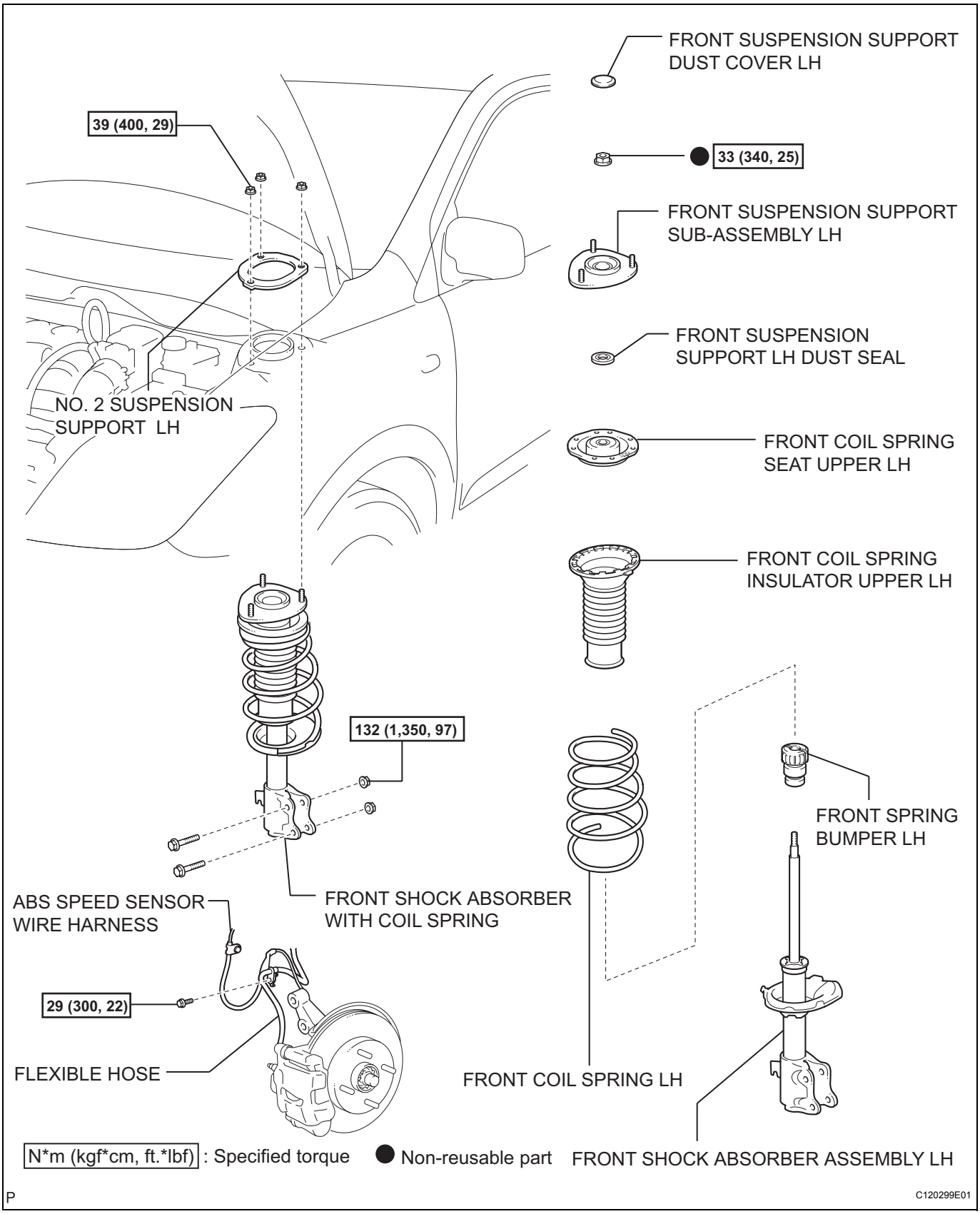
If the measured value is not within the specified value, inspect the suspension parts for damage and/or wear, and replace them if necessary because the camber is not adjustable.

FRONT SHOCK ABSORBER WITH COIL SPRING

COMPONENTS



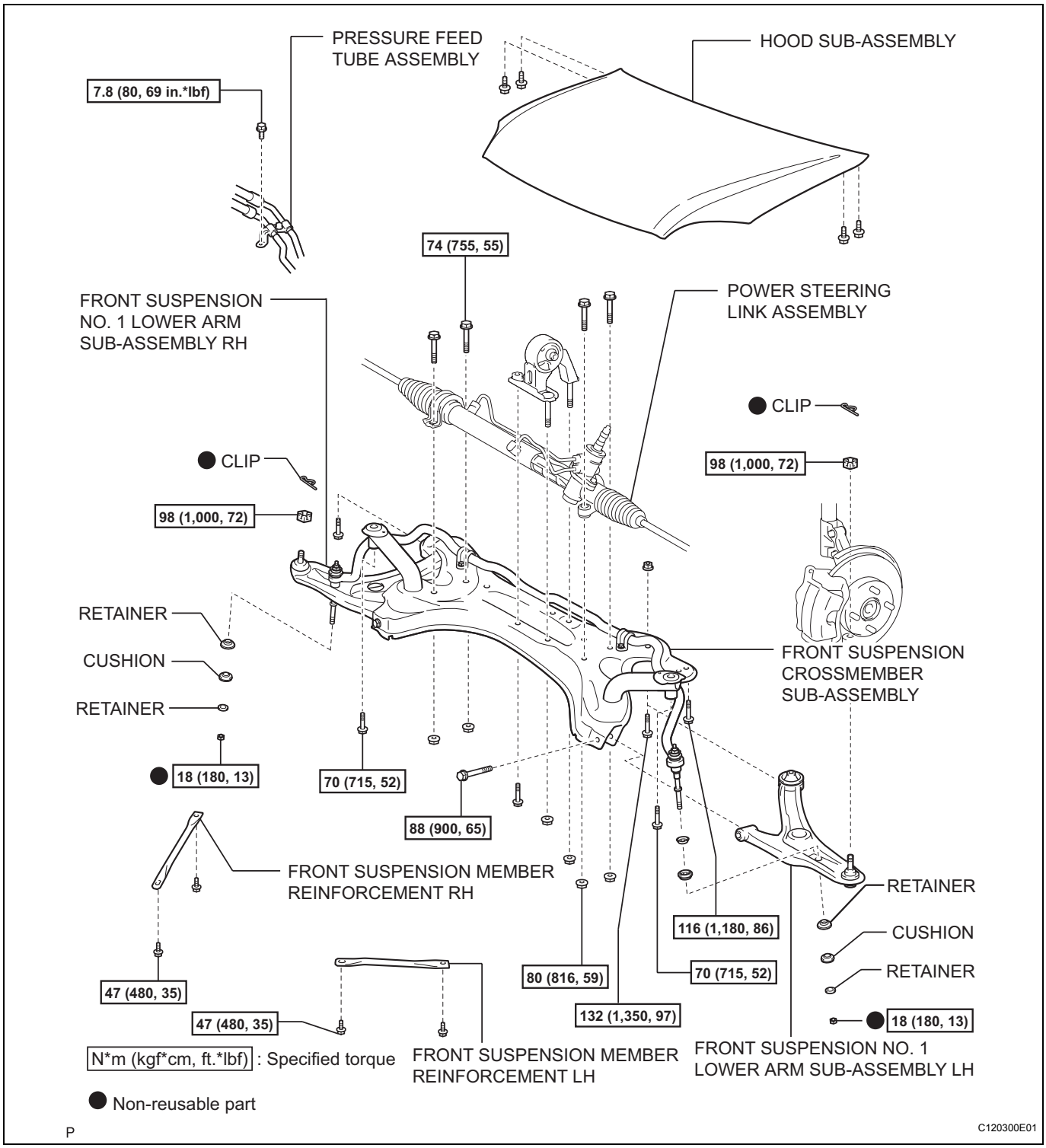
SP


FRONT SUSPENSION SUPPORT DUST COVER LH
39 (400, 29)
33 (340, 25)
FRONT SUSPENSION SUPPORT SUB-ASSEMBLY LH
FRONT SUSPENSION SUPPORT LH DUST SEAL
NO. 2 SUSPENSION SUPPORT LH
FRONT COIL SPRING SEAT UPPER LH
FRONT COIL SPRING INSULATOR UPPER LH
132 (1,350, 97)
FRONT SPRING BUMPER LH
FRONT SHOCK ABSORBER WITH COIL SPRING
ABS SPEED SENSOR WIRE HARNESS
29 (300, 22)
FLEXIBLE HOSE
FRONT COIL SPRING LH
FRONT SHOCK ABSORBER ASSEMBLY LH
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P
C120299E01

SP

FRONT SUSPENSION LOWER NO. 1 ARM (for Automatic Transaxle)

COMPONENTS

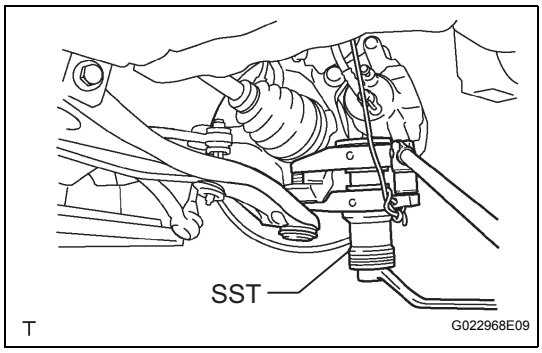


SP

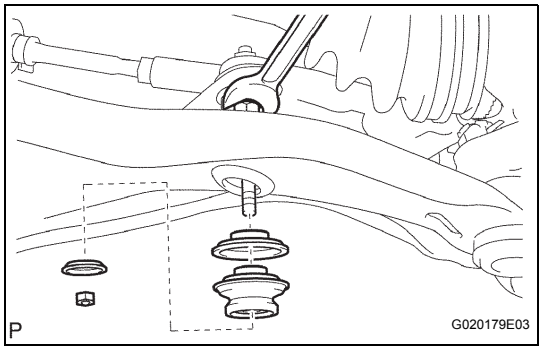
REMOVAL

HINT:
The removal on the lower No. 1 RH can be performed without removing the power steering link assembly and front suspension crossmember.

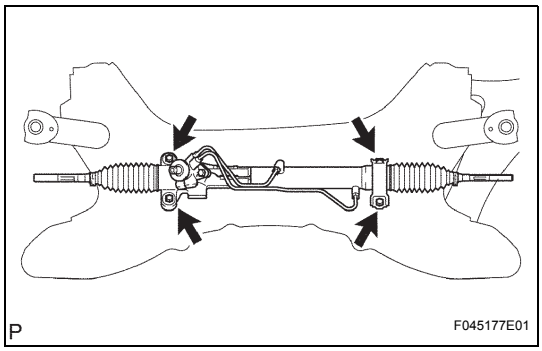
1. **REMOVE FRONT WHEEL**
2. **REMOVE HOOD SUB-ASSEMBLY**
3. **SUSPEND ENGINE ASSEMBLY**
4. **DISCONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH**
   (a) Remove the clip and nut.
   (b) Using SST, disconnect the lower arm from the steering knuckle.
   SST 09628-00011



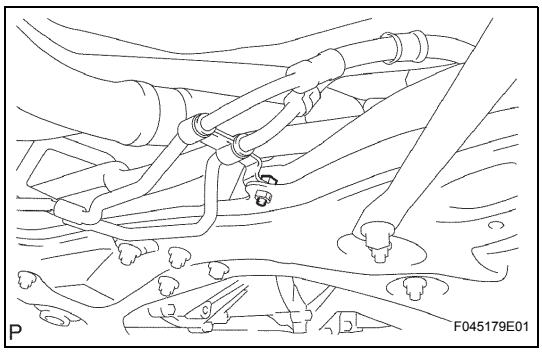
5. **DISCONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY RH**
   HINT:
   Use the same procedures described for the LH side.
6. **DISCONNECT FRONT STABILIZER BAR**
   (a) While holding the front stabilizer bolt with a wrench, remove the nut.
   (b) Remove the 2 retainers and cushion, and then remove the stabilizer bolt.
   (c) Perform the procedures above on the other side.



7. **DISCONNECT POWER STEERING LINK ASSEMBLY**
   (a) Remove the 4 bolts and 4 nuts, and disconnect the steering link.
   HINT:
   Perform this procedure with the steering link suspended.



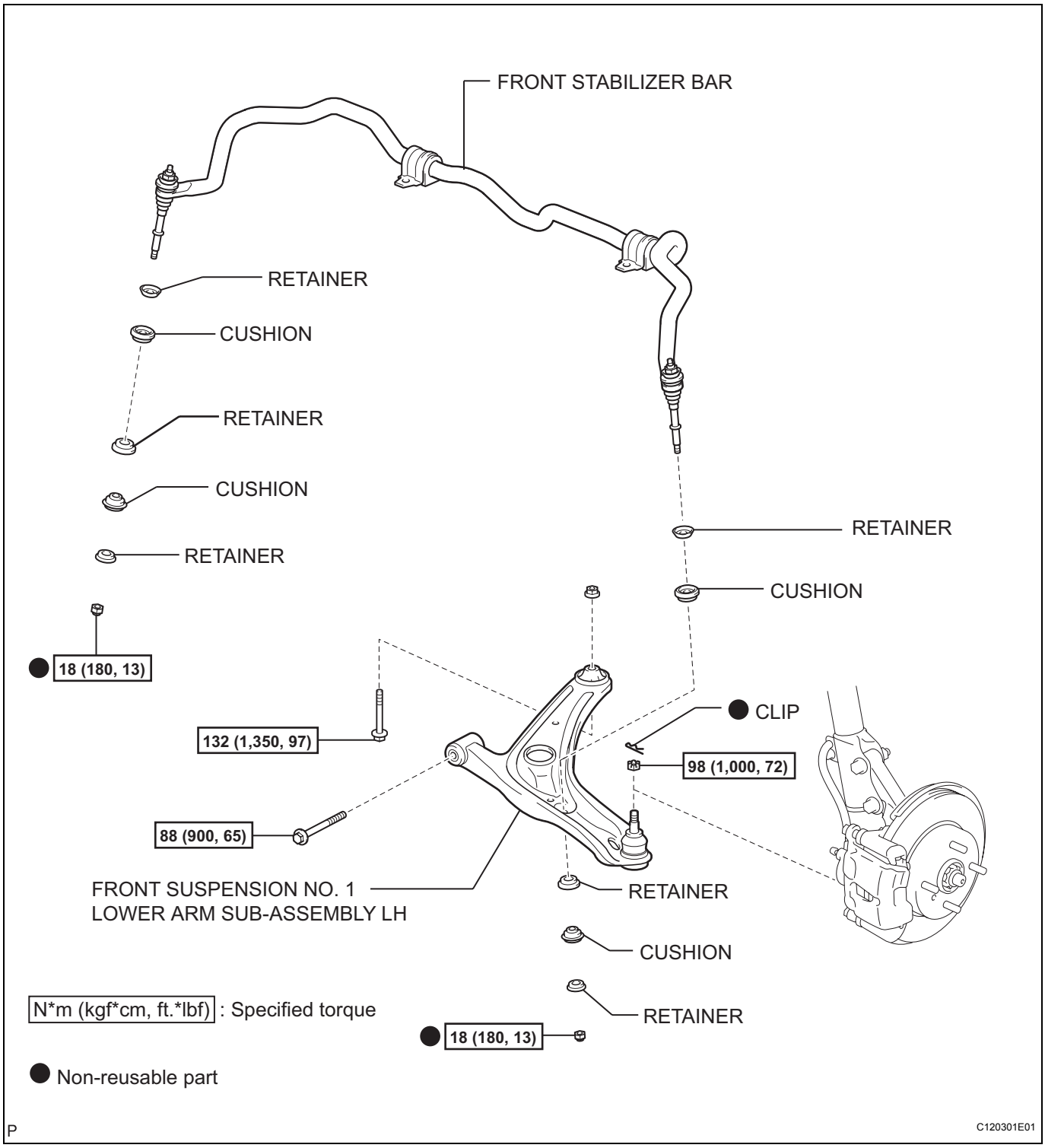
8. **DISCONNECT PRESSURE FEED TUBE ASSEMBLY**
   (a) Remove the bolt and disconnect the pressure feed tube.
9. **REMOVE FRONT SUSPENSION MEMBER REINFORCEMENT LH**
   (a) Remove the 2 bolts and reinforcement.
10. **REMOVE FRONT SUSPENSION MEMBER REINFORCEMENT RH**
    (a) Remove the 2 bolts and reinforcement.



SP

FRONT SUSPENSION LOWER NO. 1 ARM (for Manual Transaxle)

COMPONENTS

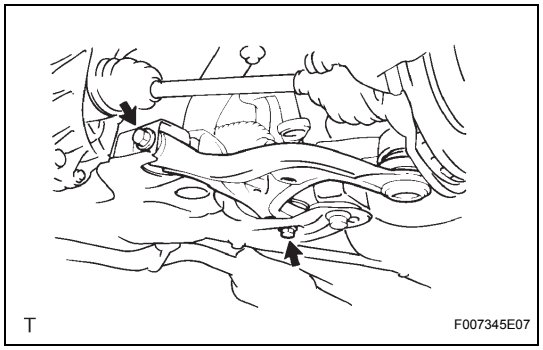


SP

REMOVAL

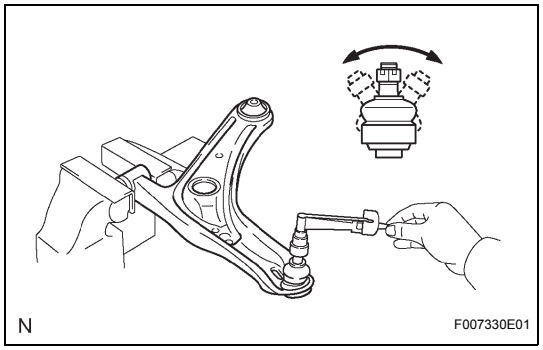
HINT:
Remove the RH (Manual transmission) following the same procedures as the suspension lower arm LH (Automatic transmission).

1. **REMOVE FRONT WHEEL**
2. **DISCONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH (See page SP-16)**
3. **DISCONNECT FRONT STABILIZER BAR (See page SP-16)**
4. **REMOVE FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH**
   (a) Remove the 2 bolts, nut and lower arm.
   NOTICE:
   Do not turn the nut.



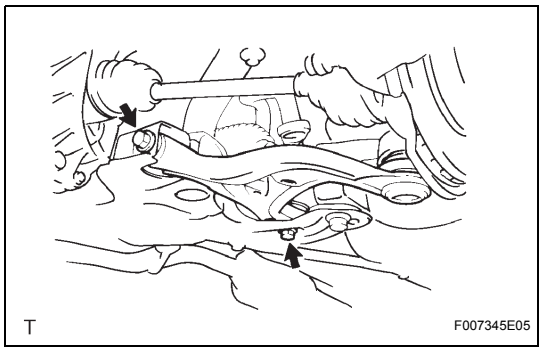
INSPECTION

1. **INSPECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH**
   (a) As shown in the illustration, flip the ball joint stud back and forth 5 times before installing the nut.
   (b) Using a torque wrench, turn the nut continuously at a rate of 2 to 4 seconds per turn and take the torque reading on the fifth turn.
   HINT:
   A bolt without a torque specification is shown in the standard bolt chart (see page SS-32).



INSTALLATION

1. **TEMPORARILY INSTALL FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH**
   (a) Temporarily install the lower arm with the 2 bolts and the nut.
2. **CONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH (See page SP-19)**
3. **CONNECT FRONT STABILIZER BAR (See page SP-19)**
4. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
5. **FULLY TIGHTEN FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH**
   (a) Install the lower arm with the 2 bolts.
   Torque: 88 N*m (900 kgf*cm, 65 ft.*lbf) for bolt A
   132 N*m (1,350 kgf*cm, 97 ft.*lbf) for bolt B



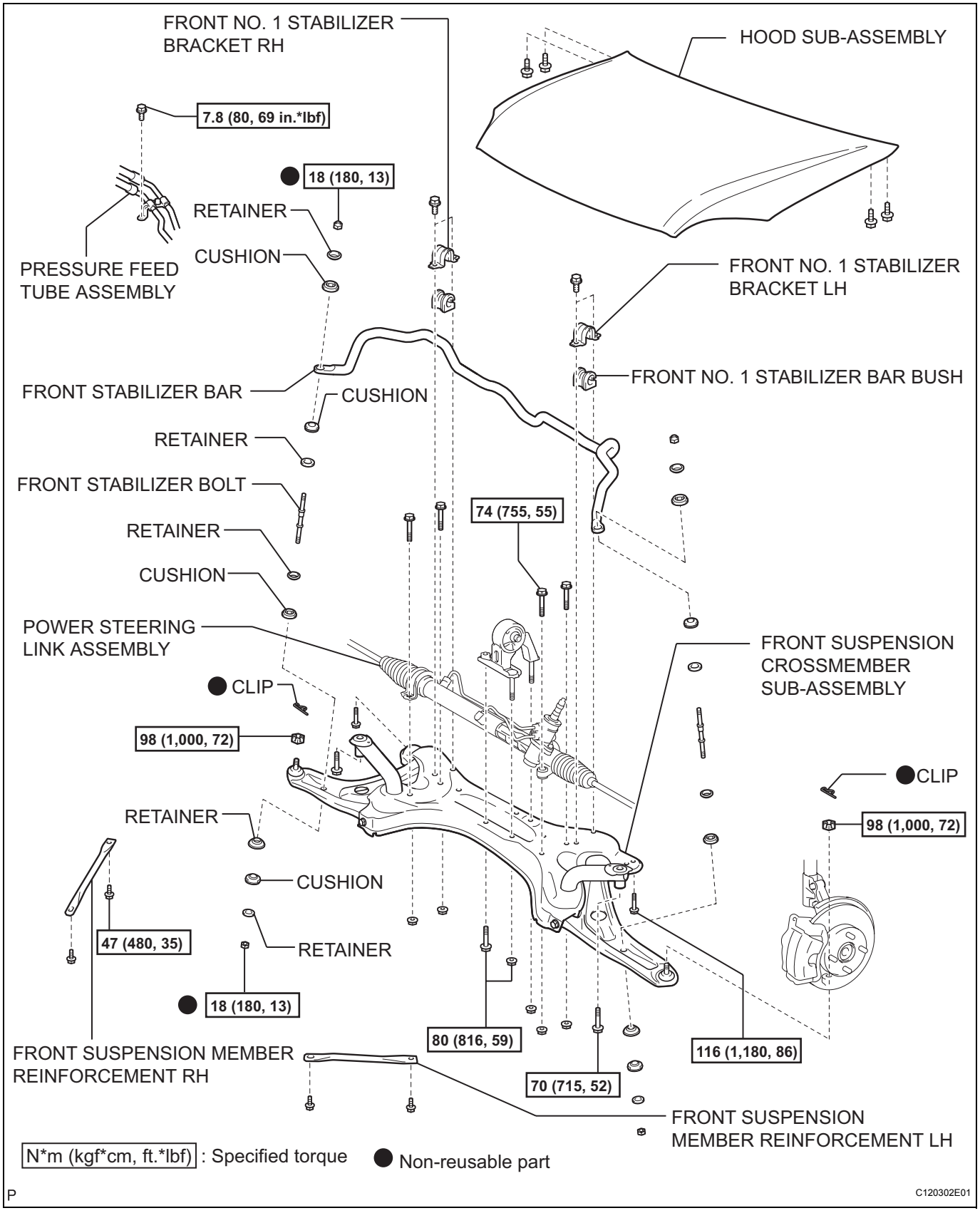
SP

NOTICE:
Do not turn the nut.

6. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
   (a) Inspect and adjust the front wheel alignment (see page SP-2).

FRONT STABILIZER BAR

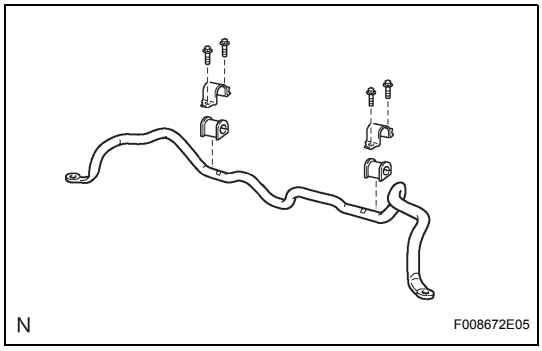
COMPONENTS

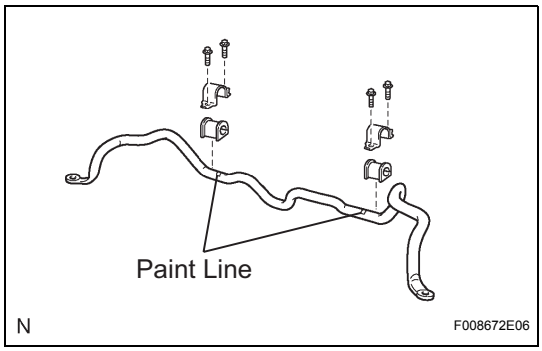


SP

REMOVAL

1. **REMOVE FRONT WHEEL**
2. **DISCONNECT HOOD SUB-ASSEMBLY**
3. **SUSPEND ENGINE ASSEMBLY**
4. **DISCONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH (See page SP-16)**
5. **DISCONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY RH (See page SP-16)**
6. **DISCONNECT FRONT STABILIZER BAR (See page SP-16)**
7. **DISCONNECT POWER STEERING LINK ASSEMBLY (See page SP-16)**
8. **DISCONNECT PRESSURE FEED TUBE ASSEMBLY (See page SP-16)**
9. **DISCONNECT FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY (See page SP-17)**
10. **REMOVE FRONT STABILIZER BAR**
    (a) Remove the 4 bolts, 2 bushes and No. 1 stabilizer bracket LH and RH.
    (b) Remove the stabilizer bar.





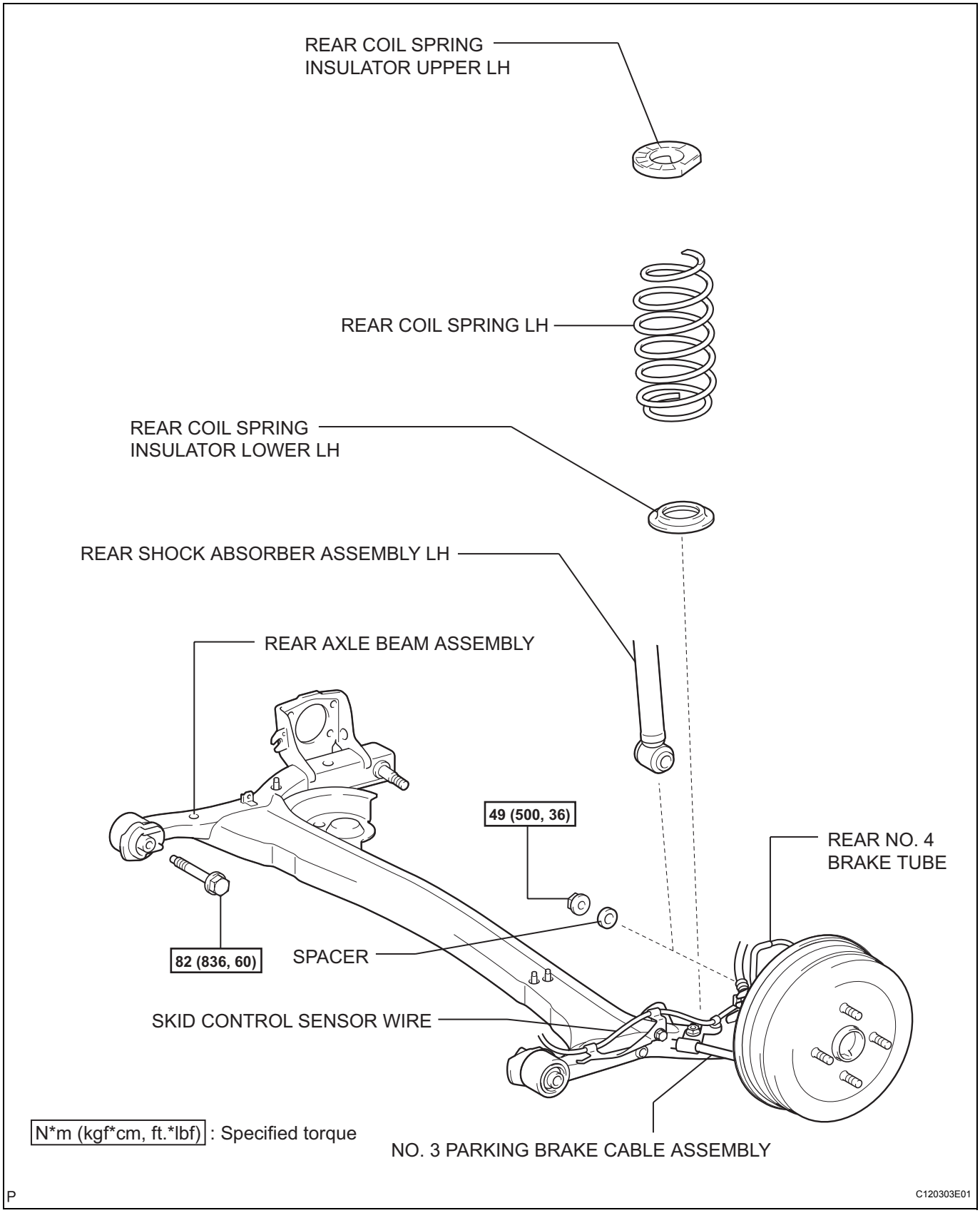
INSTALLATION

1. **INSTALL FRONT STABILIZER BAR**
    (a) Install the stabilizer bar, 2 bushes, and 2 brackets with the 4 bolts.
    Torque: 37 N*m (375 kgf*cm, 27 ft.*lbf)
    NOTICE:
    Install the bushes with the slit facing the rear side of the vehicle.
    HINT:
    Install the bushes on the outside of each paint line.
2. **CONNECT FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY (See page SP-18)**
3. **CONNECT PRESSURE FEED TUBE ASSEMBLY (See page SP-18)**
4. **CONNECT POWER STEERING LINK ASSEMBLY (See page SP-18)**
5. **CONNECT FRONT STABILIZER BAR (See page SP-19)**
6. **CONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY LH (See page SP-19)**

7. **CONNECT FRONT SUSPENSION NO. 1 LOWER ARM SUB-ASSEMBLY RH (See page SP-19)**
8. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
9. **INSTALL HOOD SUB-ASSEMBLY**
10. **INSPECT HOOD SUB-ASSEMBLY**
11. **ADJUST HOOD SUB-ASSEMBLY**
12. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    (a) Inspect and adjust the front wheel alignment (see page SP-2).

REAR COIL SPRING

COMPONENTS



SP

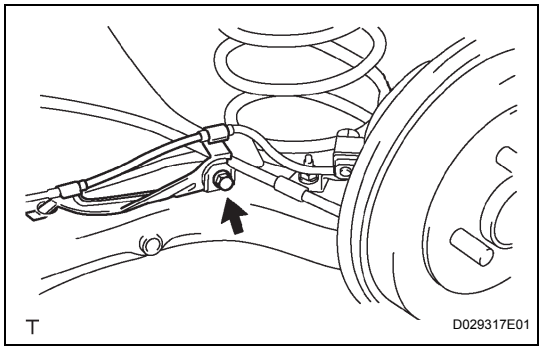
REMOVAL

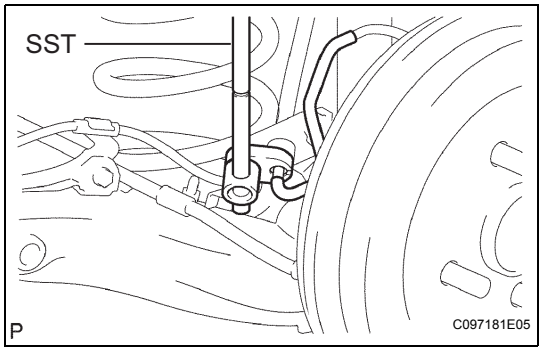
1. REMOVE REAR WHEEL

2. DISCONNECT SKID CONTROL SENSOR WIRE

(a) Disconnect the sensor connector.

(b) Remove the bolt, and disconnect the sensor wire from the axle beam.
HINT:
Disconnect the RH side using the same procedures as the LH side.





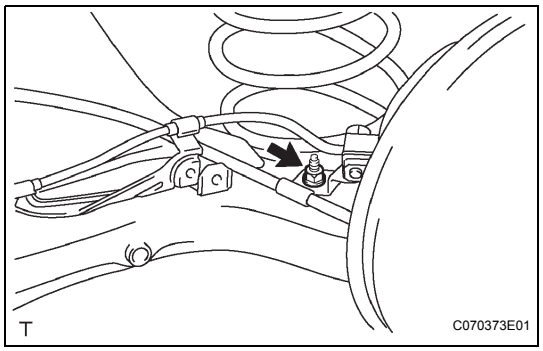
3. DISCONNECT REAR NO. 4 BRAKE TUBE

(a) Using SST, disconnect the brake tube.
SST 09023-00101

(b) Remove the clip.
NOTICE:
The clip should not be reused.

4. DISCONNECT REAR NO. 3 BRAKE TUBE

HINT:
Use the same procedures described for the No. 4 side.

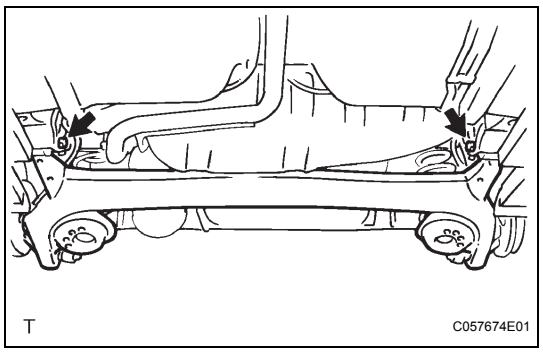


5. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Remove the nut, and disconnect the parking brake cable from the axle beam.

6. DISCONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY

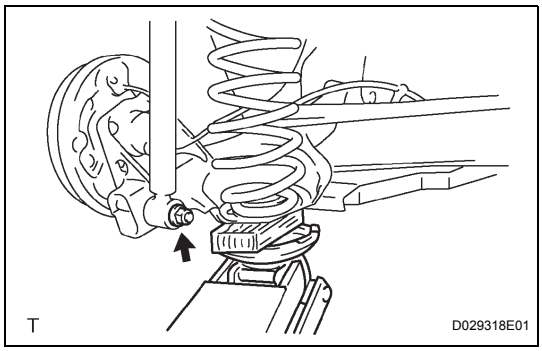
HINT:
Use the same procedures described for the No. 3 side.



7. LOOSEN REAR AXLE BEAM ASSEMBLY

(a) Loosen the 2 bolts.
NOTICE:
Do not remove the bolt.

SP



8. DISCONNECT REAR SHOCK ABSORBER ASSEMBLY LH

(a) Support both right and left sides of the axle beam with jacks.

(b) Remove the nut and disconnect the shock absorber.

9. DISCONNECT REAR SHOCK ABSORBER ASSEMBLY RH

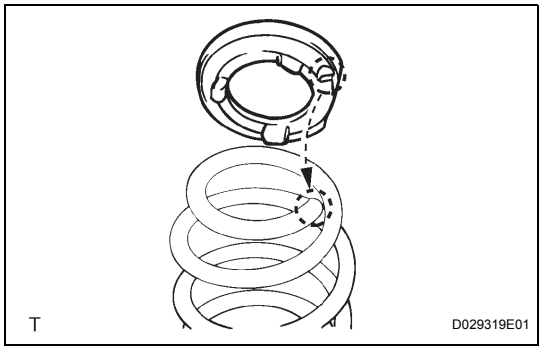
HINT:

Use the same procedures described for the LH side.

10. REMOVE REAR COIL SPRING LH

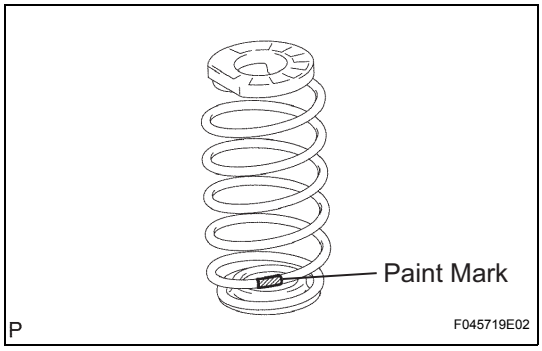
(a) Remove the coil spring, insulator upper and insulator lower by slowly lowering the jacks.

INSTALLATION



1. INSTALL REAR COIL SPRING LH

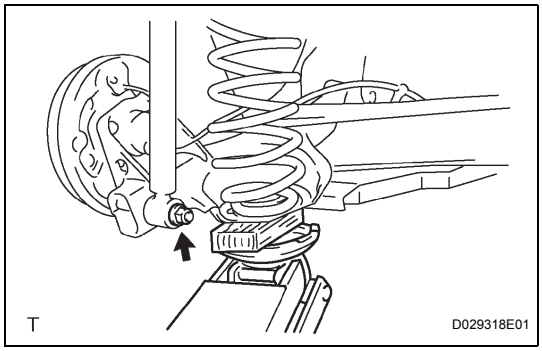
(a) Install the insulator upper so that its gap fits to the end of the coil spring.



(b) Install the insulator lower and coil spring to the axle beam.

NOTICE:

Be sure to install the coil spring so that the paint mark comes to under the vehicle.



2. TEMPORARILY INSTALL REAR SHOCK ABSORBER ASSEMBLY LH

(a) While raising the jacks, connect the shock absorber to the axle beam.

(b) Temporarily install the spacer and nut.

3. TEMPORARILY INSTALL REAR SHOCK ABSORBER ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

4. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Install the parking brake cable with the nut.

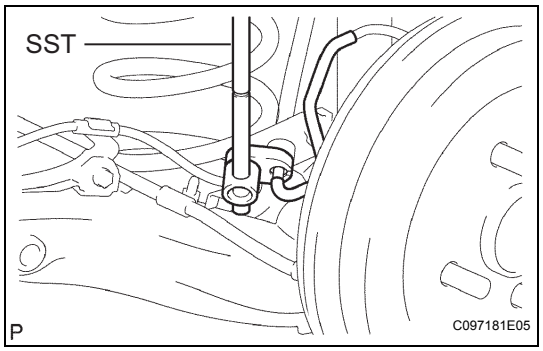
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

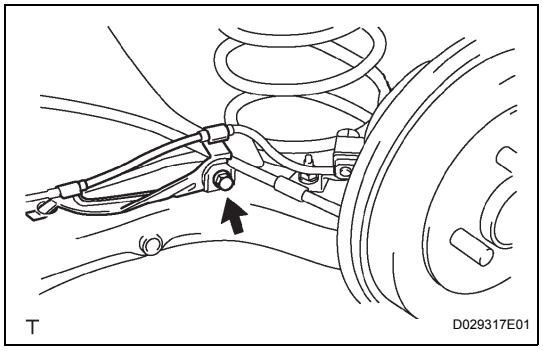
5. CONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY

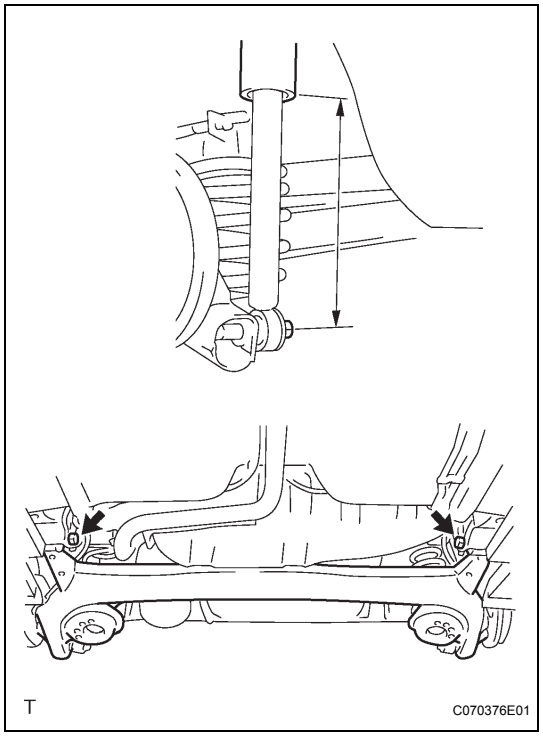
HINT:

Use the same procedures described for the No. 3 cable.

SP







6. **CONNECT REAR NO. 4 BRAKE TUBE**
   (a) Using SST, connect the brake tube to the flexible hose.
   SST 09023-00101
   Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)
   (b) Install the clip.

7. **CONNECT REAR NO. 3 BRAKE TUBE**
   HINT:
   Use the same procedures described for the No. 4 tube.

8. **CONNECT SKID CONTROL SENSOR WIRE**
   (a) Install the sensor wire with the bolt.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   (b) Connect the sensor connector.
   HINT:
   Use the same procedures described for the other side.

9. **FULLY TIGHTEN REAR AXLE BEAM ASSEMBLY**
   (a) Stabilize the shock absorber.
   HINT:
   If it is difficult to tighten the bolt in this position, support the rear axle beam with a jack and load the rear compartment with a mass of approximately 90 kg (198 lb.).
   Standard length of shock absorber:
   250 mm (9.8 in.)
   (b) Fully tighten the bolt.
   Torque: 82 N*m (836 kgf*cm, 60 ft.*lbf)

10. **FULLY TIGHTEN REAR SHOCK ABSORBER ASSEMBLY LH**
    (a) Fully tighten the nut.
    Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

11. **FULLY TIGHTEN REAR SHOCK ABSORBER ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.

12. **BLEED BRAKE LINE**
    (a) Bleed the brake line (see page BR-3).

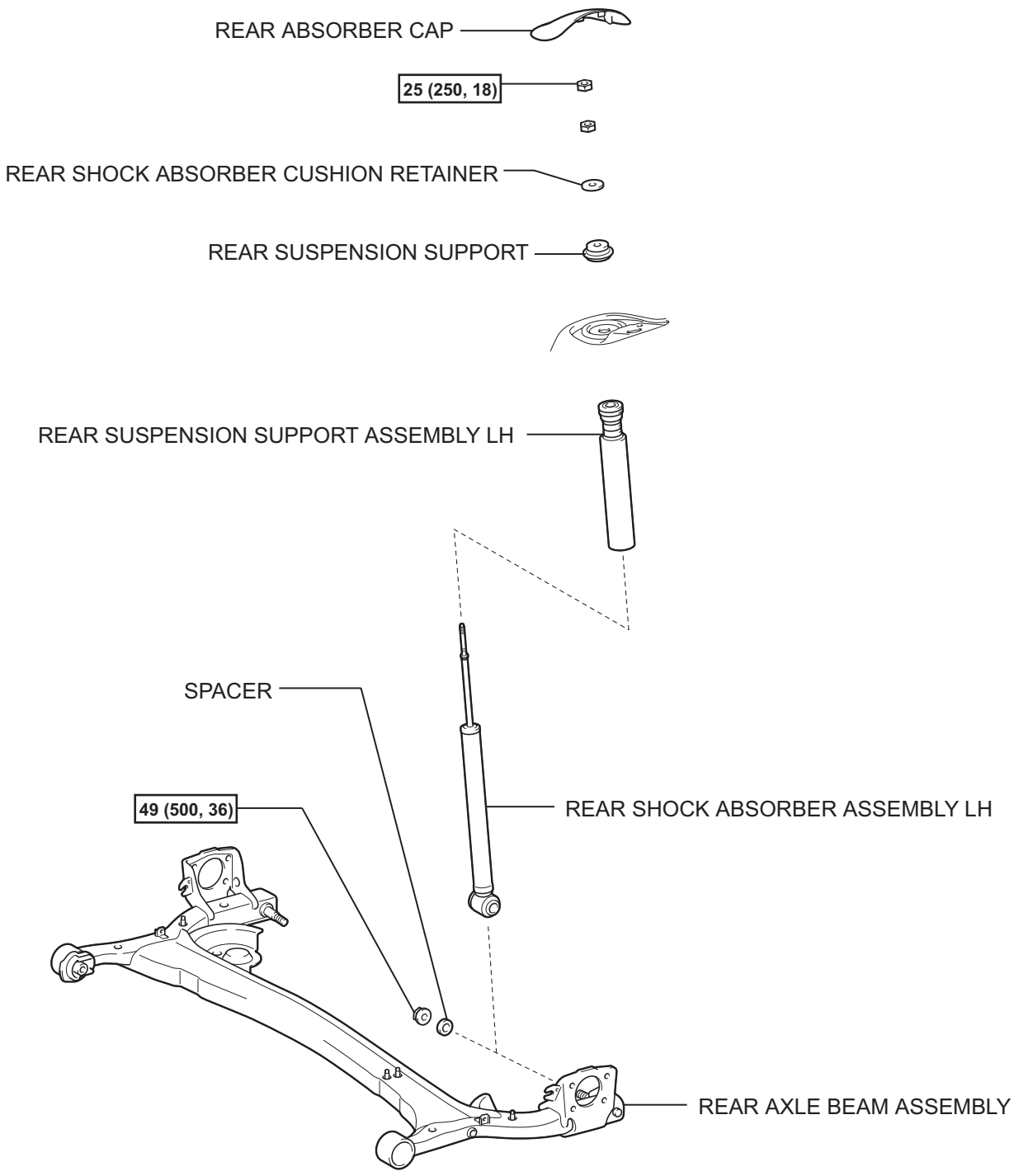
13. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

14. **INSPECT REAR WHEEL ALIGNMENT**
    (a) Inspect the rear wheel alignment (see page SP-8).

15. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) Check the ABS speed sensor signal (see page BC-73).

REAR SHOCK ABSORBER

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

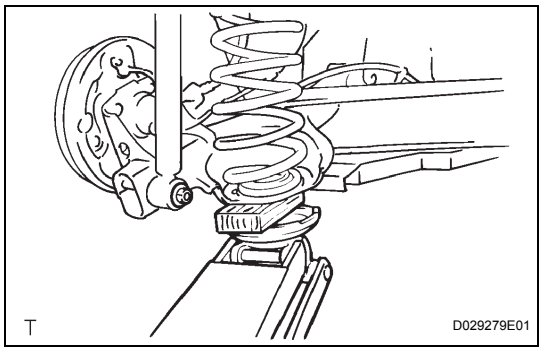
P

C120304E01

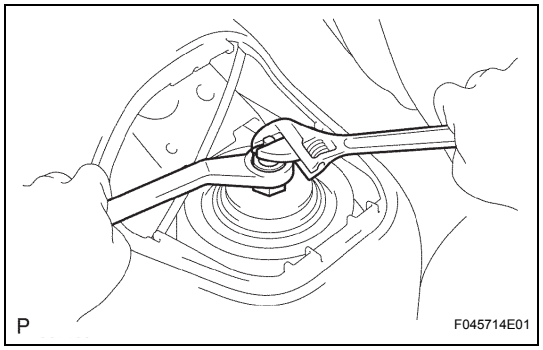
SP

REMOVAL

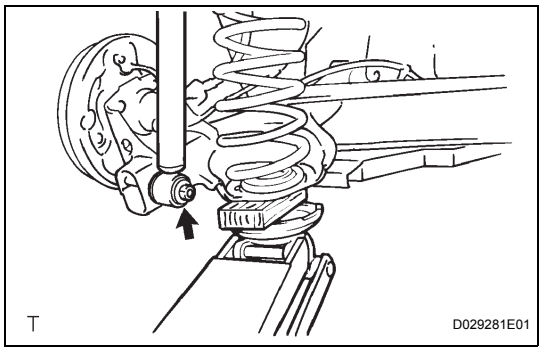
1. **REMOVE REAR ABSORBER CAP**
2. **REMOVE REAR WHEEL**
3. **REMOVE REAR SHOCK ABSORBER ASSEMBLY LH**
   (a) Support the axle beam with a jack.



(b) While holding the piston rod, remove the 2 nuts.
(c) Remove the cushion retainer and suspension support.

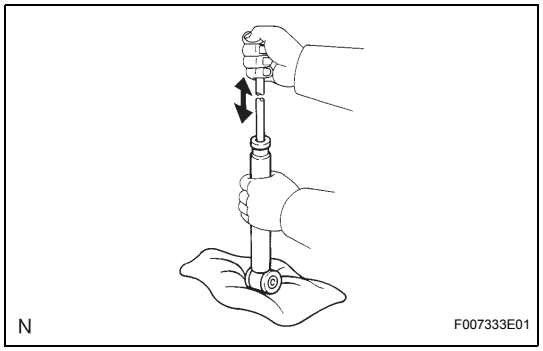


(d) Remove the nut, spacer and shock absorber assembly.
(e) Remove the suspension support from the shock absorber.



INSPECTION

1. **INSPECT REAR SHOCK ABSORBER ASSEMBLY LH**
   (a) Compress and extend the shock absorber rod, and check that there is no abnormal resistance or unusual sound.
   If there is any abnormality, replace the shock absorber with a new one.
   NOTICE:
   When disposing of the shock absorber, see DISPOSAL (see page SP-32).



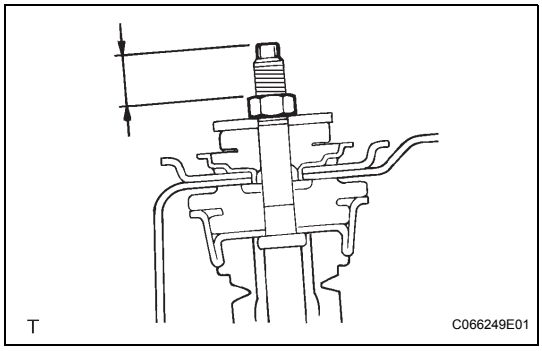
SP

INSTALLATION

1. INSTALL REAR SHOCK ABSORBER ASSEMBLY LH

(a) Install the suspension support to the shock absorber.

(b) Install the shock absorber, suspension support and cushion retainer to the body.



(c) While holding the piston rod, install the lower nut so that the piston rod protrudes 15 to 18 mm (0.59 to 0.710 in.) from the lower nut.

(d) Install the upper nut and torque it against the lower one.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

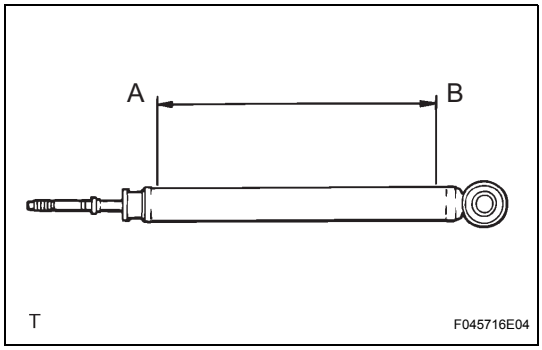
(e) While raising a jack, install the shock absorber to the axle beam with the spacer and nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

2. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

3. INSPECT REAR WHEEL ALIGNMENT

(a) Inspect the rear wheel alignment (see page SP-8).

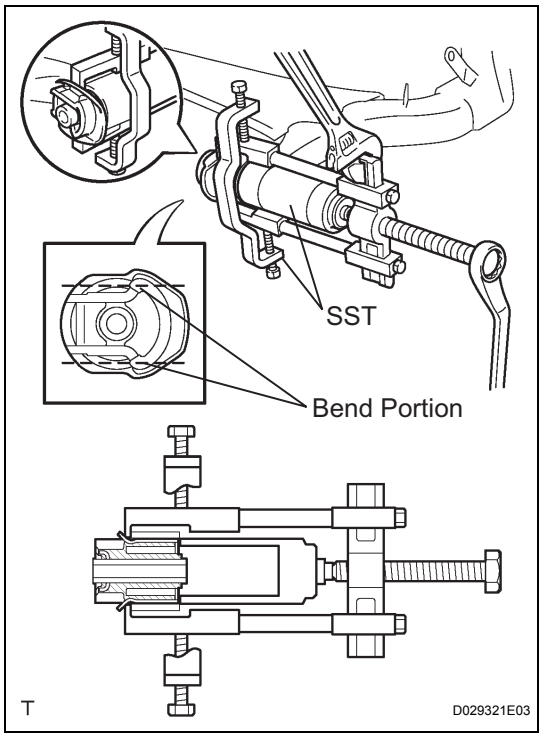
DISPOSAL



1. DISPOSE OF REAR SHOCK ABSORBER ASSEMBLY LH

(a) Fully extend the shock absorber rod.

(b) Using a drill, make a hole in the cylinder somewhere between A and B as shown in the illustration to discharge the gas inside.
CAUTION:
Be careful when drilling because shards of metal may fly about, so always use the proper safety equipment.
HINT:
The gas is colorless, odorless and non-poisonous.



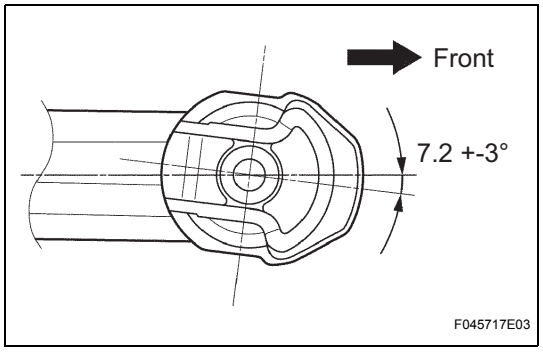
DISASSEMBLY

1. REMOVE REAR AXLE CARRIER BUSH LH

(a) Using a chisel and hammer, bend the 2 portions of the bush rib.
HINT:
Bend the bush rib so that the claw of SST can be hung.

(b) Using SST, remove the bush from the axle beam.
SST 09309-37010, 09950-40011 (09951-04010, 09952-04010, 09953-04010, 09954-04020, 09955-04051, 09957-04010, 09958-04011)
NOTICE:
If the axle beam has been scratched, apply paint.

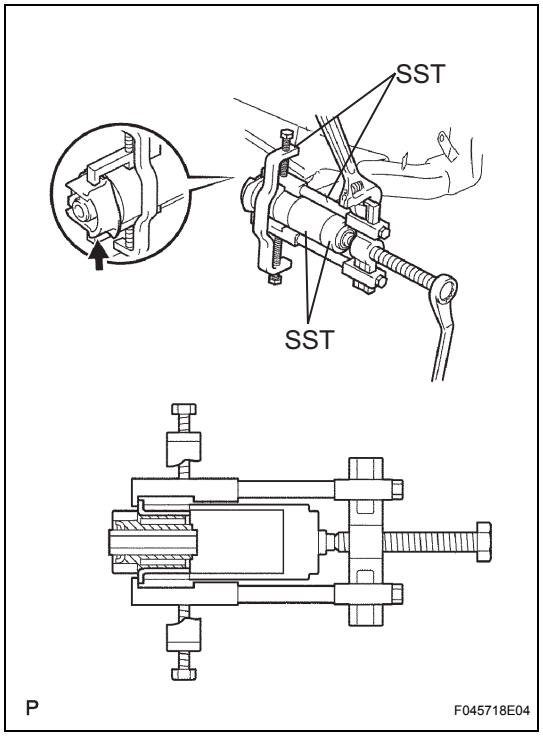
2. REMOVE REAR AXLE CARRIER BUSH RH
HINT:
Use the same procedures described for the LH side.



REASSEMBLY

1. INSTALL REAR AXLE CARRIER BUSH LH

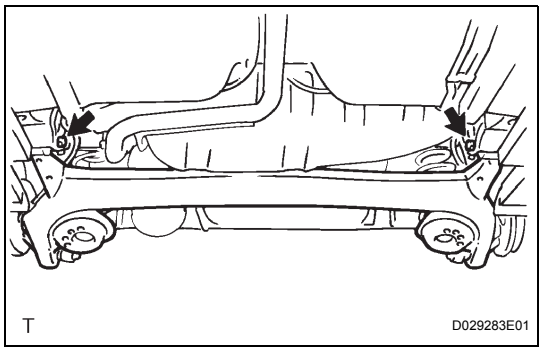
(a) Position the axle carrier bush and the axle beam as shown in the illustration.



(b) Using SST, install the axle carrier bush to the axle beam.
SST 09710-14013 (09710-00021), 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04020, 09955-04031, 09957-04010, 09958-04011), 09950-60010 (09951-00560)
NOTICE:
- **Hang the claw of SST to the bush securely.**
- **Do not scratch the rubber portion of the bush.**
- **Do not deform the bush rib.**

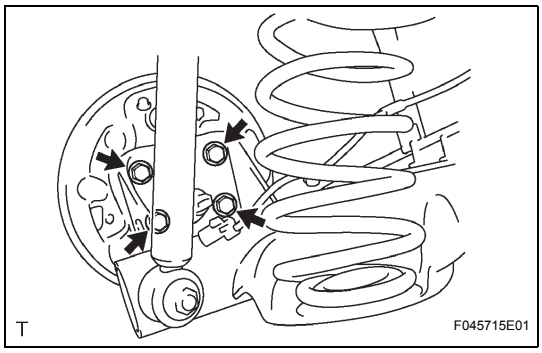
2. INSTALL REAR AXLE CARRIER BUSH RH
HINT:
Use the same procedures described for the LH side.

SP



INSTALLATION

1. **TEMPORARILY INSTALL REAR AXLE BEAM ASSEMBLY**
   (a) Support the axle beam with a jack.
   (b) Install the axle beam, and temporarily install the 2 bolts.
2. **INSTALL REAR COIL SPRING LH (See page SP-28)**
3. **INSTALL REAR COIL SPRING RH**
   HINT:
   Use the same procedure described for the LH side.
4. **TEMPORARILY INSTALL REAR SHOCK ABSORBER ASSEMBLY LH (See page SP-28)**
5. **TEMPORARILY INSTALL REAR SHOCK ABSORBER ASSEMBLY RH (See page SP-28)**



6. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY LH**
   (a) Install the rear brake axle hub and bearing with the 4 bolts.
   Torque: 61 N*m (622 kgf*cm, 45 ft.*lbf)
7. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY RH**
   HINT:
   Use the same procedures described for the LH side.
8. **INSTALL REAR BRAKE DRUM SUB-ASSEMBLY**
   (a) Install the rear brake drum (see page BR-34).
9. **ADJUST REAR DRUM BRAKE SHOE CLEARANCE**
   (a) Adjust the rear drum brake shoe clearance (see page BR-9).
10. **CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY (See page PB-6)**
11. **CONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY**
    HINT:
    Use the same procedures described for the No. 3 cable.
12. **CONNECT REAR NO. 4 BRAKE TUBE**
    (a) Connect the rear No. 4 brake tube (see page BR-34).
13. **CONNECT REAR NO. 3 BRAKE TUBE**
    HINT:
    Use the same procedures described for the No. 4 tube.
14. **CONNECT SKID CONTROL SENSOR WIRE (See page BC-172)**
15. **FULLY TIGHTEN REAR AXLE BEAM ASSEMBLY (See page SP-29)**
16. **FULLY TIGHTEN REAR SHOCK ABSORBER ASSEMBLY LH (See page SP-29)**

17. **FULLY TIGHTEN REAR SHOCK ABSORBER ASSEMBLY RH (See page SP-29)**

18. **BLEED BRAKE LINE**
    (a) Bleed the brake line (see page BR-3).

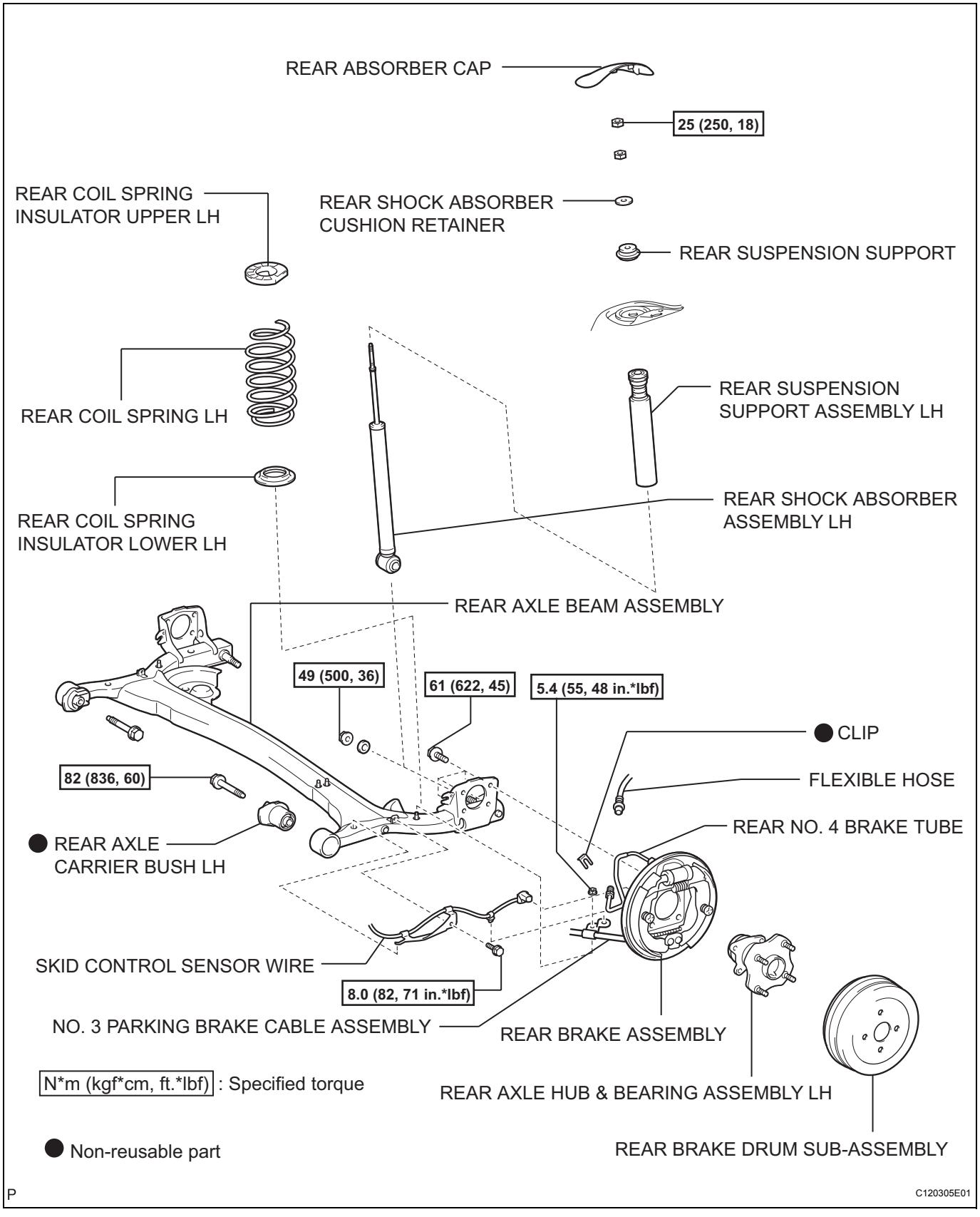
19. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

20. **INSPECT REAR WHEEL ALIGNMENT**
    (a) Inspect the rear wheel alignment (see page SP-8).

21. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) Check the ABS speed sensor (see page BC-73).

REAR AXLE BEAM

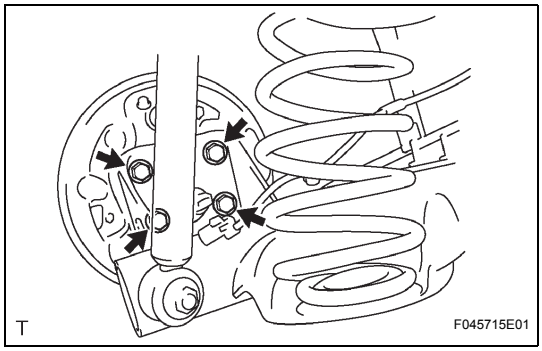
COMPONENTS



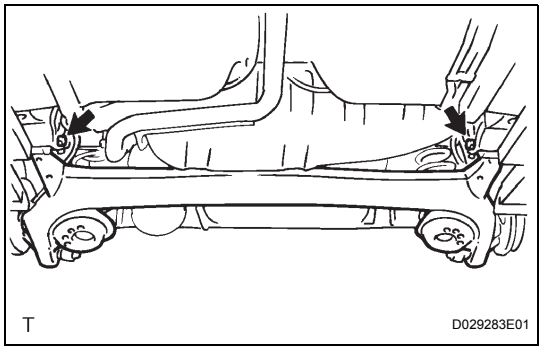
SP

REMOVAL

1. **REMOVE REAR WHEEL**
2. **DISCONNECT SKID CONTROL SENSOR WIRE (See page BC-171)**
3. **DISCONNECT REAR NO. 4 BRAKE TUBE**
   (a) Disconnect the No. 4 brake tube (see page BR-31).
4. **DISCONNECT REAR NO. 3 BRAKE TUBE**
   (a) Disconnect the No. 3 brake tube (see page BR-31).
5. **DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY**
   (a) Disconnect the No. 3 parking brake cable (see page PB-4).
6. **DISCONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY**
   (a) Disconnect the No. 2 parking brake cable (see page PB-4).
7. **REMOVE REAR BRAKE DRUM SUB-ASSEMBLY**
8. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY LH**
   (a) Remove the bolts and rear axle hub bearing.
   (b) Separate the rear brake from the rear axle beam.



9. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY RH**
   HINT:
   Use the same procedures described for the LH side.
10. **LOOSEN REAR AXLE BEAM ASSEMBLY (See page SP-27)**
11. **DISCONNECT REAR SHOCK ABSORBER ASSEMBLY LH (See page SP-28)**
12. **DISCONNECT REAR SHOCK ABSORBER ASSEMBLY RH (See page SP-28)**
13. **REMOVE REAR COIL SPRING LH (See page SP-28)**
14. **REMOVE REAR COIL SPRING RH**
    HINT:
    Use the same procedures described for the LH side.
15. **REMOVE REAR AXLE BEAM ASSEMBLY**
    (a) Support the axle beam with a jack.
    (b) Remove the 2 bolts and axle beam.



SP

INSPECTION

1. INSPECT TIRE

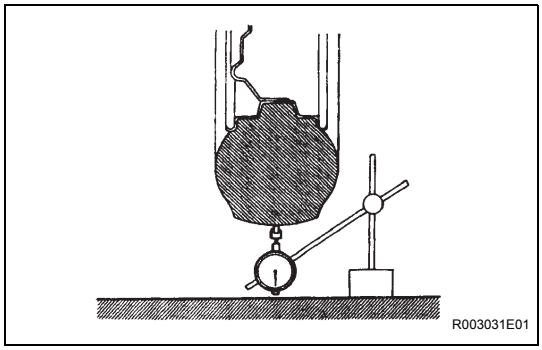
(a) Check the tires for wear and proper inflation pressure.

Standard cold tire inflation pressure

Tire size	Front	Rear
185/60R 15 84T	200 kPa (2.0 kgf/cm^2, 29 psi)	200 kPa (2.0 kgf/cm^2, 29 psi)

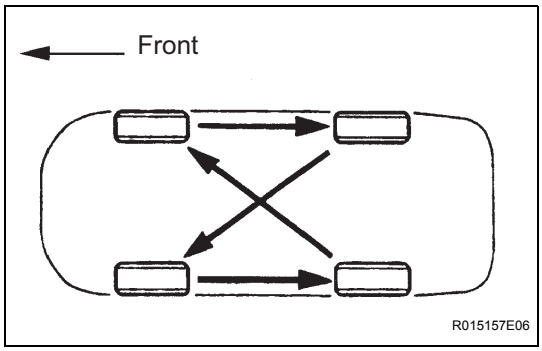
(b) Using a dial indicator, check the tire runout.

Standard tire runout:
3.0 mm (0.118 in.) or less



2. ROTATE TIRES

HINT:
See the illustration for where to rotate each tire.

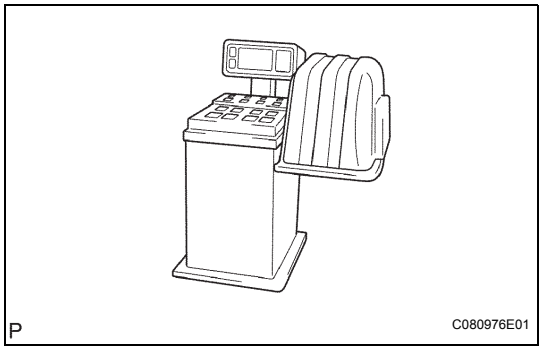


3. INSPECT WHEEL BALANCE

(a) Check and adjust the off-the-car balance.

(b) If necessary, check and adjust the on-the-car balance.

Standard imbalance after adjustment:
8.0 g (0.018 lb) or less



4. INSPECT BEARING LOOSENESS

(a) Inspect bearing looseness for front (see page AH-6).

(b) Inspect bearing looseness for rear (see page AH-15).

5. INSPECT AXLE HUB RUNOUT

(a) Inspect axle hub runout for front (see page AH-6).

(b) Inspect axle hub runout for rear (see page AH-15).

TIRE AND WHEEL SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

1. FLOWCHART FOR VEHICLE PULL AND TIRE VIBRATION.

1	CHECK THAT WHEEL NUTS ARE FULLY TIGHTENED

NG → REPAIR

OK ↓

2	CHECK TIRE PRESSURE

NG → Go to step 5

OK ↓

3	CHECK WHEEL BALANCE

NG → Go to step 7

OK ↓

4	INSPECT BEARING LOOSENESS AND AXLE HUB RUNOUT

NG → REPAIR

OK ↓

REPLACE TIRE(S)

5	ADJUSTMENT

NEXT ↓

6	CHECK WHEEL BALANCE

OK → Go to step 8

NG ↓

7	ADJUSTMENT

NEXT

8	INSPECT BEARING LOOSENESS AND AXLE HUB RUNOUT

NG → REPAIR

OK

RETURN VEHICLE TO CUSTOMER

2. FLOWCHART FOR IRREGULAR TIRE WEAR

1	CHECK TIRE PRESSURE

NG → Go to step 3

OK

2	CHECK WHEEL ALIGNMENT

NG → Go to step 5

OK

ROTATE TIRES OR REPLACE TIRE(S)

3	ADJUSTMENT

NEXT

4	CHECK WHEEL ALIGNMENT

NG → Go to step 5

OK

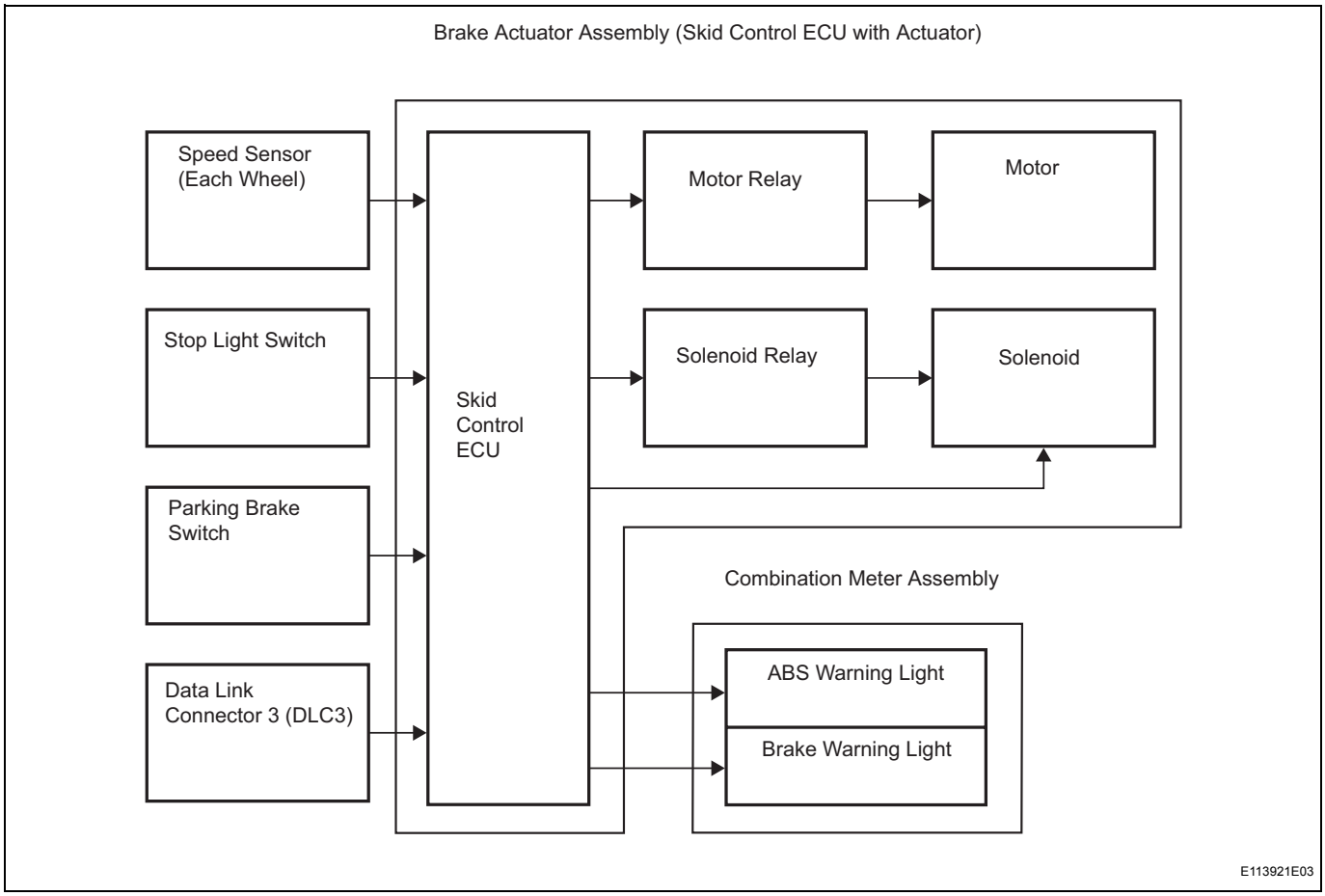
ROTATE TIRES OR REPLACE TIRE(S)

5	**ADJUSTMENT**

NEXT

ROTATE TIRES OR REPLACE TIRE(S)

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

The skid control ECU has a built-in brake actuator.

(a) The ABS helps to prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

2. ABS OPERATION

(a) Using each wheel's speed sensor signal, the skid control ECU calculates wheel speed and deceleration to check each wheel's slipping condition. Depending on the slipping condition, the ECU will control the pressure holding valve and pressure reduction valve to adjust the fluid pressure of each wheel cylinder.

3. FAIL-SAFE FUNCTION

(a) When a failure occurs in the ABS, the ABS warning light illuminates and ABS operation is prohibited.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
- Use these procedures to troubleshoot the anti-lock brake system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3 CHECK AND CLEAR DTC*

NEXT

4 PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → Go to step 6

A

5 SYMPTOM SIMULATION

NEXT

6 CHECK FOR DTC*

Result

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

B → Go to step 9

A

7 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 9

A

8 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (see page BC-7)
(b) DATA LIST / ACTIVE TEST (see page BC-11)

NEXT

9 CHECK FOR FLUID LEAKAGE

NEXT

10 REPAIR OR REPLACE

NEXT

11 CONFIRMATION TEST

NEXT

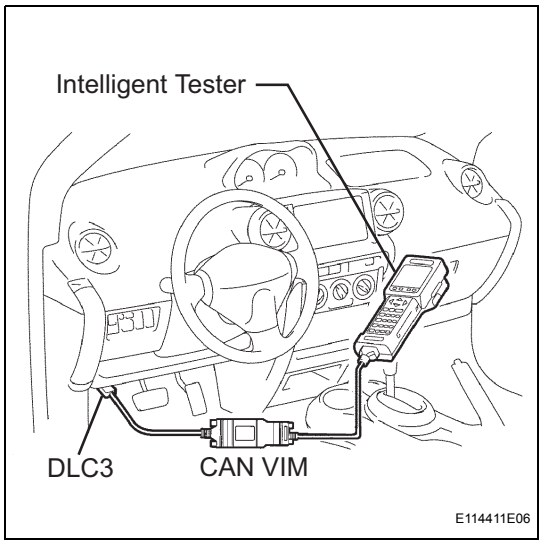
BC

END

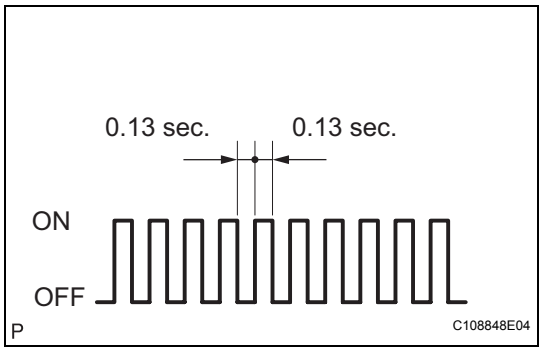
OPERATION CHECK

1. CHECK SENSOR SIGNAL BY TEST MODE (WHEN USING INTELLIGENT TESTER)

HINT:
If the ignition switch is turned from ON to ACC or OFF during test mode, the DTCs will be erased.



(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Check that the shift lever is on P.
(3) Connect the intelligent tester (with CAN VIM) to the DLC3.
(4) Turn the ignition switch ON.
(5) Select the test mode using the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.



(6) Check that the ABS warning light blinks.
HINT:
If the ABS warning light does not blink, check the ABS warning light circuit.

Trouble area	See procedure
ABS warning light circuit	BC-43

(b) Check the speed sensor.
(1) Drive the vehicle straight forward at the following speeds. Then check that the ABS warning light is as follows.

Vehicle Speed	Check	ABS Warning Light
45 km/h (28 mph) or higher	Deviations of sensor signal	Turns off

HINT:
The sensor signal check may not be completed if the vehicle's wheels slip or the steering wheel is turned during this check.
(2) Stop the vehicle.

(c) Read the DTC by following the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

BC

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the skid control ECU with actuator or sensor, turn the ignition switch OFF.

Anti-lock brake system

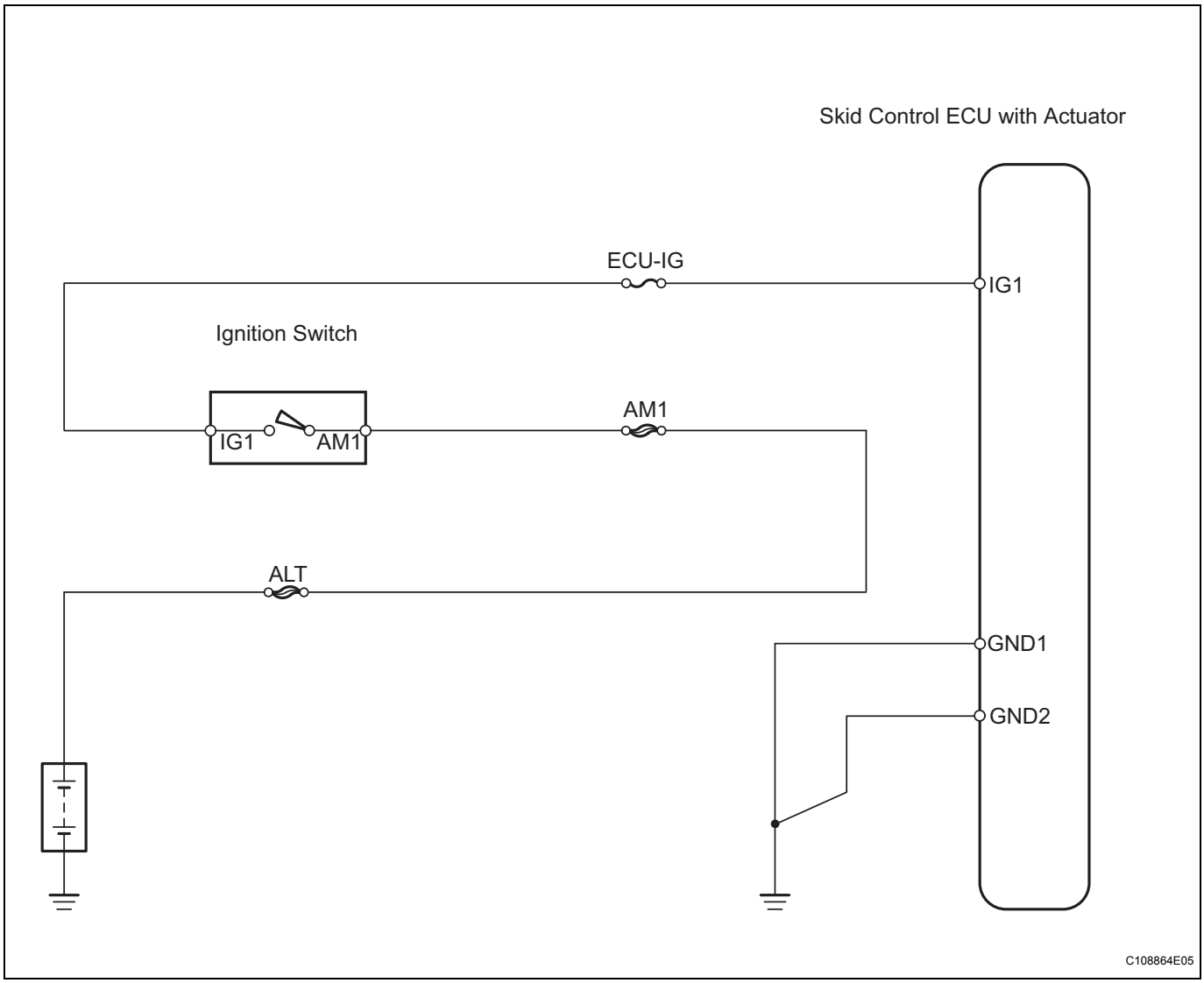
Symptom	Suspected area	See page
ABS does not operate	1. Check DTC and confirm that normal code is output	BC-8
	2. IG power source circuit	BC-34
	3. Front speed sensor circuit	BC-16
	4. Rear speed sensor circuit	BC-22
	5. Check skid control ECU with actuator with intelligent tester. If abnormal, check hydraulic circuit for leakage.	-
ABS does not operate efficiently	1. Check DTC and confirm that normal code is output	BC-8
	2. Front speed sensor circuit	BC-16
	3. Rear speed sensor circuit	BC-22
	4. Stop light switch circuit	BC-37
	5. Check skid control ECU with actuator with intelligent tester. If abnormal, check hydraulic circuit for leakage.	-
ABS warning light abnormality	1.ABS warning light circuit	BC-43
	2. Skid control ECU with actuator	-
DTC check cannot be done	1.ABS warning light circuit	BC-43
	2. TC and CG terminal circuit	BC-57
Speed sensor signal check cannot be done	1. Skid control ECU with actuator	-

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When either of following is detected: 1. Both conditions continue for at least 10 seconds • Vehicle speed is more than 3 km/h (2 mph) • IG1 terminal voltage is less than 9.5 V 2. All conditions continue for at least 0.2 seconds • Solenoid relay remains ON • Relay contact is open • IG1 terminal voltage is less than 9.5 V	• Battery • Charging system • Power source circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

1	INSPECT FUSE (ECU-IG)

(a) Remove the ECU-IG fuse from the instrument panel junction block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω
Result

Result	Proceed to
OK (when using intelligent tester)	A
OK (when not using intelligent tester)	B
NG	C

B → **Go to step 3**

C → **REPLACE FUSE**

A

2	READ INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG power voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 10 to 14 V TOO LOW: Below 10 V	-

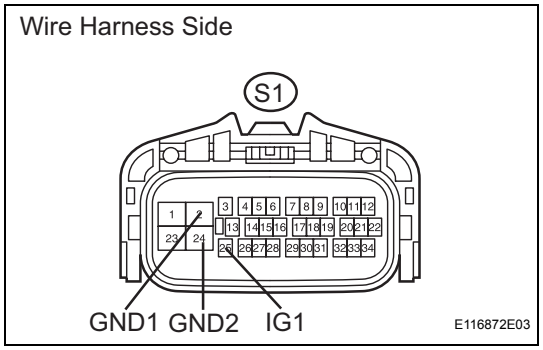
Result

Result	Proceed to
Display is not NORMAL	A
Display is NORMAL	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-25 (IG1) - Body ground	Ignition switch ON	10 to 14 V

Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

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

B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

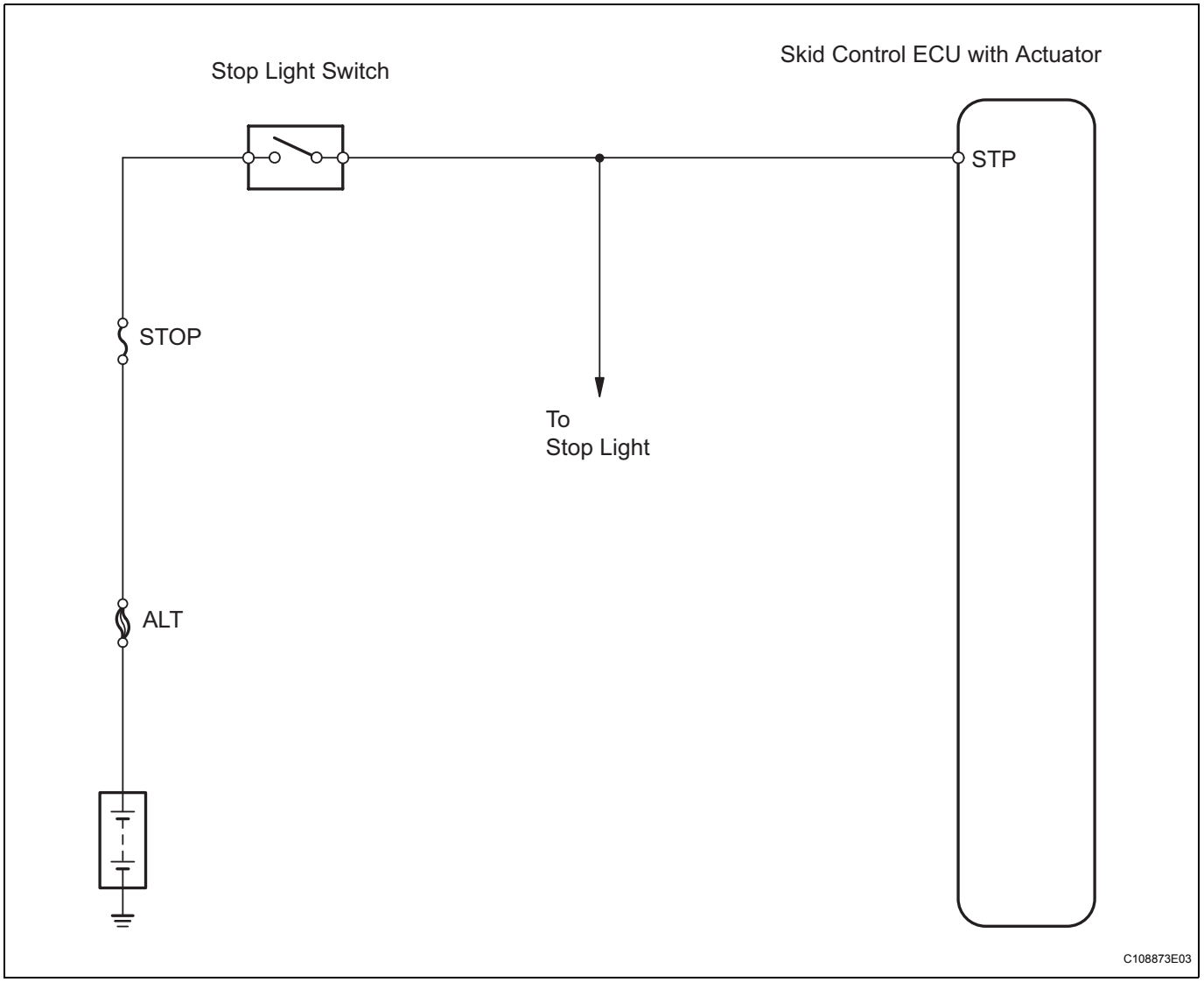
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.

DTC No.1	DTC Detection Condition	Trouble Area
C1249/49	Both conditions continue for at least 1.0 seconds: • IG1 terminal voltage is between 10 and 16 V • Open in stop light switch circuit	• Stop light switch assembly • Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK STOP LIGHT SWITCH (OPERATION)

(a) Check that the stop light illuminates when the brake pedal is depressed, and turns off when the brake pedal is released.

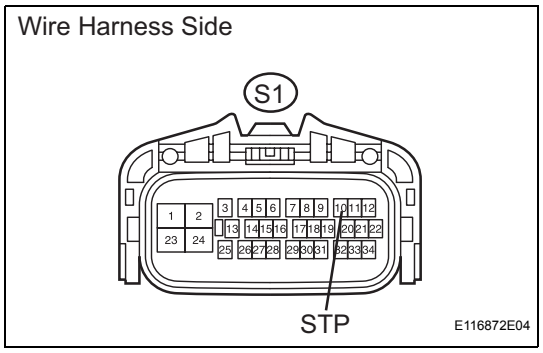
OK

Condition	Stop Light Condition
Brake pedal depressed	Illuminates
Brake pedal released	Turns off

NG → **Go to step 4**

OK ↓

2	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connectors.

Standard voltage

Tester Connection	Switch Condition	Specified Condition
S1-10 (STP) - Body ground	Brake pedal depressed	10 to 14 V
	Brae pedal released	Below 1 V

NG → **Go to step 5**

OK ↓

3	CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see pae BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).

Result

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

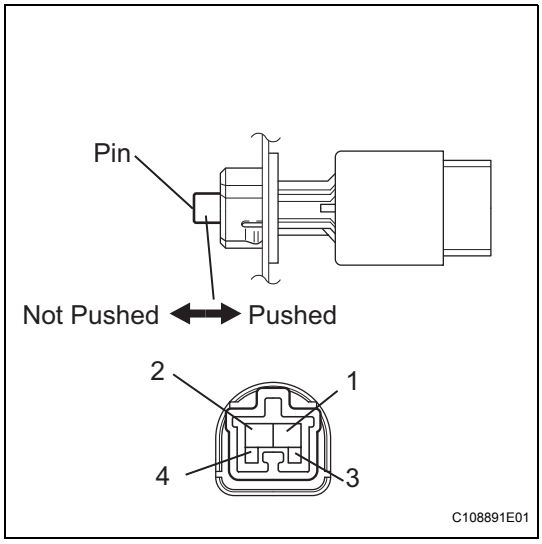
B → **END**

A ↓

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

4 INSPECT STOP LIGHT SWITCH ASSEMBLY



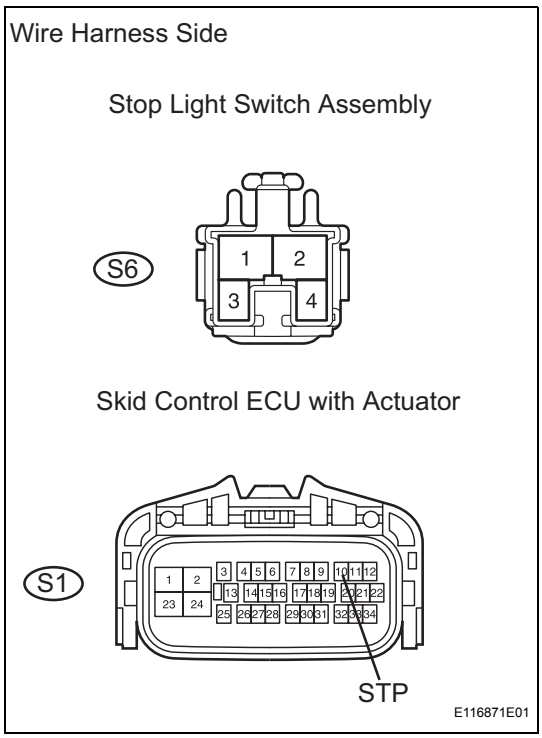
(a) Disconnect the S6 switch connector.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin not pushed	Below 1 Ω
	Pin pushed	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

5 CHECK WIRE HARNESS (STOP LIGHT SWITCH - SKID CONTROL ECU AND BATTERY)



(a) Disconnect the S6 switch connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S6-2 - Body ground	10 to 14 V

(d) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S6-1 - S1-27 (STP)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.

BC

(c) Check for DTCs (see page BC-11).
Result

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

B → END

A

REPLACE BRAKE ACTUATOR ASSEMBLY

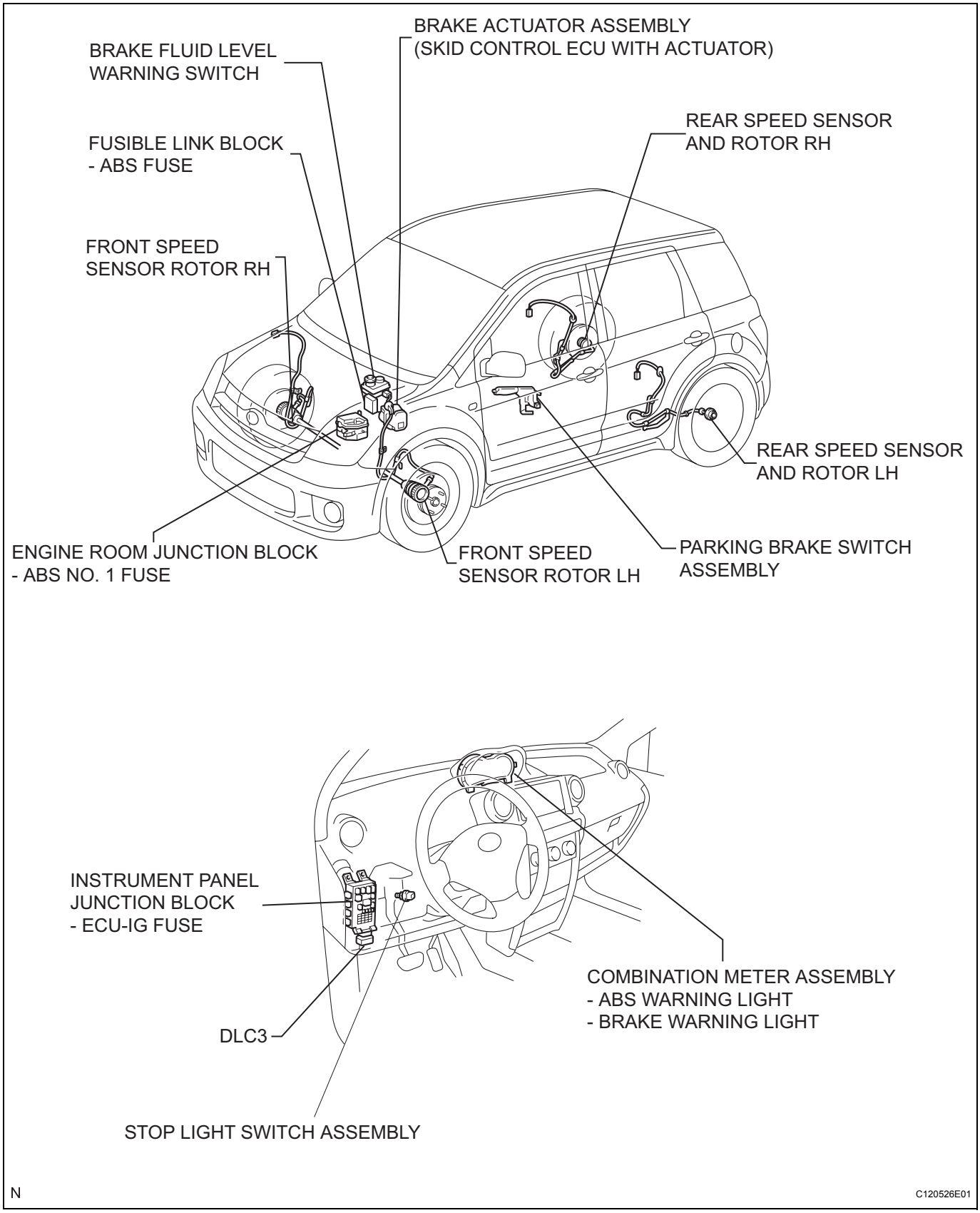
ANTI-LOCK BRAKE SYSTEM

PRECAUTION

NOTICE:

- **When there is a malfunction in the contact point of the terminals or installation problems with parts, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.**
- **In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.**
- **Since the anti-lock brake system may be influenced by a malfunction in other systems, be sure to check for DTCs in other systems.**
- **Be sure to remove and install the skid control ECU with actuator (brake actuator assembly) and each sensor with the ignition switch OFF unless specified in the inspection procedure.**
- **When removing and installing the skid control ECU with actuator and each sensor, be sure to check that the normal display is output in the test mode inspection and in the DTC output inspection after installing all the parts.**

PARTS LOCATION



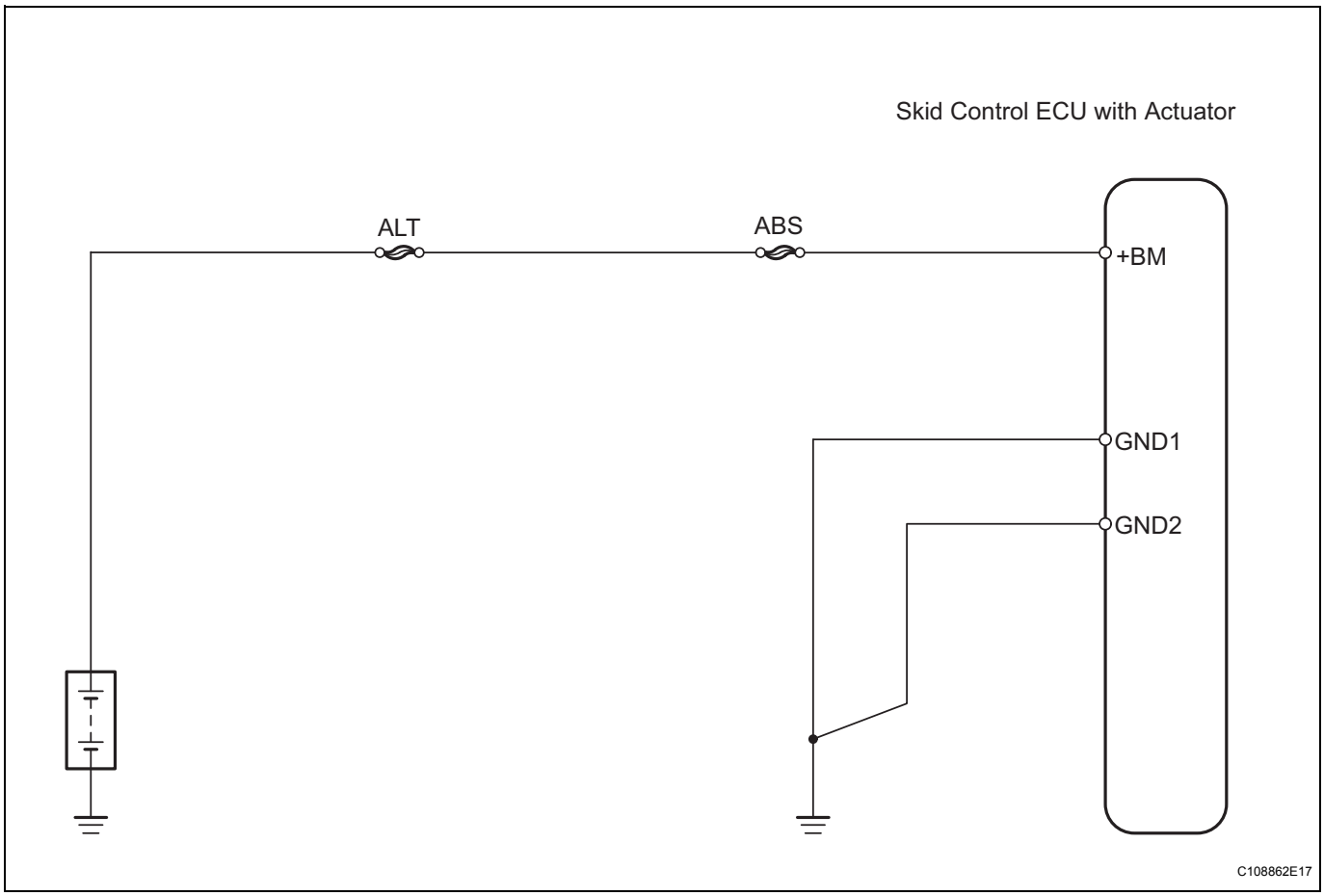
BC

DTC	C1251/51	Open in Pump Motor Circuit

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1251/51	ABS actuator pump motor is not operating normally during initial check	ABS pump motor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

BC

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS motor relay operates.

Skid control ECU with actuator

Item	Vehicle Condition/Test Details	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON/OFF	Operation sound of motor can be heard

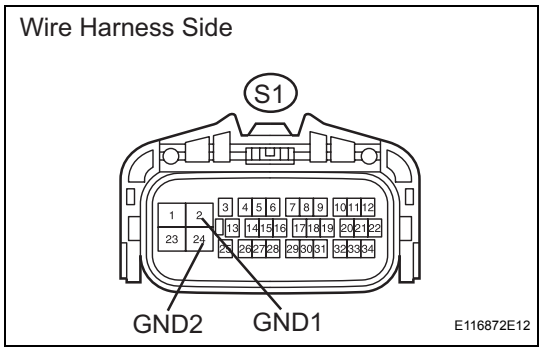
OK:

The operation sound of the ABS motor should be heard.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

3	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connector	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

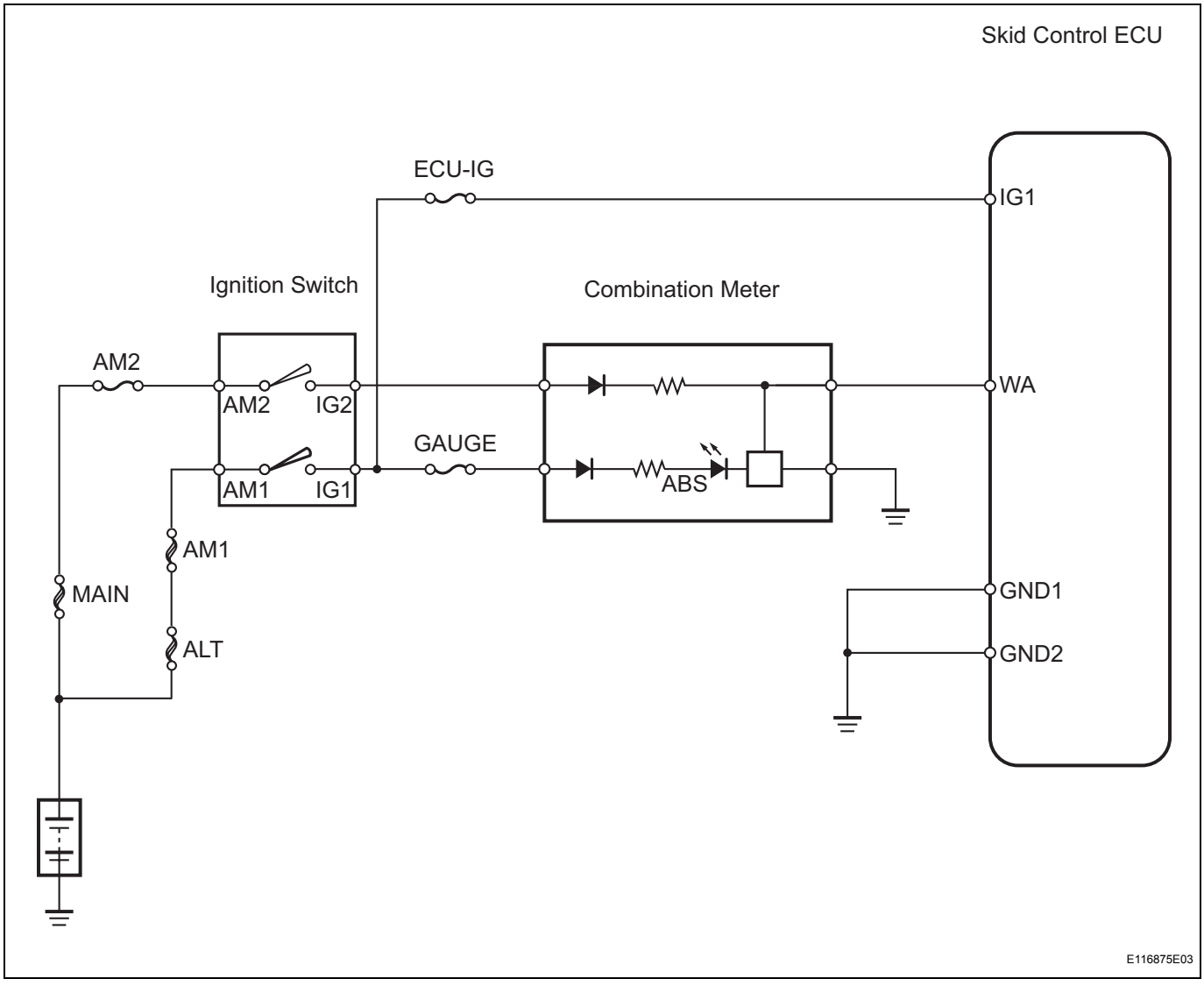
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

ABS Warning Light Remains ON

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
Always ON	When either condition below is met: 1. Voltage of ECU terminal IG1 remains at more than 17 V 2. There is a malfunction in ECU internal circuit	• Power source circuit • ABS warning light circuit • Skid control ECU with actuator • Charging system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTC

(a) Turn the ignition switch ON.
(b) Check that the ABS warning light illuminates.
(c) Check for DTCs (see page BC-8).

BC

Result

Result	Proceed to
DTC is not output (when using intelligent tester)	A
DTC is not output (when not using intelligent tester)	B
DTC is output	C

B → Go to step 7

C → REPAIR CIRCUIT INDICATED BY OUTPUT DTC

A

2 INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.
OK:
Each ECU connector is properly installed.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3 READ VALUE OF INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG power voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 10 to 14 V TOO LOW: Below 10 V	-

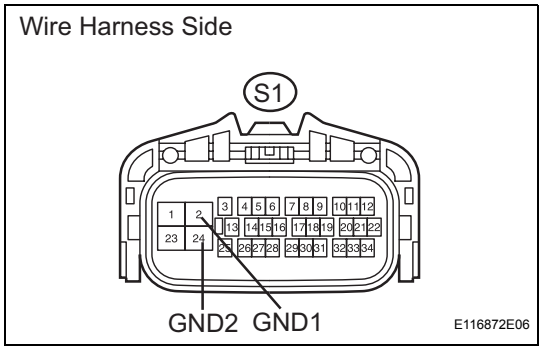
Result

Result	Proceed to
Display is NORMAL	A
Display is not NORMAL	B

B → Go to step 11

A

4	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

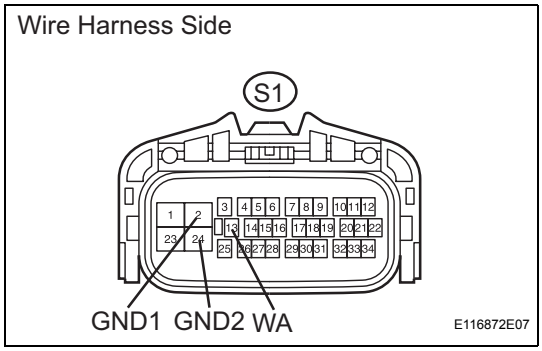
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK ABS WARNING LIGHT



(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-13) to GND1 (S1-2) or GND2 (S1-24) of the connector. Check the ABS warning light.

OK:

ABS warning light turns off.

(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.

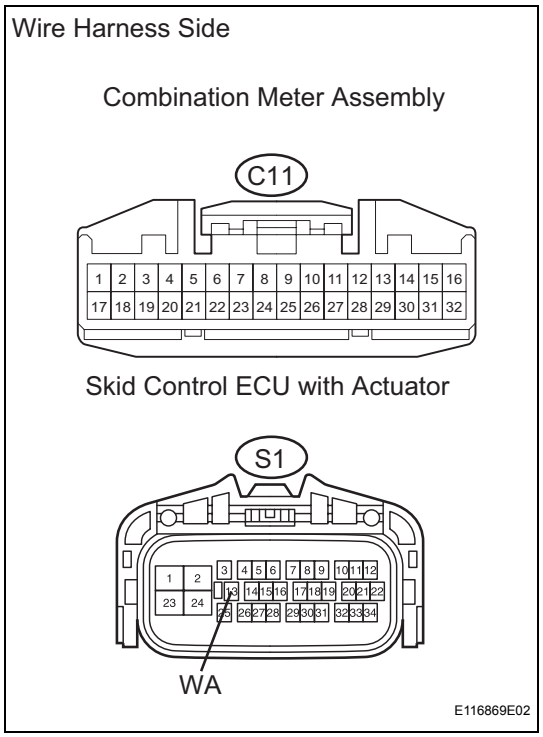
OK:

ABS warning light illuminates.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

6	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C11-11 - S1-13 (WA)	Below 1 Ω
C11-11 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

7	INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.

OK:

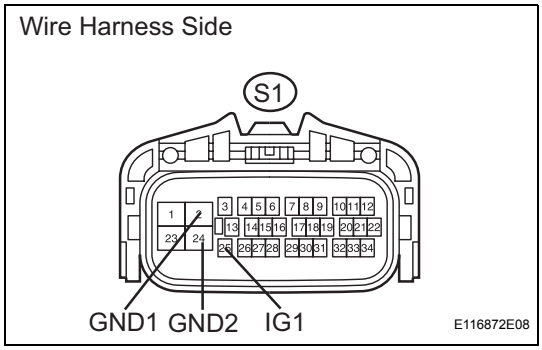
Each ECU connector is properly installed.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

BC

8 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-25 (IG1) - Body ground	Ignition switch ON	10 to 14 V

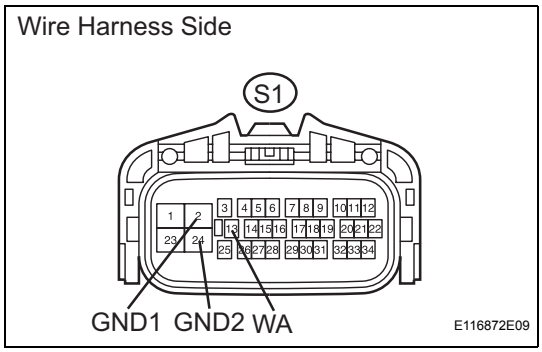
(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

9 CHECK ABS WARNING LIGHT

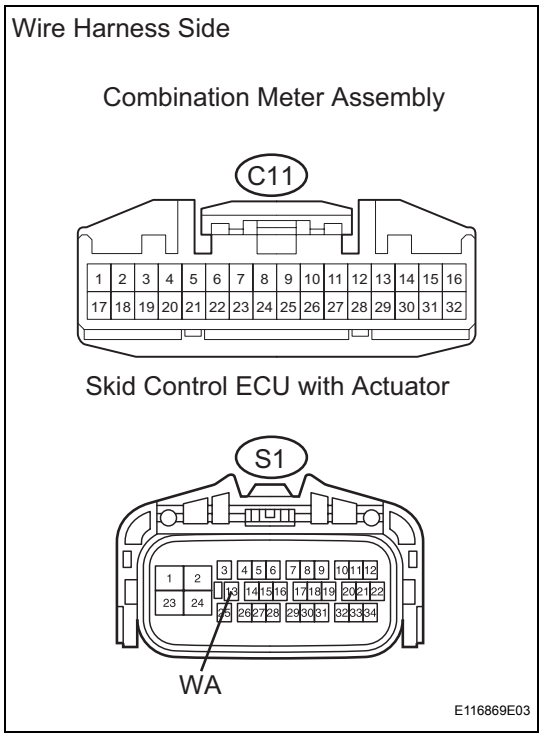


(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-13) to GND1 (S1-2) or GND2 (S1-24) of the S1 ECU connector. Check the ABS warning light.
OK:
ABS warning light turns off.
(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.
OK:
ABS warning light illuminates.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

10	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

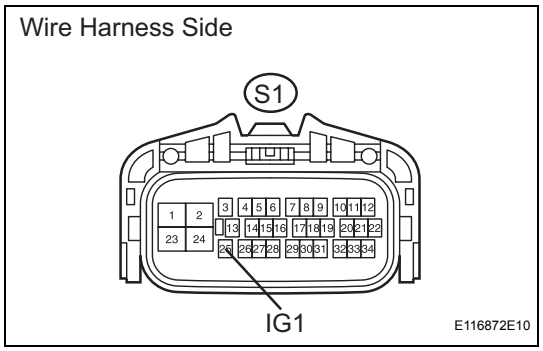
Tester Connection	Specified Condition
C11-11 - S1-13 (WA)	Below 1 Ω
C11-11 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

11	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Condition	Specified Condition
S1-25 (IG1) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

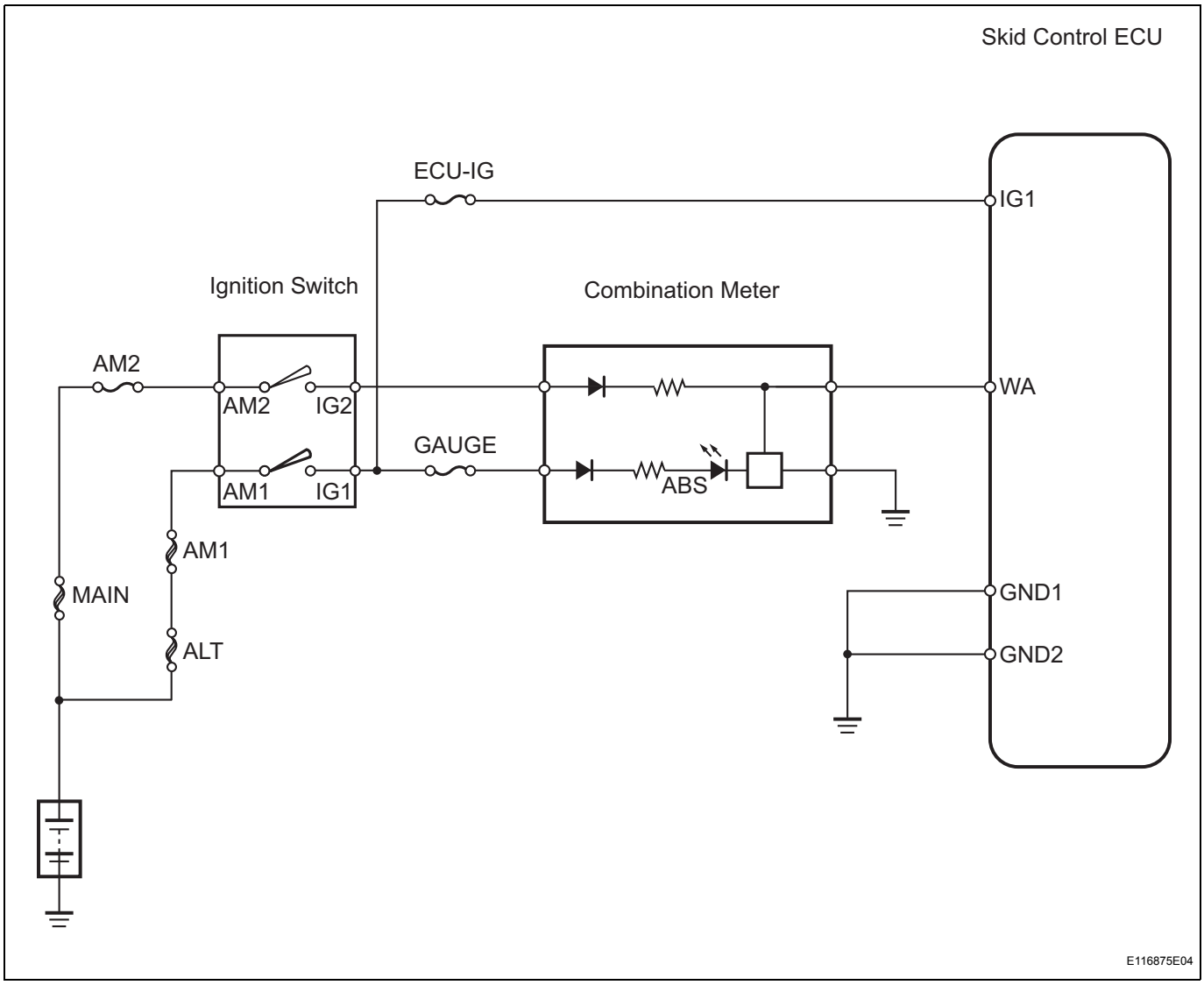
BC

ABS Warning Light does not Come ON

DESCRIPTION

If the ECU detects trouble, it will prohibit ABS control, turn on the ABS warning light, and store a DTC. Connect terminals TC and CG of the DLC3 to make the ABS warning light blink and output a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS warning light illuminates.

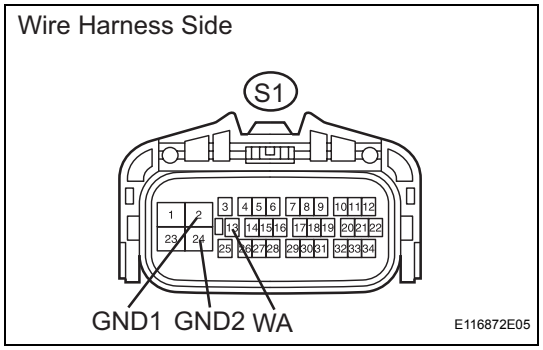
Skid control ECU with actuator

Item	Vehicle Condition/Test Details	Diagnostic Note
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 CHECK ABS WARNING LIGHT



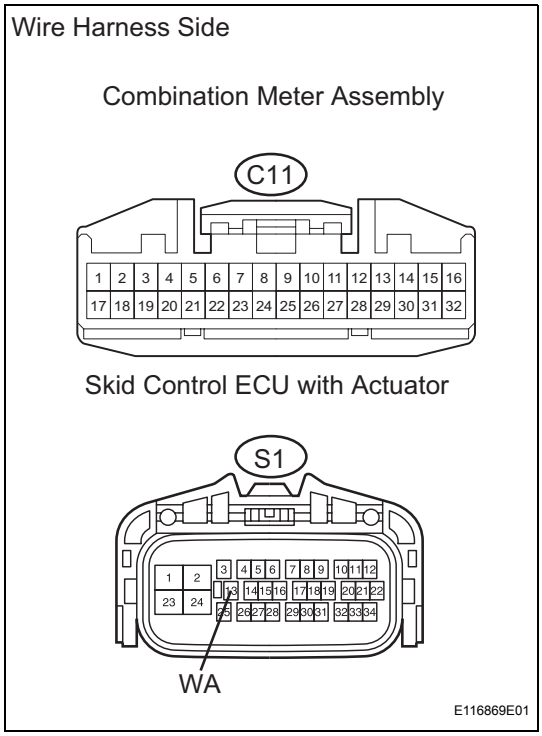
(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-13) to GND1 (S1-2) or GND2 (S1-24) of the S1 ECU connector.
(d) Check the ABS warning light.
OK:
ABS warning light turns off.
(e) Turn the ignition switch OFF.
(f) Remove the service wire.
(g) Turn the ignition switch ON.
(h) Check the ABS warning light.
OK:
ABS warning light illuminates.

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

BC

4	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connector	Specified Condition
C11-11 - S1-13 (WA)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

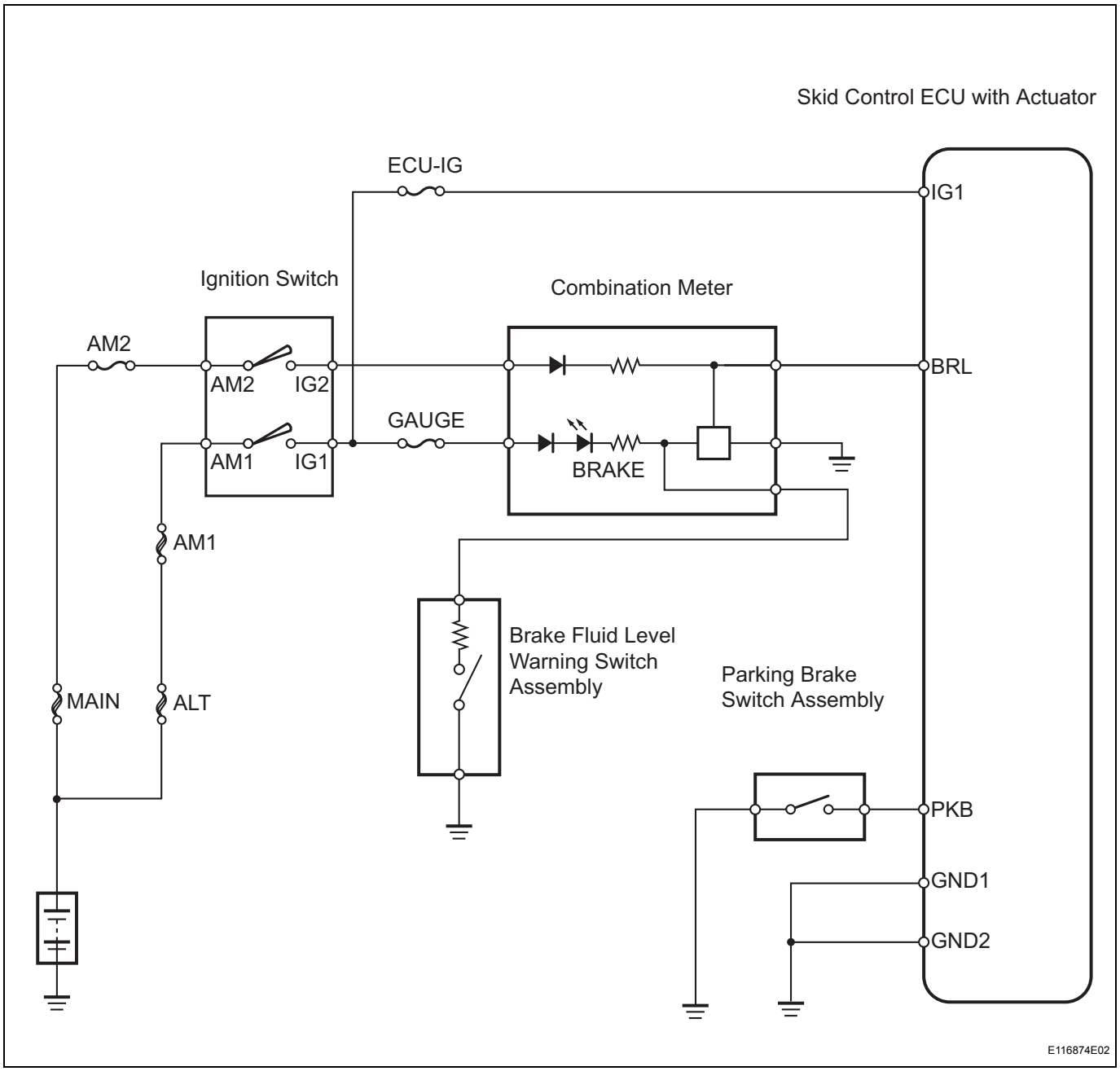
REPLACE COMBINATION METER ASSEMBLY

Brake Warning Light Circuit

DESCRIPTION

The brake warning light turns on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

BC

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (BRAKE WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the brake warning light illuminates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
BRAKE WRN LIGHT	Turns brake warning light ON / OFF	Observe combination meter

OK:
Brake warning light illuminates.

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 CHECK DTC FOR ABS

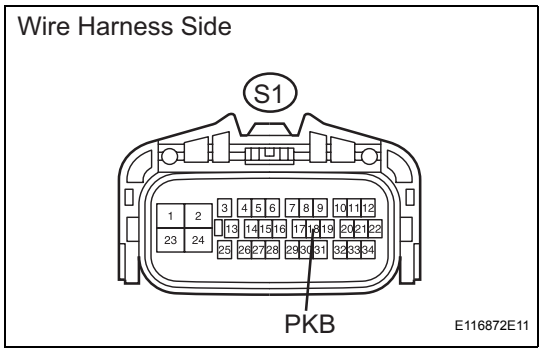
(a) Check for DTCs (see page BC-8).
Result

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

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

A

4 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

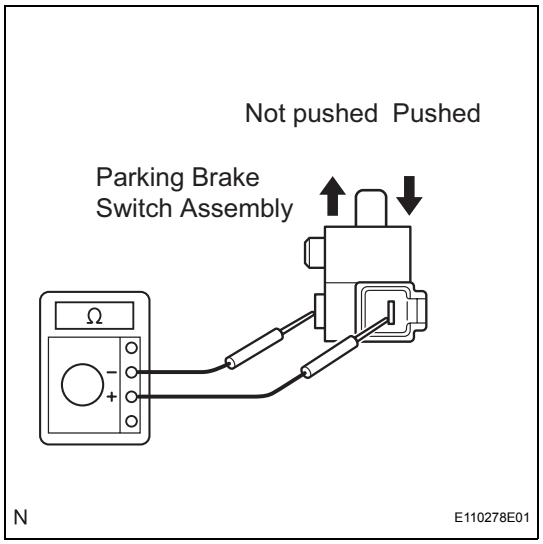
Tester Connection	Switch Condition	Specified Condition
S1-18 (PKB) - Body ground	Parking brake switch ON	Below 1 Ω
	Parking brake switch OFF	10 kΩ or higher

OK → Go to step 7

BC

NG

5 INSPECT PARKING BRAKE SWITCH ASSEMBLY



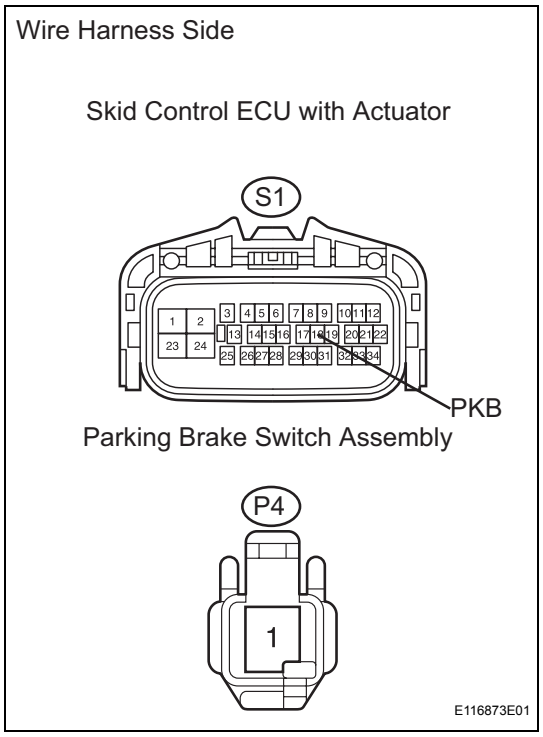
(a) Remove the parking brake switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	Pushed	Below 1 Ω
	Not pushed	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

6 CHECK WIRE HARNESS (SKID CONTROL ECU - PARKING BRAKE SWITCH)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the P4 switch connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S1-18 (PKB) - P4-1	Below 1 Ω

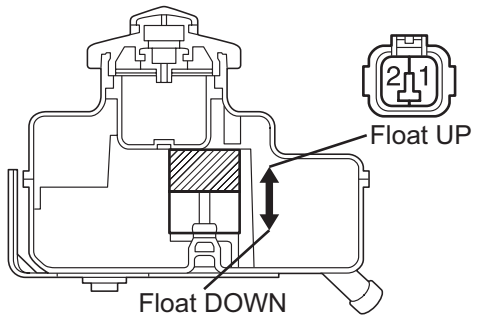
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

BC

7	INSPECT BRAKE FLUID LEVEL WARNING SWITCH ASSEMBLY

Brake Fluid Level Warning Switch Assembly



N E110273E01

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the B2 switch connector.
(c) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Float DOWN	Below 1 Ω
	Float UP	10 kΩ or higher

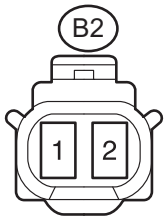
NG → **REPLACE BRAKE MASTER CYLINDER SUB-ASSEMBLY**

OK

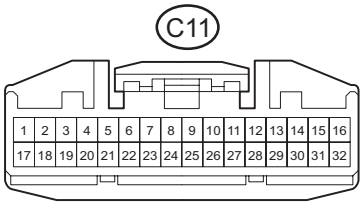
8	CHECK WIRE HARNESS (WARNING SWITCH - COMBINATION METER AND BODY GROUND)

Wire Harness Side

Brake Fluid Level Warning Switch Assembly



Combination Meter Assembly



E116388E01

(a) Disconnect the B2 switch connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

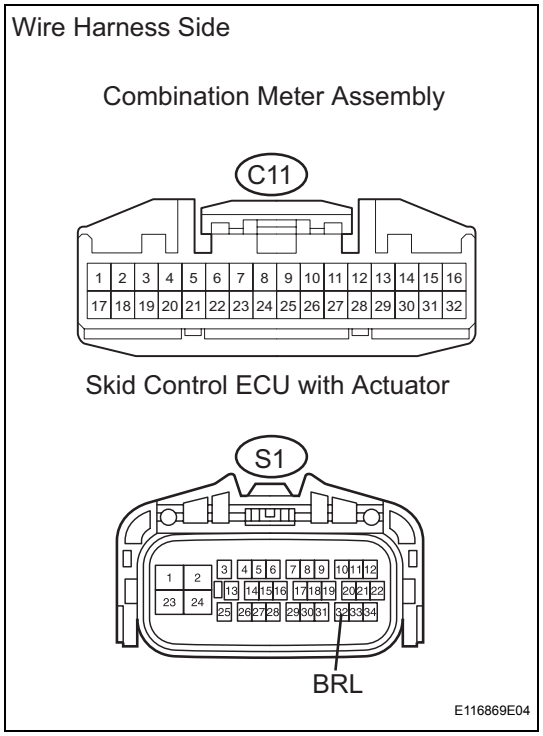
Tester Connection	Specified Condition
B2-1 - C11-15	Below 1 Ω
B2-2 - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

BC

9	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C11-14 - S1-32 (BRL)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

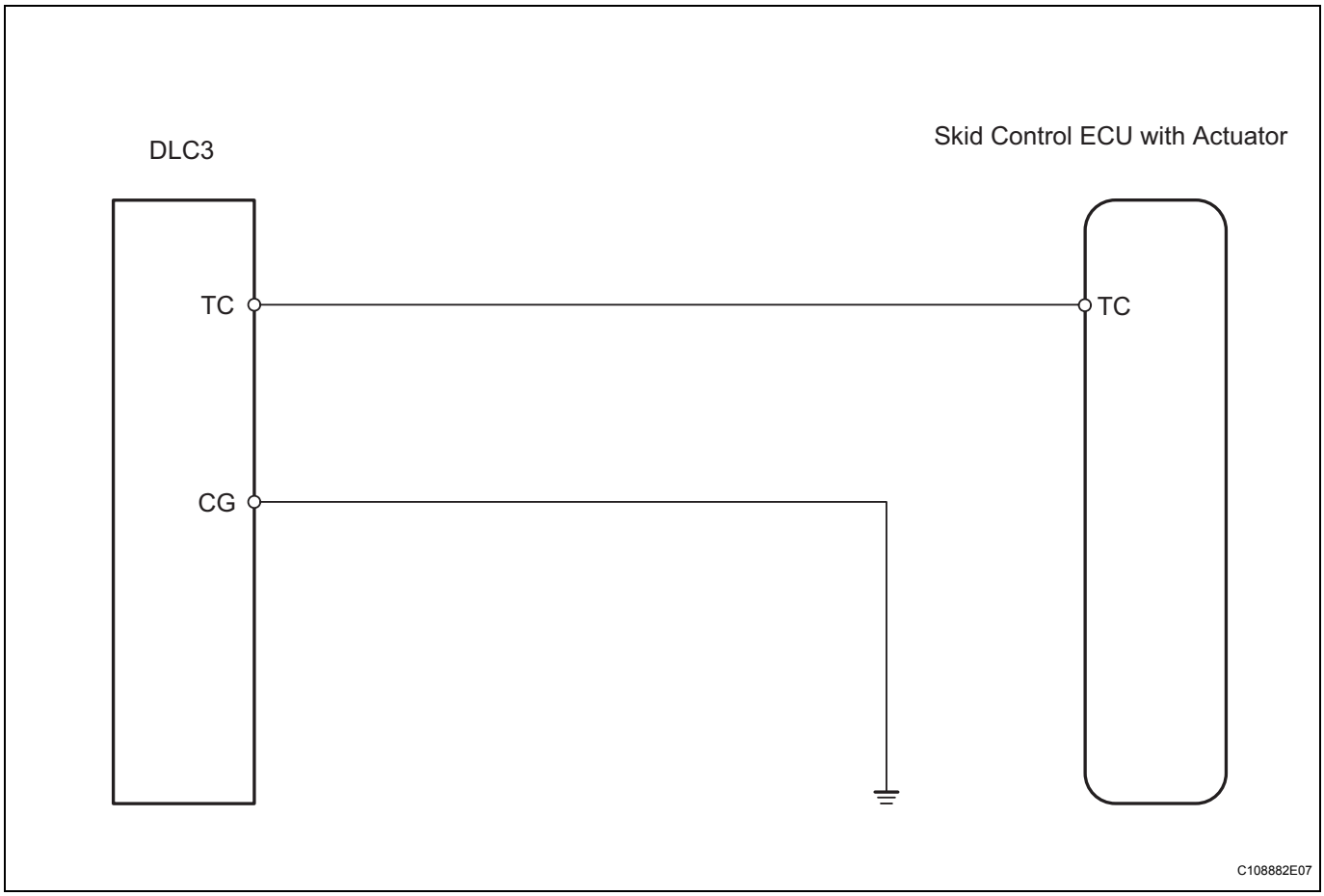
REPLACE BRAKE ACTUATOR ASSEMBLY

TC and CG Terminal Circuit

DESCRIPTION

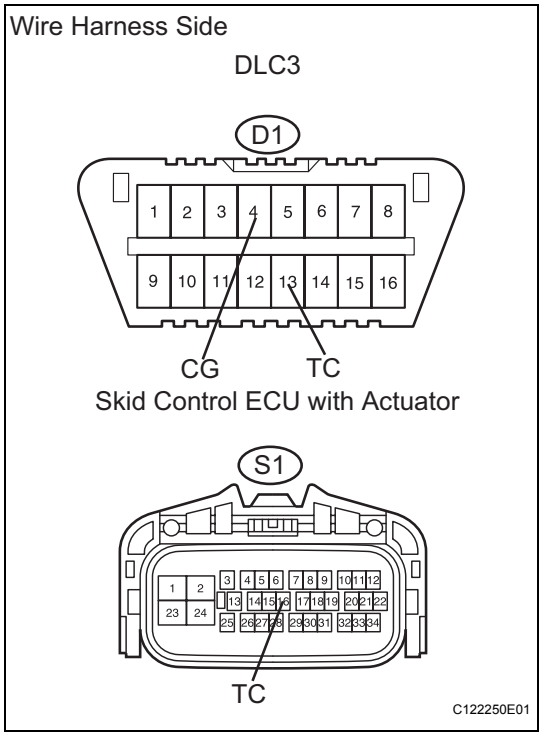
Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (DLC3 - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the D1 DLC3 connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

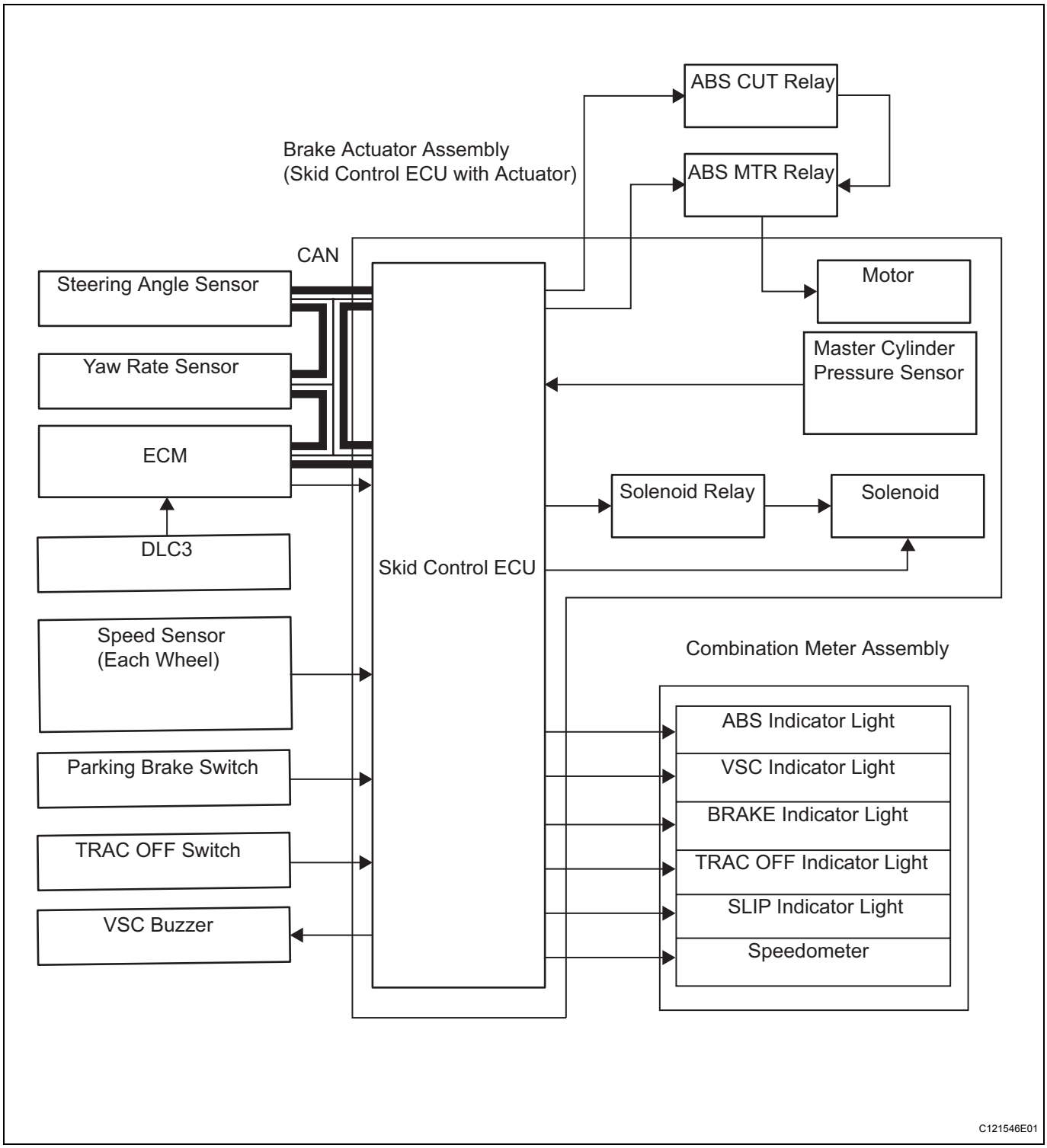
Tester Connector	Specified Condition
D1-13 (TC) - S1-16 (TC)	Below 1 Ω
D1-4 (CG) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

SYSTEM DIAGRAM



BC

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

The yaw rate sensor and deceleration sensor are combined in a single unit. This unit communicates with the skid control ECU through the CAN communication system.

(a) ABS (Anti-lock brake system)
The ABS helps prevent the wheel from locking when the brakes are applied firmly or when braking on a slippery surface.
Wheels in accordance with driving conditions. In addition, when braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.

(b) EBD (Electronic brake force distribution)
The EBD control utilizes the ABS, realizing proper brake force distribution between the front and rear.

(c) BA (Brake assist)
The primary purpose of the brake assist system is to provide an auxiliary brake force to assist the driver who cannot generate a large enough brake force during emergency braking, thus helping to maximize vehicle's brake performance.

(d) TRC (Traction control)
The TRC system helps prevent the drive wheels from slipping if the driver presses down on the accelerator pedal excessively when starting off or accelerating on a slippery surface.

(e) VSC (Vehicle stability control)
The VSC system helps prevent the vehicle from slipping sideways as a result of strong front wheel skid or strong rear wheel skid when cornering.

CAN communication (☐: Receiving signal from skid control ECU with actuator)

Related ECU / Parts	Signal
Steering Angle Sensor	☐: Steering angle signal
Yaw rate (deceleration) sensor	☐: Yaw rate signal ☐: Deceleration sensor signal

2. ABS with EBD & BA & TRC & VSC OPERATION

(a) The skid control ECU calculates vehicle stability tendency based on signals of the master cylinder pressure sensor, speed sensors, yaw rate (deceleration) sensor and steering angle sensor. The skid control ECU judges whether the control of engine output torque by the electronic control throttle and control of wheel brake pressure by the skid control ECU with actuator will start or not by the calculation results.

(b) The SLIP indicator blinks and the VSC warning buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when the TRC system is operating, and the operation being performed is displayed.

3. FAIL-SAFE FUNCTION

(a) When a failure occurs in the ABS & BA & TRC & VSC systems, the ABS warning light and the VSC warning light turn on and ABS & BA & TRC & VSC operations are prohibited. In addition to this, when there is a failure that disables EBD operation, the brake warning light also turns on and EBD operation is prohibited.

(b) If some control is prohibited due to a malfunction during its operation, that control will be cut off gradually so that vehicle stability will not change.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
- Use these procedures to troubleshoot the vehicle stability control system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	CHECK AND CLEAR DTC*

NEXT

4	PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → Go to step 6

A

5	SYMPTOM SIMULATION

BC

NEXT

6	CHECK FOR DTC*

Result

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

B → Go to step 9

A

7 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 9

A

8 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (see page BC-72)
(b) DATA LIST / ACTIVE TEST (see page BC-77)

NEXT

9 CHECK FOR FLUID LEAKAGE

NEXT

10 REPAIR OR REPLACE

NEXT

11 CONFIRMATION TEST

NEXT

END

OPERATION CHECK

1. CHECK SENSOR SIGNAL BY TEST MODE (When Using Intelligent Tester)

NOTICE:

After replacing the yaw rate sensor and/or skid control ECU with actuator (brake actuator assembly), perform zero point calibration of the yaw rate sensor (see page BC-69).

HINT:

If the ignition switch is turned from ON to ACC or OFF during test mode, the DTCs will be erased.

(a) Procedures for test mode:

(1) Turn the ignition switch OFF.

(2) Check that the shift lever is on P.

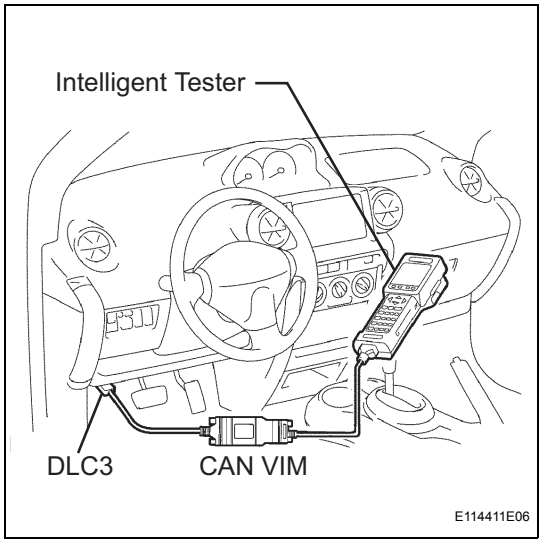
(3) Connect the intelligent tester (with CAN VIM) to the DLC3.

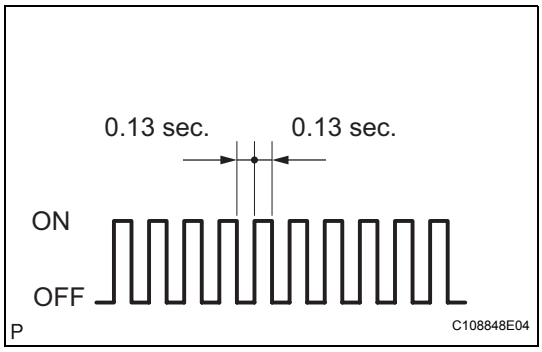
(4) Turn the ignition switch ON.

(5) Select the Test Mode using the intelligent tester.

HINT:

Refer to the intelligent tester operator's manual for further details.





(6) Check that the ABS warning light and VSC warning light blink.

HINT:

If the ABS warning light and VSC warning light do not blink, check the ABS warning light and VSC warning light circuits.

Trouble area	See procedure
ABS warning light circuit	BC-132
VSC warning light circuit	BC-139

(b) Check the master cylinder pressure sensor.

(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more. Then, quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

HINT:

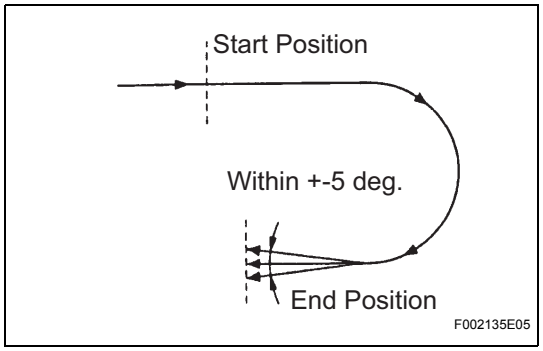
At this time, the ABS warning light and VSC warning light illuminate for 3 seconds.

BC

(c) Check the speed sensor.
(1) Drive the vehicle straightforward at the following speeds. Then check that the ABS warning light is as follows.

Vehicle Speed	Check	ABS Warning Light
45 km/h (28 mph) or higher	Deviations of sensor signal	Turns off

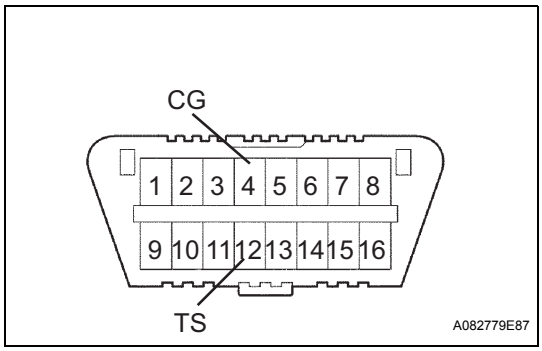
HINT:
The sensor signal check may not be completed if the vehicle's wheels slip or the steering wheel is turned during this check.
(2) Stop the vehicle.

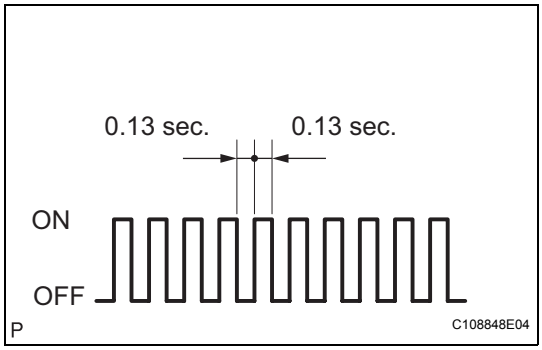


(d) Check the yaw rate sensor.
(1) Move the shift lever to the D position and drive the vehicle at 5 km/h (3 mph). Turn the steering wheel either to the left or right 90°or more, and drive the vehicle in a half-circle pattern.
(2) Stop the vehicle and move the shift lever to the P position. Check that the skid control buzzer sounds for 3 seconds.
If the skid control buzzer sounds, the sensor check is completed normally.
If the skid control buzzer does not sound, check the skid control buzzer circuit (see page BC-155), and then perform the sensor check again.
If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor. Check the DTC.
HINT:
- Drive the vehicle in a half-circle. At the end of the turn, the direction of the vehicle should be within 180°+-5° of its start position.
- Do not spin the wheels.

(e) Read the DTC by following the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CHECK SENSOR SIGNAL BY TEST MODE (When not Using Intelligent Tester)
NOTICE:
After replacing the yaw rate sensor and/or skid control ECU with actuator (brake actuator assembly), perform zero point calibration of the yaw rate sensor (see page BC-69).
HINT:
If the ignition switch is turned from ON to ACC or OFF during test mode, the DTCs will be erased.
During test mode, the ECU records all DTCs of the sensor check function.
By performing the sensor signal check, the codes are erased. If proper function is confirmed the codes left over are the codes when problems were found.





(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Using SSt, connect terminal 12 (TS) and 4 (CG) of the DLC3.
SST 09843-18040
(3) Check that the steering wheel is in the center position and move the shift lever to a P position.
(4) Turn the ignition switch ON.

(5) Check that the ABS warning light and VSC warning light blink as shown in the illustration.
HINT:
If the ABS warning light or VSC warning light does not blink, check the ABS warning light circuit, VSC warning light circuit or TC and CG terminal circuit.

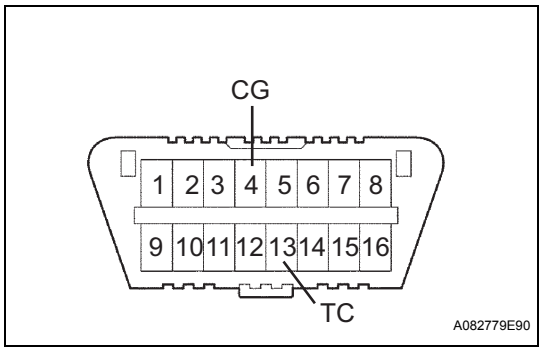
Trouble area	See procedure
ABS warning light circuit	BC-132
VSC warning light circuit	BC-139
TS and CG terminal circuit	BC-159

(b) Check the master cylinder pressure sensor.
(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more. Then, quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.
HINT:
At this time, the ABS warning light illuminates for 3 seconds.

(c) Check the speed sensor.
(1) Drive the vehicle straight forward at the following speeds. Then check that the ABS warning light is as follows.

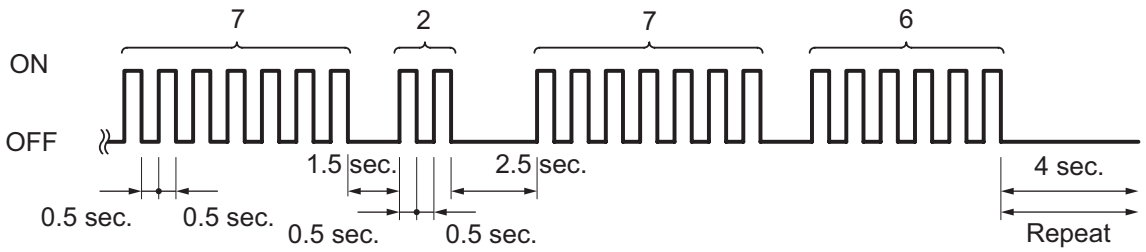
Vehicle Speed	Check	ABS Warning Light
45 km/h (28 mph) or higher	Deviations of sensor signal	Turns off

HINT:
The sensor signal check may not be completed if the vehicle's wheels slip or the steering wheel is turned during this check.
(2) Stop the vehicle.



(d) Read the DTCs.
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
(2) Read the number of blinks of the ABS warning light.
HINT:
- As an example, the blinking patterns for DTCs 72 and 76 are shown below.
- The conditions are explained in the Diagnostic Trouble Code Chart.
- For the normal code, the light cycles between ON and OFF at intervals of 0.25 seconds.
- If more than 1 DTC is detected at the same time, the codes will be displayed in numerical order.

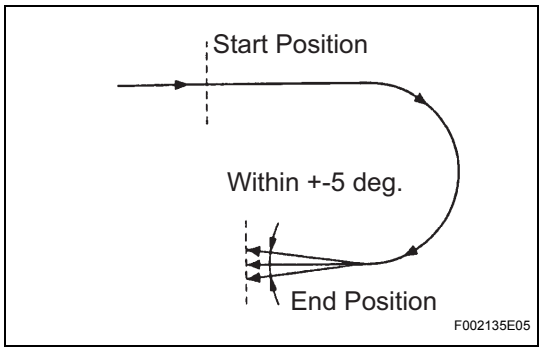
DTC (Example: DTCs 72 and 76)



DTC 72 DTC 76

C108851E01

(e) After the check, disconnect SST from terminals 13 (TC) and 4 (CG) of the DLC3.



(f) Check the yaw rate sensor.
(1) Move the shift lever to the D position and drive the vehicle at 5 km/h (3 mph). Turn the steering wheel either to the left or right 90°or move, and drive the vehicle in a half-circle pattern.
(2) Stop the vehicle and move the shift lever to the P position. Check that the skid control buzzer sounds for 3 seconds.
If the skid control buzzer sounds, the sensor check is completed normally.
If the skid control buzzer does not sound, check the skid control buzzer circuit (see page BC-155), and then perform the sensor check again.
If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor. Check the DTC.
HINT:
- Drive the vehicle in a half-circle. At the end of the turn, the direction of the vehicle should be within 180°+-5° of its start position.

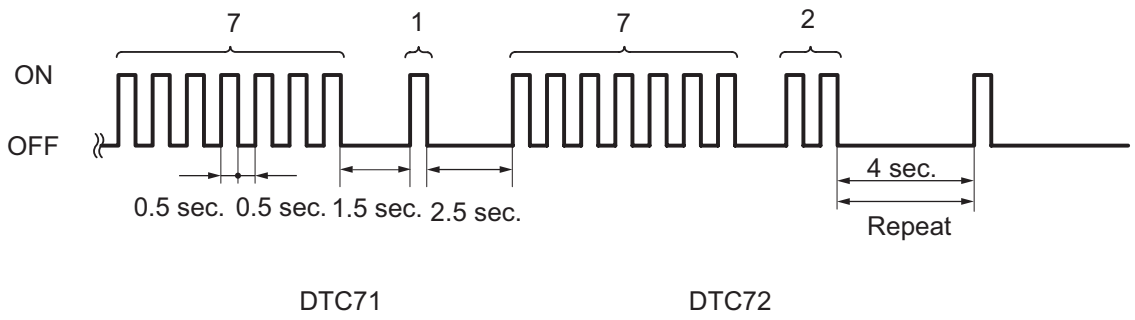
BC

- Do not spin the wheels.

(3) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040

(4) Read the number of blinks of the VSC warning light.
HINT:
- As an example, the blinking patterns for DTCs 71 and 72 are shown below.
- The conditions are explained in the Diagnostic Trouble Code Chart.
- For the normal code, the light cycles between ON and OFF at intervals of 0.25 seconds.
- If more than 1 DTC is detected at the same time, the codes will be displayed in numerical order.

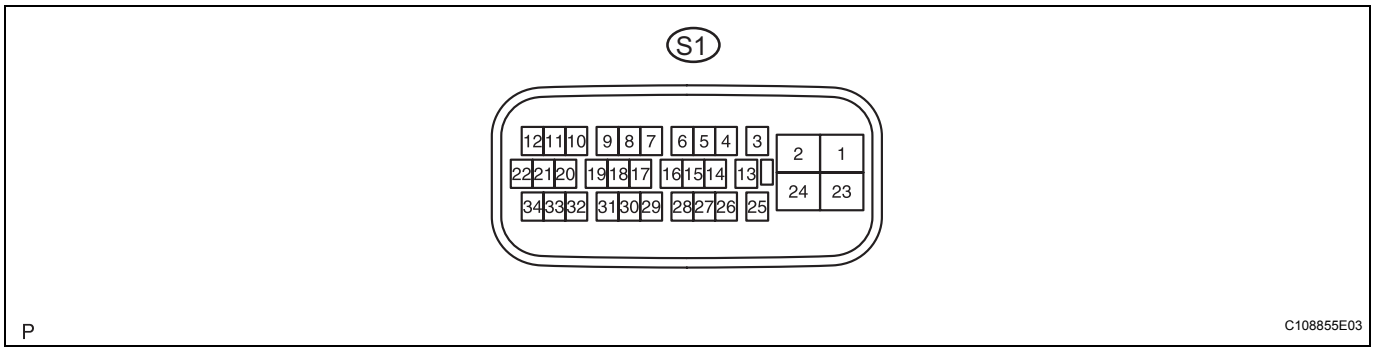
Malfunction Code (Example Code 71 and 72)



(5) After performing the check, disconnect the SST from terminals 13 (TS) and 4 (CG) of the DLC3, and turn the ignition switch OFF.

TERMINALS OF ECU

1. CHECK BRAKE ACTUATOR ASSEMBLY (SKID CONTROL ECU ASSEMBLY WITH ACTUATOR)

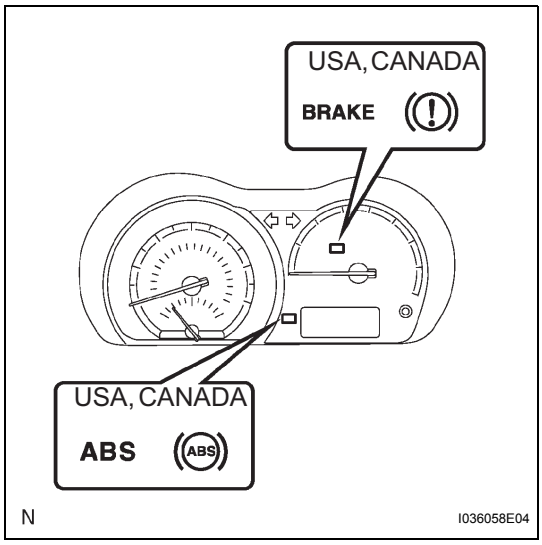


(a) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+BS (S1-1) - GND (S1-2, 24)	B - W-B	Solenoid relay power supply	Always	11 to 14 V
FR+ (S1-31) - FR- (S1-30)	G-W - G-O	Front RH wheel speed signal input	Ignition switch ON, slowly turn right front wheel	AC generation
FL+ (S1-9) - FL- (S1-8)	R - G	Front LH wheel speed signal input	Ignition switch ON, slowly turn left front wheel	AC generation
RR+ (S1-33) - RR- (S1-34)	LG-B - LG-R	Rear RH wheel speed signal input	Ignition switch ON, slowly turn right rear wheel	AC generation
RL+ (S1-11) - RL- (S1-12)	Y-B - P-B	Rear LH wheel speed signal input	Ignition switch ON, slowly turn left rear wheel	AC generation
SP1 (S1-26) - GND (S1-2, 24)	W-R - W-B	Speed signal output	Vehicle driving at about 20 km/h (12 mph)	AC generation
D/G (S1-14) - GND (S1-2, 24)	W - W-B	Diagnostic communication line	Ignition switch ON	11 to 14 V
TC (S1-16) - GND (S1-2, 24)	P-B - W-B	Diagnosis tester communication line	Ignition switch ON	11 to 14 V
+BM (S1-23) - GND (S1-2, 24)	B - W-B	Motor relay test input	Always	11 to 14 V
STP (S1-10) - GND (S1-2, 24)	G-W - W-B	Stop light input signal	Stop light switch ON (Brake pedal depressed)	8 to 14 V
PKB (S1-18) - GND (S1-2, 24)	Y-B - W-B	Parking brake switch input	Ignition switch ON, parking brake switch ON	Below 1.5 V
			Ignition switch ON, parking brake switch OFF	11 to 14 V
WA (S1-13) - GND (S1-2, 24)	P - W-B	ABS warning light output	Ignition switch ON, ABS warning light ON	8 to 14 V
BRL (S1-32) - GND (S1-2, 24)	B-Y - W-B	Brake warning line output	Ignition switch ON, brake warning light ON	8 to 14 V
IG1 (S1-25) - GND (S1-2, 24)	B-L - W-B	IG1 power supply	Ignition switch ON	11 to 14 V

If the result is not as specified, there may be a malfunction in the ECU.

BC



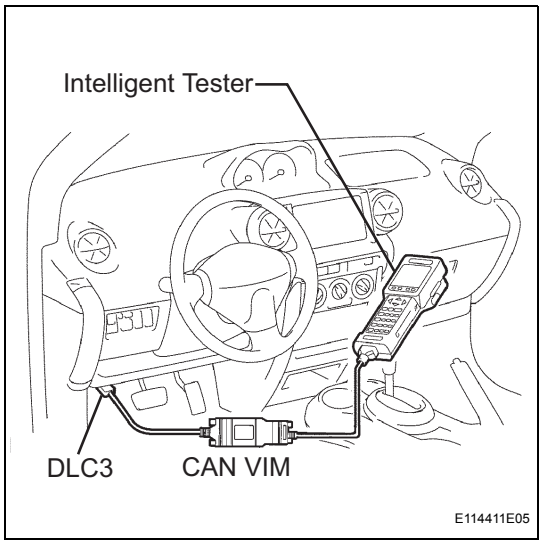
DIAGNOSIS SYSTEM

1. CHECK INDICATOR

(a) Check the warning lights.
  (1) Release the parking brake lever.
  (2) When the ignition switch is ON, check that the ABS warning light and brake warning light illuminate for approximately 3 seconds.
  HINT:
  - When the parking brake is applied or brake fluid level is low, the brake warning light illuminates.
  - If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light and brake warning light circuit. If the indicator remains on, proceed to troubleshooting for the light circuit below.

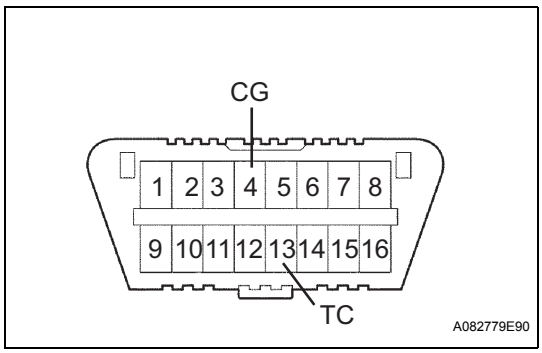
Trouble Area	See procedure
ABS warning light circuit	BC-43
Brake warning light circuit	BC-52

DTC CHECK / CLEAR



1. CHECK DTC (WHEN USING INTELLIGENT TESTER)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Read the DTCs by following the prompts on the tester screen.
  HINT:
  Refer to the intelligent tester operator's manual for further details.



2. CHECK DTC (WHEN NOT USING INTELLIGENT TESTER:)

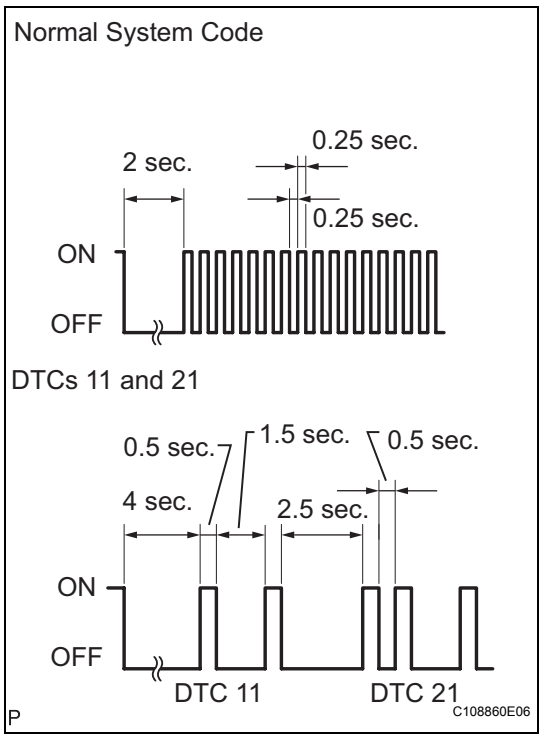
(a) Check the DTCs.
  (1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
  SST 09843-18040
  (2) Turn the ignition switch ON.
  (3) Read the DTC from the ABS warning light on the combination meter.
  HINT:
  - If no code appears, check the TC and CG terminal circuit or ABS warning light circuit.

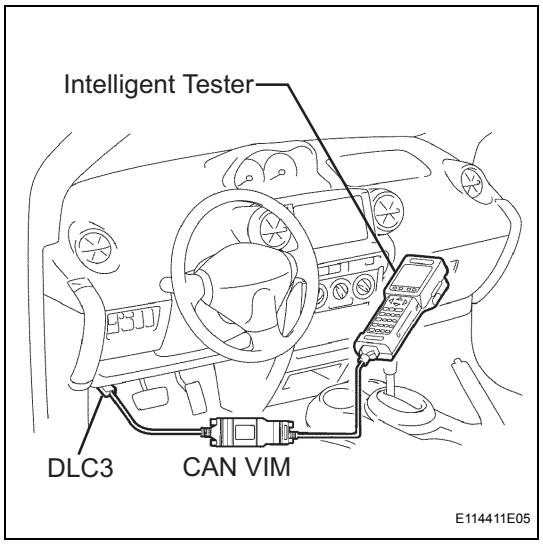
Trouble Area	See procedure
ABS warning light circuit	BC-43
TC and CG terminal circuit	BC-57

BC

- If more than 1 DTC is detected at the same time, the DTCs will be displayed in numerical order.
- As an example, the blinking patterns for a normal system code and DTCs 11 and 21 are shown in the illustration.
- DTCs are explained in the Diagnostic Trouble Code Chart.

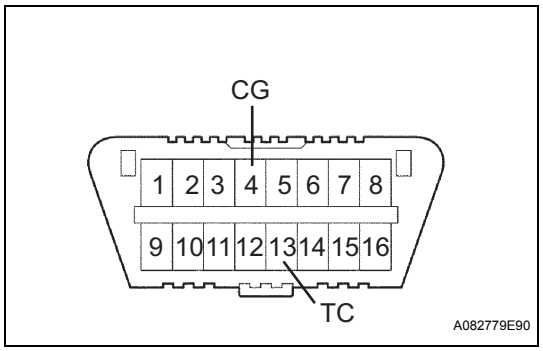
(b) After completing the check, disconnect terminals 13 (TC) and 4 (CG) of the DLC3, and turn off the display.
If 2 or more DTCs are detected at the same time, the DTCs will be displayed first.





3. CLEAR DTC (WHEN USING INTELLIGENT TESTER)

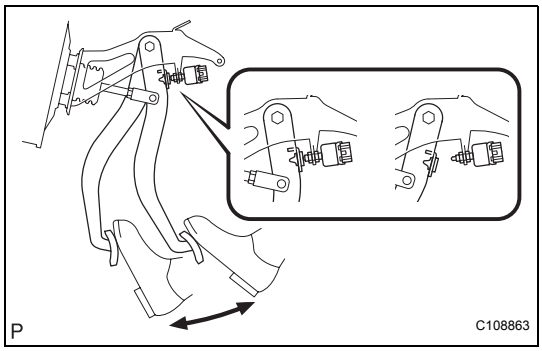
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) Operate the intelligent tester to erase the codes.
HINT:
Refer to the intelligent tester operator's manual for further details.



4. CLEAR DTC (WHEN NOT USING INTELLIGENT TESTER)

(a) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
(b) Turn the ignition switch ON.

BC



(c) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(d) Check that the ABS warning light and brake warning light displays the normal system code.
(e) Remove SST from the terminals of the DLC3.
HINT:
DTCs cannot be cleared by removing the battery cable or ECU-IG fuse.

CALIBRATION

1. PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR (When not Using Intelligent Tester)

HINT:

After replacing the yaw rate sensor and/or the skid control ECU with actuator (brake actuator assembly), make sure to perform the yaw rate sensor and deceleration sensor zero point calibration.

NOTICE:

- **While performing the calibration, do not tilt, move or shake the vehicle. Keep it in a stationary condition. Do not start the engine.**
- **Be sure to perform the calibration on a level surface that has an inclination of less than 1 degree.**

(a) Move the shift lever to P.

(b) Clear the zero point calibration using the SST check wire.

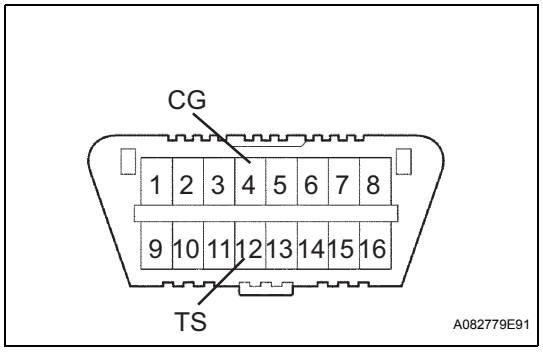
SST 09843-18040

(1) Turn the ignition switch ON.

(2) Using SST, connect and disconnect terminals 12 (TS) and 4 (CG) of the DLC3 4 times or more within 8 seconds.

(3) Check that the warning light indicates the normal code.

(4) Remove the SST from the terminals of the DLC3.



(c) Procedure for test mode:

(1) Turn the ignition switch OFF.

(2) Apply the parking brake (the parking brake switch is turned ON).

(3) Using SST, connect and disconnect terminals 12 (TS) and 4 (CG) of the DLC3.

SST 09843-18040

(4) Check that the steering wheel is in the center position and move the shift lever to P.

(5) Turn the ignition switch ON.

(d) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.

(e) Check that the VSC warning light blinks.

HINT:

If the VSC warning light does not blink, perform the zero point calibration again.

2. PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR (When Using Intelligent Tester)

NOTICE:

- **While performing the calibration, do not tilt, move or shake the vehicle. Keep it in a stationary condition. Do not start the engine.**
- **Be sure to perform the calibration on a level surface (within an inclination of 1 degree).**

BC

(a) Check that the steering wheel is in the center position and move the shift lever to the P position.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON.
(d) Operate the intelligent tester to test mode (SIGNAL CHECK).
(e) Obtain zero point of the yaw rate sensor and deceleration sensor:
    (1) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.
    (2) Check that the VSC warning light blinks.
    HINT:
    If the VSC warning light does not blink, perform the zero point calibration again.
(f) Turn the ignition switch OFF.

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

- **When replacing the skid control ECU, sensors, etc., turn the ignition switch OFF.**
- **When replacing the yaw rate sensor and/or the brake actuator assembly, make sure to perform the yaw rate sensor zero point calibration (see page BC-69)**

Vehicle stability control system

Symptom	Suspected area	See page
ABS, BA and/or EBD does not operate	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. IG power source circuit	BC-120
	3. Front speed sensor circuit	BC-83
	4. Rear speed sensor circuit	BC-89
	5. Check the ABS and TRACTION actuator assembly with the intelligent tester (Check the skid control ECU with actuator operation using the active test function). If abnormal, check the hydraulic circuit for leakage.	BC-74
	6. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU with actuator	-
ABS, BA and/or EBD does not operate efficiently	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. Front speed sensor circuit	BC-83
	3. Rear speed sensor circuit	BC-89
	4. Stop light switch circuit	BC-125
	5. Check the skid control ECU with actuator operation using the active test function. If abnormal, check the hydraulic circuit for leakage	BC-74
	6. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU with actuator	-
ABS warning light abnormal (Remains on)	1. ABS warning light circuit	BC-132
	2. Skid control ECU with actuator (brake actuator assembly)	-
ABS sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. TC and CG terminal circuit	BC-157
	3. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU with actuator	-
Sensor signal check cannot be done	1. Skid control ECU with actuator	-
VSC and/or TRAC does not operate	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2, IG1 power source circuit	BC-120
	3. Check hydraulic circuit for leakage	-
	4. Front speed sensor circuit	BC-83
	5. Rear speed sensor circuit	BC-89
	6. Yaw rate sensor circuit (Deceleration sensor)	BC-117
	7. Steering sensor circuit	BC-115
SLIP indicator light abnormal	1. SLIP indicator light circuit	BC-153
	2. Skid control ECU with actuator	-

Symptom	Suspected area	See page
TRAC OFF indicator abnormal	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. TRAC OFF switch circuit	BC-149
VSC DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. TC and CG terminal circuit	BC-157
VSC warning light abnormal	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. VSC warning circuit	BC-139

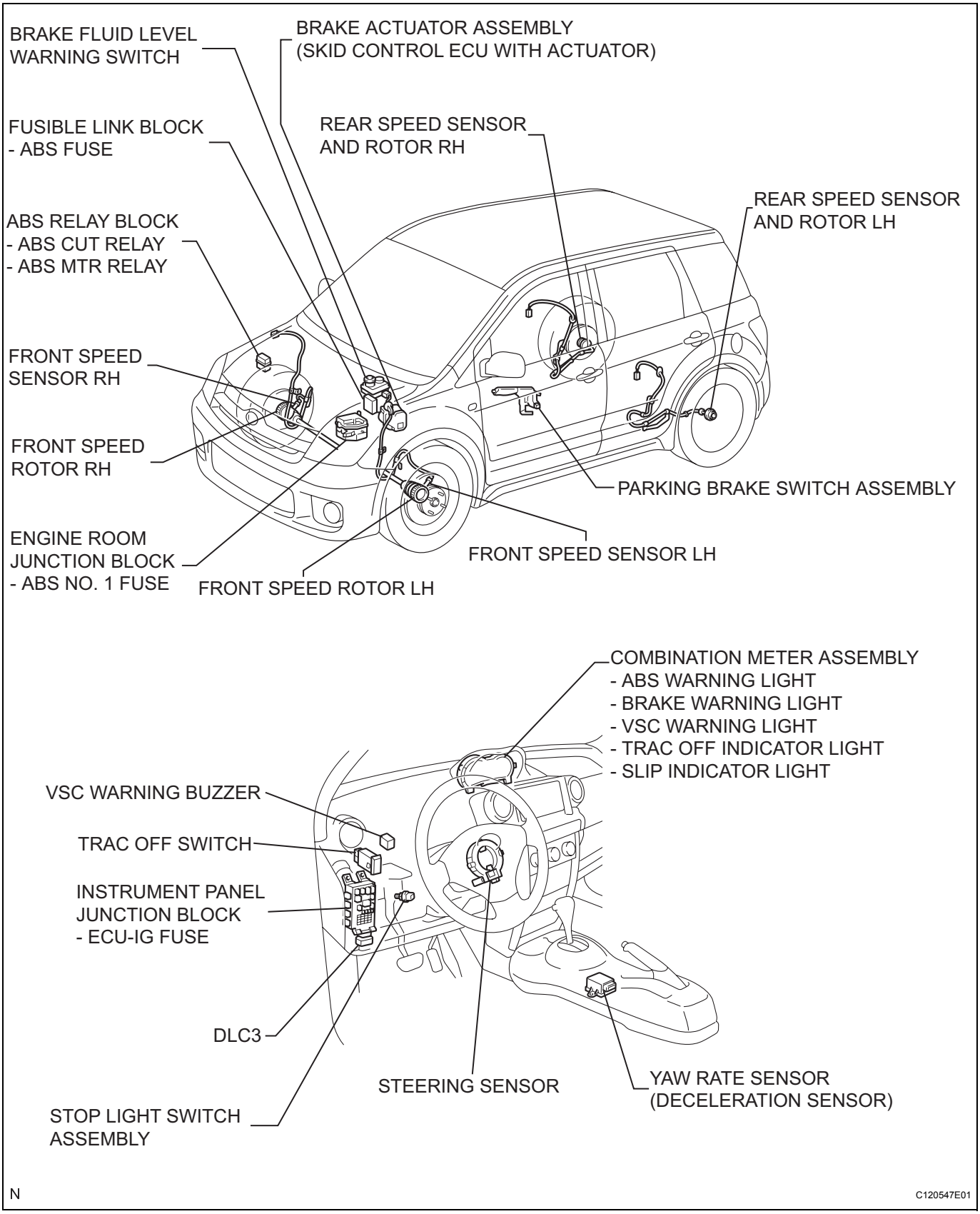
VEHICLE STABILITY CONTROL SYSTEM

PRECAUTION

NOTICE:

- **When there is a malfunction in the contact point of the terminals or installation problems with parts, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.**
- **In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.**
- **Since the vehicle stability control system may be influenced by a malfunction in the other systems, be sure to check for DTCs in the other systems.**
- **Be sure to remove and install the brake actuator assembly and each sensor with the ignition switch OFF unless specified in the inspection procedure.**
- **When removing and installing the brake actuator assembly and each sensor, be sure to check that the normal display is output in test mode inspection and in DTC output inspection after installing all the parts.**
- **After replacing the brake actuator assembly and/or the yaw rate (deceleration) sensor, make sure to perform yaw rate (deceleration) sensor zero point calibration (see page BC-69).**
- **The CAN communication system is used for data communication between the skid control ECU, the steering angle sensor, and the yaw rate (deceleration) sensor. If there is trouble in the CAN communication line, the DTC of the communication line is output.**
- **If a DTC of the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the vehicle stability control system.**
- **Since the CAN communication line has its own length and route, it cannot be repaired temporarily with the bypass wire, etc.**

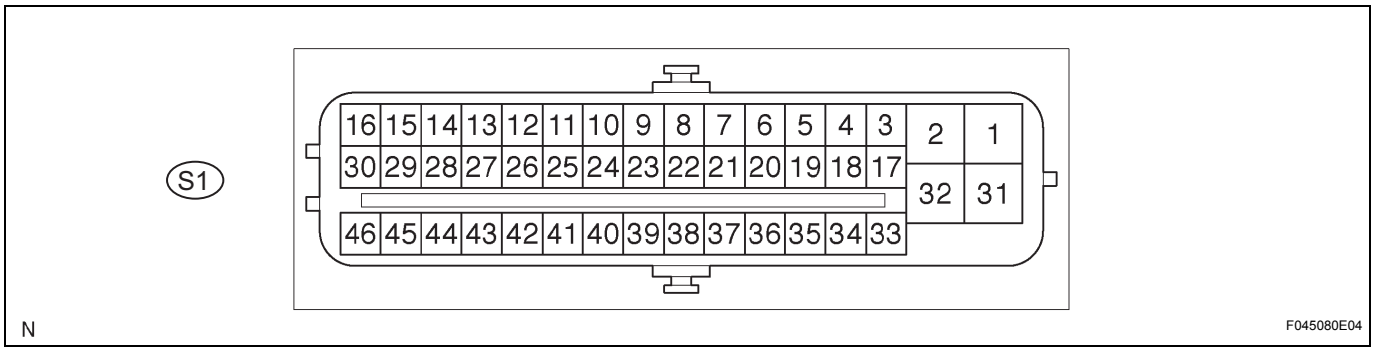
PARTS LOCATION



BC

TERMINALS OF ECU

1. CHECK BRAKE ACTUATOR ASSEMBLY (SKID CONTROL ECU ASSEMBLY WITH ACTUATOR)



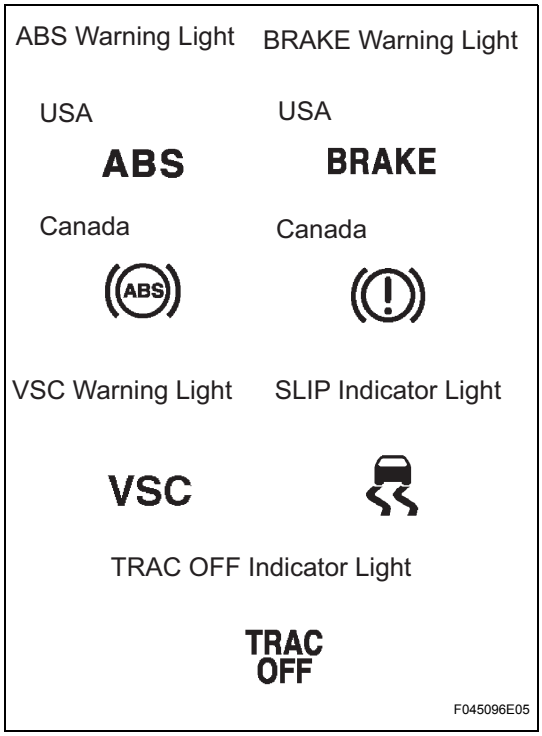
(a) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BM (S1-2) - GND1, 2 (S1-1, 32)	W-L - W-B	Motor relay test input	Ignition switch ON, pump motor running	11 to 14 V
FR+ (S1-3) - FR- (S1-17)	G-W - G-O	Front RH wheel speed signal input	Ignition switch ON, slowly turn right front wheel	AC generation
FL+ (S1-18) - FL- (S1-4)	R - G	Front LH wheel speed signal input	Ignition switch ON, slowly turn left front wheel	AC generation
RR+ (S1-5) - RR- (S1-19)	LG-B - LG-R	Rear RH wheel speed signal input	Ignition switch ON, slowly turn right rear wheel	AC generation
RL+ (S1-20) - RL- (S1-6)	Y-B - Y-B	Rear LH wheel speed signal input	Ignition switch ON, slowly turn left rear wheel	AC generation
NEO (S1-10) - GND1, 2 (S1-1, 32)	V - W-B	Engine rpm signal input	Engine idling	Pulse generation
CANH (S1-11) - CANL (S1-25)	B - W	CAN communication line	Ignition switch ON	Pulse generation
D/G (S1-13) - GND1, 2 (S1-1, 32)	W - W-B	Diagnostic communication line	Ignition switch ON	11 to 14 V
MRF (S1-14) - R+ (S1-45)	GR - R-W	Fail-safe motor relay output	Ignition switch ON	11 to 14 V
MR (S1-15) - R+ (S1-45)	P - R-W	Ignition switch ON, pump motor running	Motor relay output	11 to 14 V
+BS (S1-31) - GND1, 2 (S1-1, 32)	B - W-B	Solenoid relay power supply	Always	11 to 14 V
STP (S1-27) - GND1, 2 (S1-1, 32)	G-W - W-B	Stop light input signal	Stop light switch ON (Brake pedal depressed)	8 to 14 V
			Stop light switch OFF (Brake pedal released)	Below 1.5 V
PKB (S1-28) - GND1, 2 (S1-1, 32)	Y-B - W-B	Parking brake switch input	Ignition switch ON, parking brake switch ON	Below 1.5 V
			Ignition switch ON, parking brake switch OFF	9 to 14 V
WA (S1-29) - GND1, 2 (S1-1, 32)	P - W-B	ABS warning light output	Ignition switch ON, ABS warning light ON	4 to 14 V
			Ignition switch ON, ABS warning light OFF	Below 2.0 V
Bz (S1-30) - GND1, 2 (S1-1, 32)	R-W - W-B	Buzzer output	Ignition switch ON, VSC buzzer sounds	Below 1.0 V
			Ignition switch ON, VSC buzzer does not sound	6 to 14 V
IND (S1-34) - GND1, 2 (S1-1, 32)	B-R - W-B	SLIP input	Ignition switch ON	11 to 14 V

BC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
WT (S1-35) - GND1, 2 (S1-1, 32)	R-L - W-B	TRAC OFF input	Ignition switch ON	11 to 14 V
VSCW (S1-36) - GND1, 2 (S1-1, 32)	BR-W - W-B	VSC warning light output	Ignition switch ON, VSC warning light ON	Below 2.0 V
			Ignition switch ON, VSC warning light OFF	11 to 14 V
WFSE (S1-42) - GND1, 2 (S1-1, 32)	R - W-B	WIFSE input	Ignition switch ON	11 to 14 V
CSW (S1-43) - GND1, 2 (S1-1, 32)	W-L - W-B	TRAC OFF switch input	TRAC OFF switch OFF	11 to 14 V
BRL (S1-44) - GND1, 2 (S1-1, 32)	B-Y - W-B	Brake warning line output	Ignition switch ON, brake warning light ON	4 to 14 V
			Ignition switch ON, brake warning light OFF	Below 1.0 V
R+ (S1-45) - GND1, 2 (S1-1, 32)	R-W - W-B	Power supply for motor relay	Ignition switch ON, ABS warning light OFF	11 to 14 V
IG1 (S1-46) - GND1, 2 (S1-1, 32)	B-L - W-B	IG1 power supply	Ignition switch ON	11 to 14 V

If the result is not as specified, there may be a malfunction in the ECU.



DIAGNOSIS SYSTEM

1. CHECK INDICATOR

(a) Check the warning lights.

(1) Release the parking brake lever.

(2) When the ignition switch ON, check that the ABS warning light, VSC warning light, TRAC OFF indicator light, brake warning light and SLIP indicator light illuminate for approximately 3 seconds.

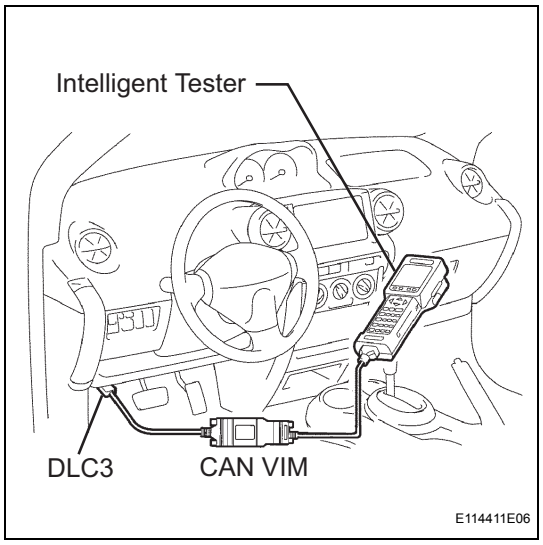
HINT:

- When the parking brake is applied or brake fluid level is low, the brake warning light illuminates.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light, VSC warning light, TRAC OFF indicator light, brake warning light and SLIP indicator light circuit.

If the indicator remains on, proceed to troubleshooting for the light circuit below.

Trouble Area	See procedure
ABS warning light circuit	BC-132
Brake warning light circuit	BC-139
VSC warning light circuit	BC-143
TRAC OFF warning light circuit	BC-149
SLIP indicator light circuit	BC-153

BC



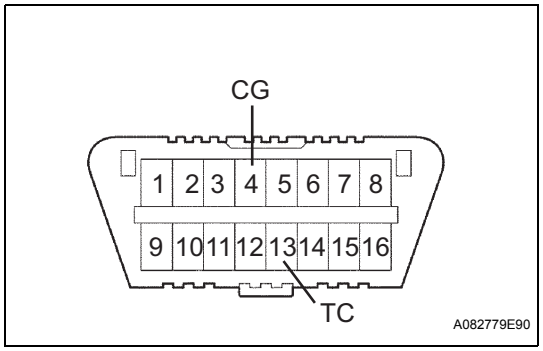
DTC CHECK / CLEAR

1. CHECK DTC (When Using Intelligent Tester)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.



2. CHECK DTC (When not Using Intelligent Tester)

(a) Check the DTCs.

(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040

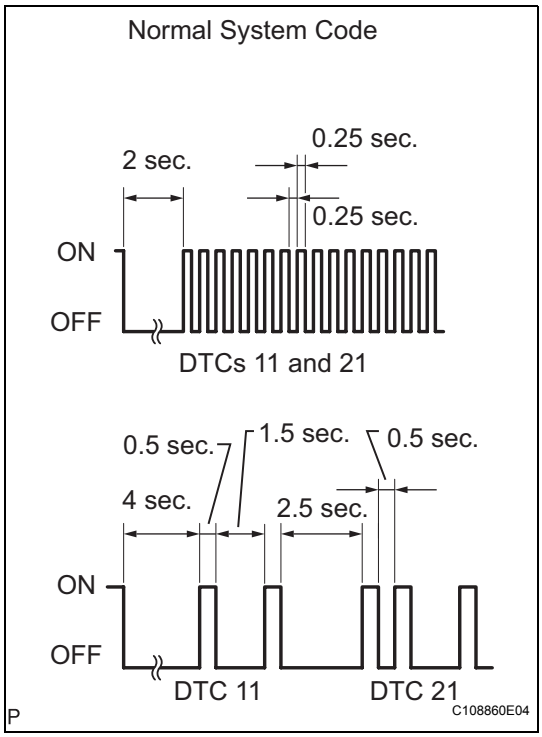
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and VSC warning light on the combination meter.
HINT:

- If no code appears, check the TC and CG circuit or ABS warning light and VSC warning light circuits.

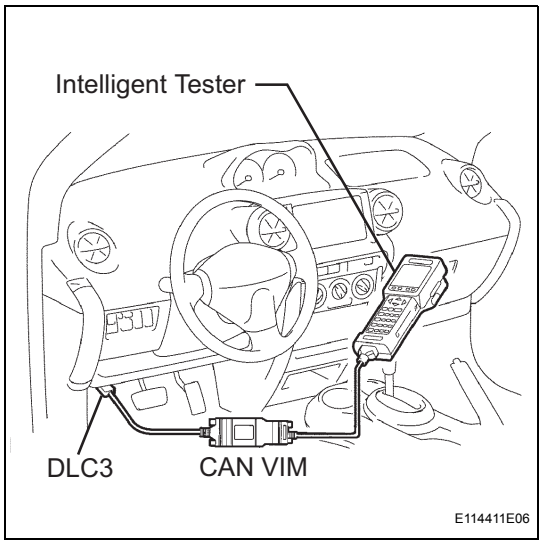
Trouble Area	See procedure
ABS warning light circuit	BC-132
VSC warning light circuit	BC-139
TC and CG terminal circuit	BC-157

- If more than 1 DTC is detected at the same time, the DTCs will be displayed in numerical order.



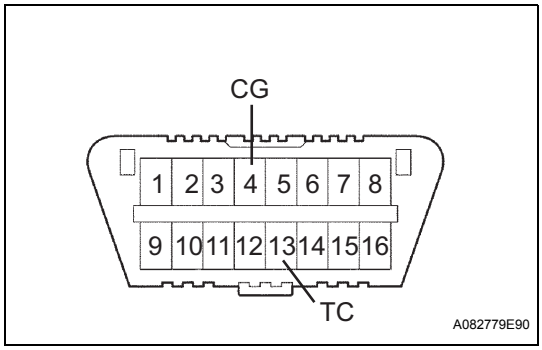
- As an example, the blinking patterns for a normal system code and DTCs 11 and 21 are shown in the illustration.
- DTCs are explained in the Diagnostic Trouble Code Chart.

(b) After completing the check, disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
If 2 or more DTCs are detected at the same time, the DTCs will be displayed first.



3. CLEAR DTC (When Using Intelligent Tester)

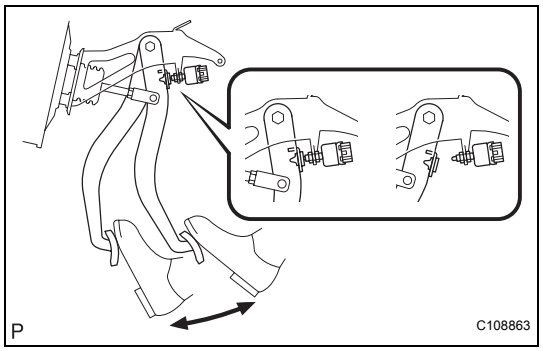
(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Operate the intelligent tester to erase the codes.
HINT:
Refer to the intelligent tester operator's manual for further details.



4. CLEAR DTC (When not Using Intelligent Tester)

(a) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
(b) Turn the ignition switch ON.

BC



(c) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(d) Check that the ABS warning light and VSC warning light indicate the normal system code.
(e) Remove SST from the terminals of the DLC3.
HINT:
DTCs cannot be cleared by removing the battery cable or ECU-IG fuse.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

- When a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from OFF to ON since the last time the ABS was activated. However, if the vehicle is stopped, the vehicle is driven at 7 km/h (4.3 mph) or less, or a DTC is detected, the ECU will not count the next time the ignition switch is turned from OFF to ON.
- Freeze frame data at the time the ABS operates: The skid control ECU stores data or updates stored data when the ABS operates. This data is erased when the ECU stores data at the time a DTC is detected.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, the data will not be updated until the data is cleared.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) From the display on the tester, select FREEZE FRAME DATA.

Intelligent tester display	Measurement item	Reference value
VEHICLE SPD	Vehicle speed	Speed indication on meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON Stop light switch OFF: OFF
# IG ON	Number of ignition switch OFF to ON operations after memorizing freeze frame data	0 to 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.9 V Brake pedal depressed: 0.8 to 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	Min.: -30 MPa/s Max.: 200 MPa/s
SYSTEM	Information about system / mode status	No system activated: NO SYS ABS operating: ABS Fail-safe mode activated: FAIL SF
YAW RATE	Yaw rate sensor reading	-100 to 100
STEERING ANG	Steering angle sensor reading	Left turn: Increase Right turn: Drop
THROTTLE	Throttle position sensor reading	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.
G (RIGHT & LEFT)	Forward and rearward gravitational force (G)	Min.: -1.869 Max.: 1.869
G (BACK & FORTH)	Forward and rearward gravitational force (G)	Min.: -1.869 Max.: 1.869
VSC (TRAC) OFF SW	VSC OFF switch signal	Traction OFF switch ON: OFF, OFF: ON
SHIFT POSITION	Shift lever position	FAIL P*, N* R D 2 L

HINT:
*: The A/C switch is OFF and all accessory switches are OFF.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DATA LIST according to the display on the tester.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PKB SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake not applied	-
STOP LIGHT SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal not depressed	-
VSC/TRAC OFF SW	VSC/TRAC OFF switch/ON or OFF	ON: TRAC OFF switch ON	-
IDLE SW	Main idle switch/ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
ABS MOT RELAY	ABS MTR relay / ON or OFF	ON: MTR relay ON OFF: MTR relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: Test mode	-
SRRR (SRR)	ABS solenoid (SRRR (SRR)) / ON or OFF	ON: Operates OFF: Does not operate	-
SRRH (SRH)	ABS solenoid (SRRH (SRH)) / ON or OFF	ON: Operates OFF: Does not operate	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates OFF: Does not operate	-
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
IG VOLTAGE	ECU power supply voltage / TOO LOW / NORMAL	NORMAL: 10 to 14.0 V TOO LOW: Below 10 V	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
DECELERATION SENSOR	Deceleration sensor 1 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 +-0.13 G when vehicle is not moving	Reading changes when vehicle is shaken
DECELERATION SENSOR 2	Deceleration sensor 2 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 +-0.13 G when vehicle is not moving	Reading changes when vehicle is shaken
ABS OPERT FR	ABS operation (FR) / Before or Operate	Before: No ABS operation (FR) Operate: During ABS operation (FR)	-
ABS OPERT FL	ABS operation (FL) / Before or Operate	Before: No ABS operation (FL) Operate: During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / Before or Operate	Before: No ABS operation (RR) Operate: During ABS operation (RR)	-
ABS OPERT RL	ABS operation (RL) / Before or Operate	Before: No ABS operation (RL) Operate: During ABS operation (RL)	-
SRLR	ABS solenoid (SRLR)/ON or OFF	ON: Operated OFF: Not operated	-
SRLH	ABS solenoid (SRLH)/ON or OFF	ON: Operated OFF: Not operated	-
SM1 (BA-SOL)	TRAC solenoid (SMF)/ON or OFF	ON: Operated OFF: Not operated	-
SM2	TRAC solenoid (SMR)/ON or OFF	ON: Operated OFF: Not operated	-
THROTTLE	Throttle position sensor/ Min.: 0 deg, Max.: 125 deg	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.	-
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 6000 rpm	Actual engine speed	-
VEHICLE SPD	Maximum wheel speed sensor reading/ Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual engine speed	Speed indicated on speedometer
YAW RATE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
YAW ZERO VALUE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
STEERING ANG	Steering sensor/ Min.: -1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / Min.: 0 V, Max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
AIR BLD SUPPORT	Air bleed support/ NOT SUP or SUPPORT	Not supported	-
SPD SEN FR	FR speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
SPD SEN FL	FL speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
SPD SEN RR	RR speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
SPD SEN RL	RL speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
EFI COM	EFI communication open detection/ OPN DET/NORMAL	NORMAL	-
YAWRATE SEN	Yaw rate sensor open detection/ OPN DET/NORMAL	NORMAL	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
DECELE SEN	Deceleration sensor open detection/ OPN DET/NORMAL	NORMAL	-
STEERING SEN	Steering sensor open detection/ OPN DET/NORMAL	NORMAL	-
TEST MODE	Test mode/NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of DTC recorded/ Min.: 0, Max.: 255	Min.: 0, Max.: 39	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Perform the ACTIVE TEST according to the display on the tester.

Skid control ECU with actuator

Item	Vehicle Condition / Test Details	Diagnostic Note
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMF (BA-SOL)	Turns TRAC solenoid SMF (BA-SOL) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMR	Turns TRAC solenoid (SMR) ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard
SOL RELAY	Turns ABS solenoid relay ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS WARNING LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator ON / OFF	Observe combination meter
BRAKE WRN LIGHT	BRAKE warning light ON / OFF	Observe combination meter
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a malfunction code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, turn to the page for the respective "DTC No." in the DTC chart.

DTC chart of VSC

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor - Front speed sensor circuit - Speed sensor rotor	BC-83
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor - Front speed sensor circuit - Speed sensor rotor	BC-83
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor - Rear speed sensor circuit - Speed sensor rotor	BC-89
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor - Rear speed sensor circuit - Speed sensor rotor	BC-89
C0226/21	SFR Solenoid Circuit	- SFRR or SFRH circuit - Skid control ECU with actuator	BC-94
C0236/22	SFL Solenoid Circuit	- SRRR or SRRH circuit - Skid control ECU with actuator	BC-94
C0246/23	SRR Solenoid Circuit	- SRLR or SRLH circuit - Skid control ECU with actuator	BC-94
C0256/24	SRL Solenoid Circuit	- SFRR or SFRH circuit - Skid control ECU with actuator	BC-94
C0273/13	Open in ABS Motor Relay Circuit	- ABS MTR relay - ABS MTR relay circuit - Skid control relay - ABS NO. 1 H-fuse - ABS MTR relay power source circuit	BC-97
C0274/14	Short to B+ in ABS Motor Relay Circuit	- ABS MET relay - ABS MET relay circuit - Skid control relay - ABS NO. 1 H-fuse	BC-97
C0278/11	Open in ABS Solenoid Relay Circuit	- Skid control ECU with actuator - ABS solenoid relay circuit	BC-102
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	- Skid control ECU with actuator - ABS solenoid relay circuit	BC-102
C1201/51	Engine Control System Malfunction	Engine control system	BC-105
C1203/53	ECM Communication Circuit Malfunction	- CAN communication system - ECM	BC-106
C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone	- Yaw rate sensor - Yaw rate sensor circuit - Zero point calibration not done	BC-108
C1223/43	ABS Control System Malfunction	Anti-lock brake system	BC-111
C1224/44	NE Signal Circuit	- NEO circuit - ECM - Skid control ECU with actuator	BC-112
C1225/25	SMC Solenoid Circuit	- SM1 or SM2 circuit - Skid control ECU with actuator	BC-94
C1231/31	Steering Angle Sensor Circuit Malfunction	- Steering angle sensor - Steering angle sensor circuit - Power source circuit	BC-115

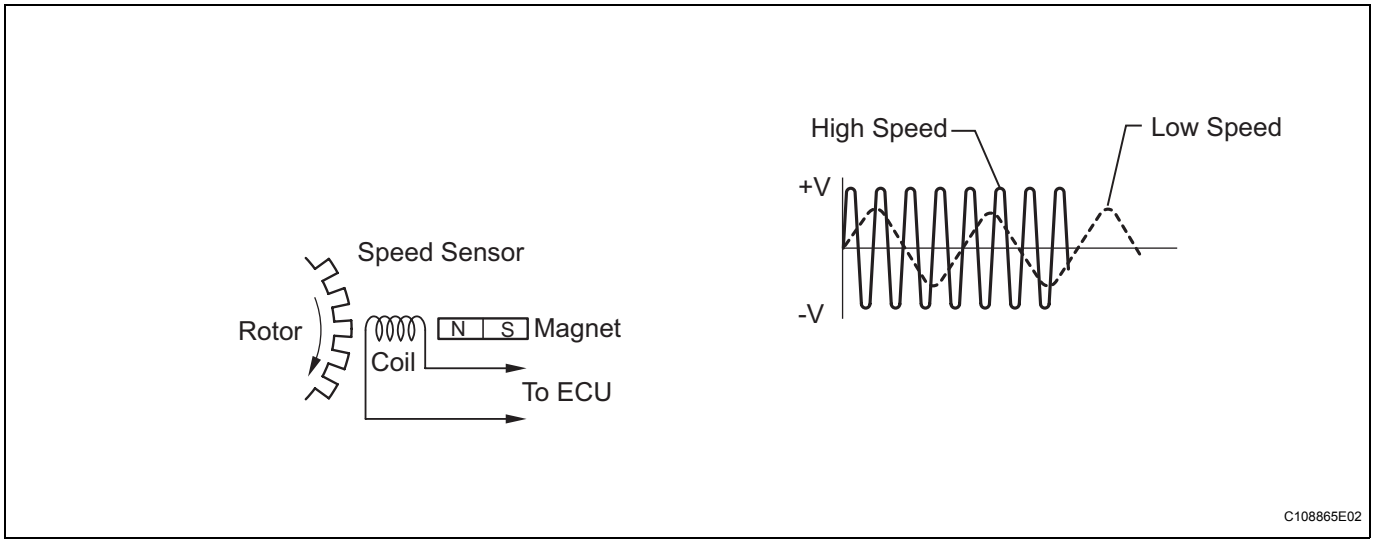
DTC No.	Detection Item	Trouble Area	See page
C1232/32	Stuck in Deceleration Sensor	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1234/34	Yaw Rate Sensor Malfunction	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	- Front speed sensor - Front speed sensor circuit	BC-83
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	- Front speed sensor - Front speed sensor circuit	BC-83
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	- Rear speed sensor - Rear speed sensor circuit	BC-89
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	- Rear speed sensor - Rear speed sensor circuit	BC-89
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	- Battery - Charging system - Power source circuit	BC-120
C1246/46	Master Cylinder Pressure Sensor Malfunction	- Master cylinder pressure sensor - Master cylinder pressure sensor circuit	BC-123
C1249/49	Open in Stop Light Switch Circuit	- Stop light switch assembly - Stop light switch circuit	BC-125
C1251/51	Open in Pump Motor Circuit	- Skid control ECU with actuator - Skid control ECU with actuator circuit	BC-129
C1243/43	Acceleration Sensor Stuck Malfunction	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1244/44	Open or Short in Deceleration Sensor Circuit	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1245/45	Acceleration Sensor Output Malfunction	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit	- ABS MET relay - ABS MET relay circuit - Skid control relay - ABS NO. 1 H-fuse	BC-97
C1336/39	Zero Point Calibration of Acceleration Sensor Undone	- Yaw rate sensor (Deceleration sensor) - Yaw rate sensor circuit (Deceleration sensor) - Zero point calibration not done	BC-108
C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction	- Battery - Power source circuit - Charging system	BC-117
U0100/65	Lost Communication with ECM / PCM	CAN communication system	BC-131
U0121/94	CAN Communication Function Fault	CAN communication system	BC-131
U0123/62	Lost Communication with Yaw Rate Sensor Module	CAN communication system	BC-131
U0124/95	Lost Communication with Lateral Acceleration Sensor Module	CAN communication system	BC-131
U0126/63	Lost Communication with Steering Angle Sensor Module	CAN communication system	BC-131

DTC chart of sensor check function

DTC No.	Detection Item	Trouble Area	See page
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor RH - Sensor installation - Sensor rotor	BC-83
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor LH - Sensor installation - Sensor rotor	BC-83
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor RH - Sensor installation - Sensor rotor	BC-89
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor LH - Sensor installation - Sensor rotor	BC-89
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor rotor RH	BC-83
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor rotor LH	BC-83
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor rotor RH	BC-89
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor rotor LH	BC-89
C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)	- Deceleration sensor - Sensor installation	BC-117
C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)	- Master cylinder pressure sensor	BC-123

DTC	C0200/31	Right Front Wheel Speed Sensor Signal Malfunction
DTC	C0205/32	Left Front Wheel Speed Sensor Signal Malfunction
DTC	C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH
DTC	C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH
DTC	C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)
DTC	C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)

DESCRIPTION



The speed sensor detects wheel speed and transmits the appropriate signals to the ECU. These signals are used for control of the ABS.

BC

Each of the front and rear rotors have 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor produces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71, C1272/72, C1275/75 and C1276/76 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1271/71, C1272/72, C1275/75 and C1276/76 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 1 second or more • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.5 seconds or more	• Front speed sensor • Front speed sensor circuit • Speed sensor rotor
C1235/35 C1236/36	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more.	• Front speed sensor • Front speed sensor circuit
C1271/71	Detected only during test mode	• Front speed sensor RH • Sensor installation • Sensor rotor
C1272/72	Detected only during test mode	• Front speed sensor LH • Sensor installation • Sensor rotor
C1275/75	Detected only during test mode	Front speed sensor rotor RH
C1276/76	Detected only during test mode	Front speed sensor rotor LH

HINT:
- DTCs C0200/31 and C1235/35 are for the front speed sensor RH.
- DTCs C0205/32 and C1236/36 are for the front speed sensor LH.

WIRING DIAGRAM

BC

INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 4

A

2 READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Check the DATA LIST for proper functioning of the front speed sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → Go to step 4

OK

3 CHECK DTC IF OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

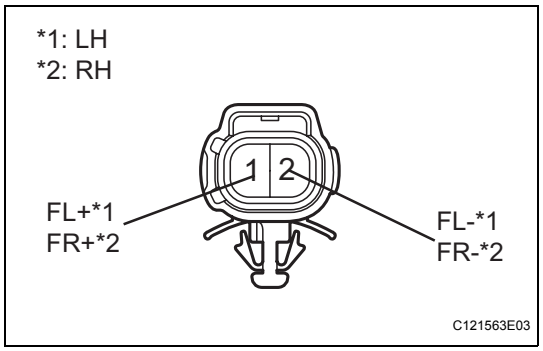
B → CHECK FOR INTERMITTENT PROBLEMS

BC

A

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT FRONT SPEED SENSOR



(a) Disconnect the A3 and A4 sensor connectors.
(b) Measure the resistance of the speed sensors.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (FL+) - 2 (FL-)	0.6 to 2.5 kΩ at 40 to 120°C
1 (FL+) - Body ground	10 kΩ or higher
2 (FL-) - Body ground	

RH

Tester Connection	Specified Condition
1 (FR+) - 2 (FR-)	0.6 to 2.5 kΩ at 40 to 120°C
1 (FR+) - Body ground	10 kΩ or higher
2 (FR-) - Body ground	

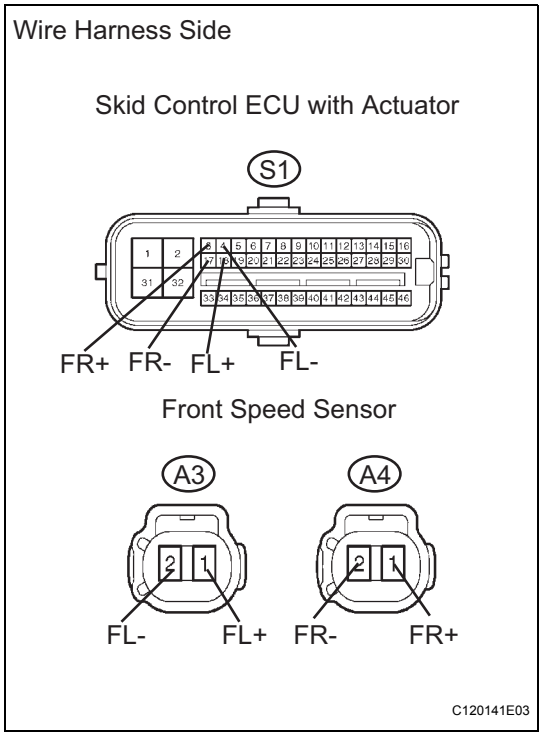
HINT:
- Check the speed sensor signal after the speed sensor replacement (see page BC-65).
- When replacing the speed sensor, clean the installation hole of the sensor.

NG → **REPLACE FRONT SPEED SENSOR**

OK

BC

5 CHECK WIRE HARNESS (SKID CONTROL ECU - FRONT SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A3 and A4 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance:

LH

Tester Connection	Specified Condition
S1-18 (FL+) - A3-1 (FL+)	Below 1 Ω
S1-4 (FL-) - A3-2 (FL-)	
A3-1 (FL+) - Body ground	10 kΩ or higher
A3-2 (FL-) - Body ground	

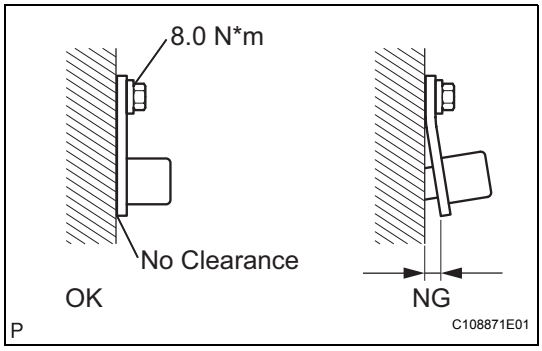
RH

Tester Connection	Specified Condition
S1-3 (FR+) - A4-1 (FR+)	Below 1 Ω
S1-17 (FR-) - A4-2 (FR-)	
A4-1 (FR+) - Body ground	10 kΩ or higher
A4-2 (FR-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 INSPECT FRONT SPEED SENSOR (INSTALLATION)



(a) Check the speed sensor installation.

OK:

Installation bolt is tightened properly.
There is no clearance between sensor and front steering knuckle.
Torque:
8.0 N*m (82 kgf*cm, 71 in.*lbf)

HINT:

- Check the speed sensor signal after the speed sensor replacement (see page BC-65).
- When replacing the speed sensor, clean the installation hole of the sensor.

NG → **SECURELY REINSTALL FRONT SPEED SENSOR**

OK

7 INSPECT SPEED SENSOR (TIP)

(a) Remove the front speed sensor.
(b) Check the sensor tip.

BC

OK:

No scratches or foreign matter on sensor tip.

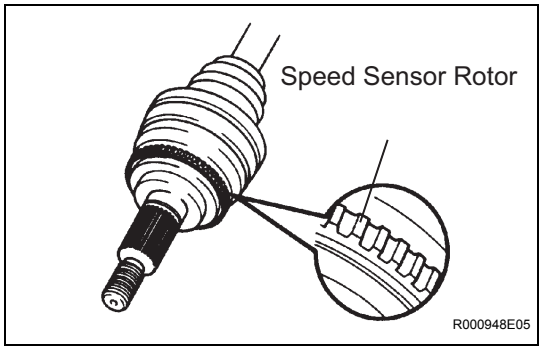
HINT:

Check the speed sensor signal after cleaning or replacing the speed sensor (see page BC-65).

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

8 INSPECT SPEED SENSOR ROTOR



(a) Remove the front axle hub.

(b) Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter on sensor rotor.

HINT:

- If foreign matter is attached, remove it and check the output waveform after reassembly.
- Check the speed sensor signal after cleaning or replacing the speed sensor rotor (see page BC-65).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

9 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).

(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.

(c) Check for DTCs (see page BC-74).

Result

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

HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

DTC	C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction
DTC	C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction
DTC	C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH
DTC	C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH
DTC	C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)
DTC	C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)
DTC	C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)
DTC	C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DESCRIPTION

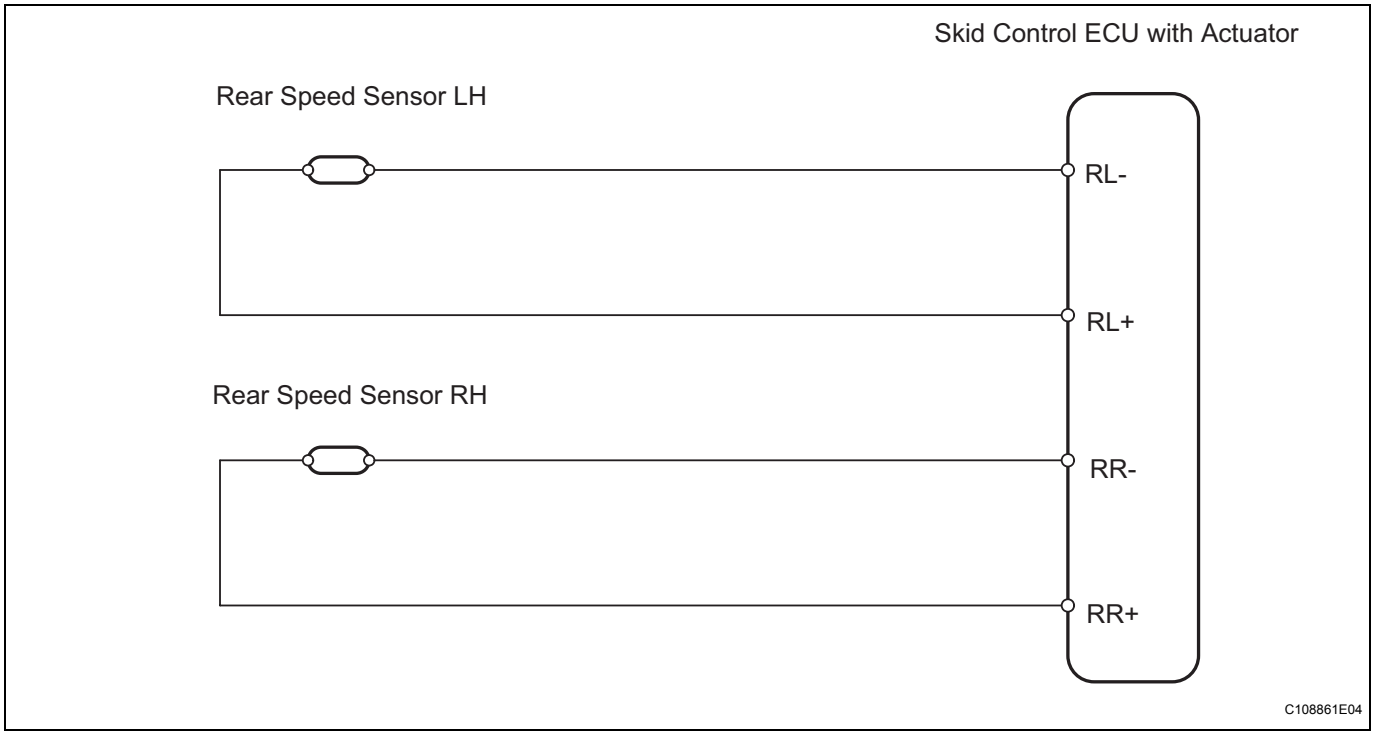
Refer to DTCs C0200/31, C0205/32, C1235/35 and C1236/36.
DTCs C1273/73, C1274/74, C1277/77 and C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1273/73, C1274/74, C1277/77 and C1278/78 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 1 second or more • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.5 seconds or more	• Rear speed sensor • Rear speed sensor circuit • Speed sensor rotor
C1238/38 C1239/39	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more	• Rear speed sensor • Rear speed sensor circuit
C1273/73	Detected only during test mode	• Rear speed sensor RH • Sensor installation • Sensor rotor
C1274/74	Detected only during test mode	• Rear speed sensor LH • Sensor installation • Sensor rotor

DTC No.	DTC Detection Condition	Trouble Area
C1277/77	Detected only during test mode	Rear speed sensor RH
C1278/78	Detected only during test mode	Rear speed sensor LH

HINT:
- DTCs C0210/33 and C1233/38 are for the rear speed sensor RH.
- DTCs C0215/34 and C1239/39 are for the rear speed sensor LH.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 4**

A

2 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Check the DATA LIST for proper functioning of the rear speed sensor.

BC

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → **Go to step 4**

OK ↓

3 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

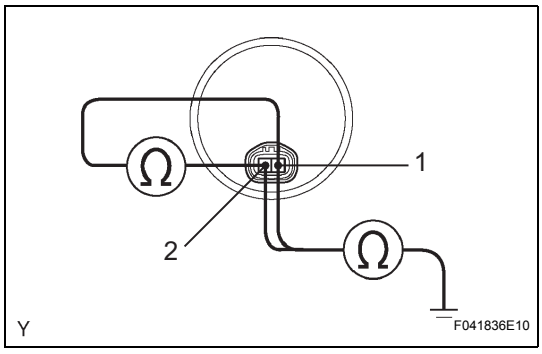
B → **END**

A ↓

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT REAR SPEED SENSOR

BC



(a) Disconnect the A15 and A16 sensor connectors.
(b) Measure the resistance of the speed sensors.
Standard resistance:
LH

Tester Connection	Specified Condition
1 (RL-) - 2 (FL+)	1.0 to 1.4 kΩ at 20°C
1 (RL-) - Body ground	10 kΩ or higher
2 (RL+) - Body ground	

RH

Tester Connection	Specified Condition
1 (RR-) - 2 (RR+)	1.0 to 1.4 kΩ at 20°C

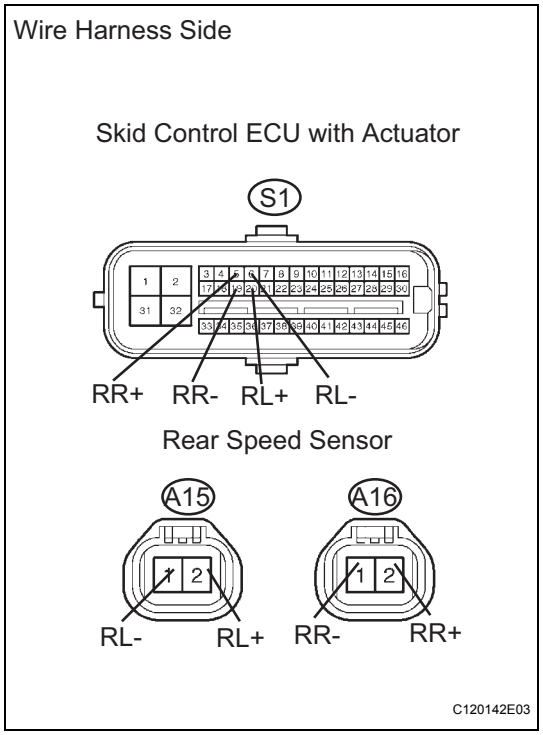
Tester Connection	Specified Condition
1 (RR-) - Body ground	10 kΩ or higher
2 (RR+) - Body ground	

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-65).

NG → REPLACE REAR SPEED SENSOR

OK

5 CHECK WIRE HARNESS (SKID CONTROL ECU - REAR SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A15 and A16 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance:
LH

Tester Connection	Specified Condition
S1-20 (RL+) - A15-2	Below 1 Ω
S1-6 (RL-) - A15-1	
A15-2 - Body ground	10 kΩ or higher
A15-1 - Body ground	

RH

Tester Connection	Specified Condition
S1-5 (RR+) - A16-2	Below 1 Ω
S1-19 (RR-) - A16-1	
A16-2 - Body ground	10 kΩ or higher
A16-1 - Body ground	

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

BC

B → END

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

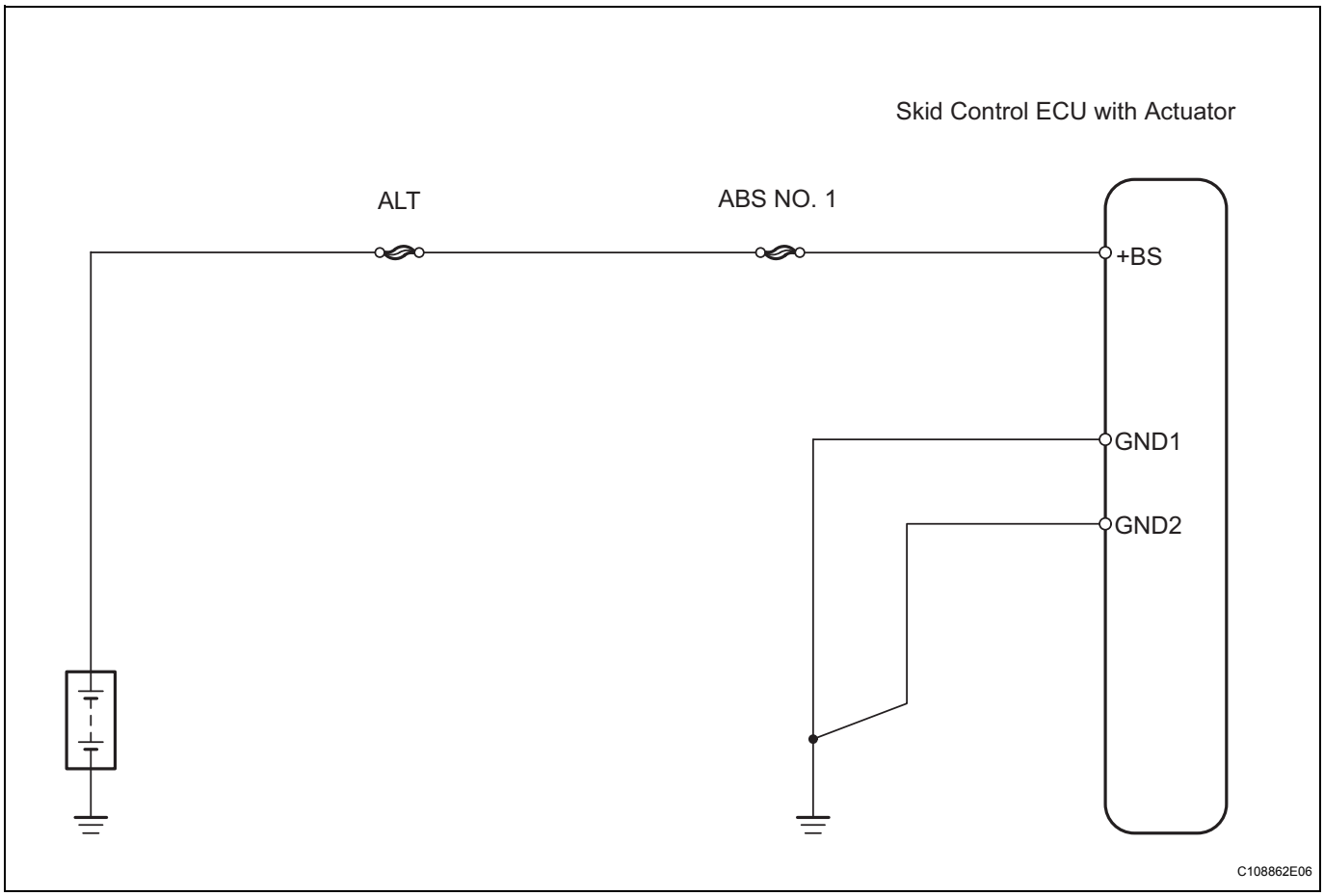
DTC	C1225/25	SMC Solenoid Circuit

DESCRIPTION

ABS solenoids turn on when receiving signals from the ECU. They control braking force by adjusting the pressure applied to the wheel cylinders.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21	Open or short circuit in front right solenoid circuit (SFRR or SFRH) continues for 0.05 seconds or more	• SFRR or SFRH circuit • Skid control ECU with actuator
C0236/22	Open or short circuit in front left solenoid circuit (SFLR or SFLH) continues for 0.05 seconds or more	• SFLR or SFLH circuit • Skid control ECU with actuator
C0246/23	Open or short circuit in rear right solenoid circuit (SRRR or SRRH) continues for 0.05 seconds or more	• SRRR or SRRH circuit • Skid control ECU with actuator
0256/24	Open or short in rear left solenoid circuit (SRLR or SRLH) continues for 0.05 seconds or more	• SRLR or SRLH circuit • Skid control ECU with actuator
C1255/25	Detection of any of conditions 1. to 5.: 1. When SM1 or SM2 is ON, excessive electric current on SM1 or SM2 continues for 0.05 seconds or more 2. When SM1 or SM2 is OFF, open circuit in SM1 or SM2 continues for 0.05 seconds or more 3. When SM1 or SM2 is ON and electric current is 0.348 A or more, duty ratio between SM1 and SM2 is 2.08 or more, or below 0.48 for 0.2 seconds or more 4. When SM1 or SM2 is OFF, electric current is 0.15 A or more for 0.05 seconds or more 5. All of following conditions continue • When switch solenoid (SM1 or SM2) outputs ON signal • Output current is more than 0.348 A • Ratio of monitored current to target current is more than 2 A for 0.1 second, or less than 0.15 A for 0.5 seconds.	• SM1 or SM2 circuit • Skid control ECU with actuator

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the solenoid circuit is built into the brake actuator assembly, solenoid circuit inspection and solenoid unit inspection cannot be performed.
Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTCs (see page BC-74).
(b) Turn the ignition switch ON and check that the ABS warning light illuminates for approximately 3 seconds.
(c) Check for DTCs (see page BC-74).

Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

BC

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

- When a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times the ignition switch has been turned from OFF to ON (maximum: 31) since the last time the ABS was activated. However, if the vehicle is stopped, the vehicle is driven at 7 km/h (4.3 mph) or less, or a DTC is detected, the ECU will not count the next time the ignition switch is turned from OFF to ON.
- Freeze frame data at the time the ABS operates: The skid control ECU stores data or updates stored data when the ABS operates. This data is erased when the ECU stores data at the time a DTC is detected.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, the data will not be updated until the data is cleared.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) From the display on the tester, select FREEZE FRAME DATA.

Intelligent tester display	Measurement item	Reference value*
VEHICLE SPD	Vehicle speed	Speed indication on meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON Stop light switch OFF: OFF
# IG ON	Number of ignition switch OFF to ON operations after memorizing freeze frame data	0 to 31
SYSTEM	Information about system / mode status	No system activated: NO SYS ABS operating: ABS Fail-safe mode activated: FAIL SF

HINT:

*: The A/C switch is OFF and all accessory switches are OFF.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DATA LIST according to the display on the tester.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PKB SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake not applied	-
STOP LIGHT SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal not depressed	-
ABS MOT RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: Test mode	-
SRRR	ABS solenoid (SRRR) / ON or OFF	ON: Operates OFF: Does not operate	-
SRRH	ABS solenoid (SRRH) / ON or OFF	ON: FOperates OF: Does not operate	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates OFF: Does not operate	-
SRLR	ABS solenoid (SRLR) ON or OFF	ON: Operates OFF: Does not operate	-
SRLH	ABS solenoid (SRLH) ON or OFF	ON: Operates OFF: Does not operate	-
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOWT	NORMAL: 10 to 14.0 V TOO LOW: Below 10 V	-
ABS OPERT FR	ABS operation (FR) / Before or Operate	Before: No ABS operation (FR) Operate: During ABS operation (FR)	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS OPERT FL	ABS operation (FL) / Before or Operate	Before: No ABS operation (FL) Operate: During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / Before or Operate	Before: No ABS operation (RR) Operate: During ABS operation (RR)	-
ABS OPERT RL	ABS operation (RL) / Before or Operate	Before: No ABS operation (RL) Operate: During ABS operation (RL)	-
AIR BLD SUPPORT	Air bleed support / SUPPORT or NOT SUP	Supported	-
#CODES	Number of DTC recorded / Min.: 0, Max.: 255	Min.: 0, Max.: 19	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Perform the ACTIVE TEST according to the display on the tester.

Skid control ECU with actuator

Item	Vehicle Condition / Test Details	Diagnostic Note
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR & SFRH	Turns ABS solenoid SFRR & SFRH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR & SFLH	Turns ABS solenoid SFLR & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH & SRRR	Turns ABS solenoid SRRH & SRRR ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR & SRLH	Turns ABS solenoid SRLR & SRLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH & SFLH	Turns ABS solenoid SFRH & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard

Item	Vehicle Condition / Test Details	Diagnostic Note
SOL RELAY	Turns ABS solenoid relay ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS WARNING LIGHT	Turns warning light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Brake warning light ON / OFF	Operation of solenoid (clicking sound) can be heard

DTC	C0273/13	Open in ABS Motor Relay Circuit

DTC	C0274/14	Short to B+ in ABS Motor Relay Circuit

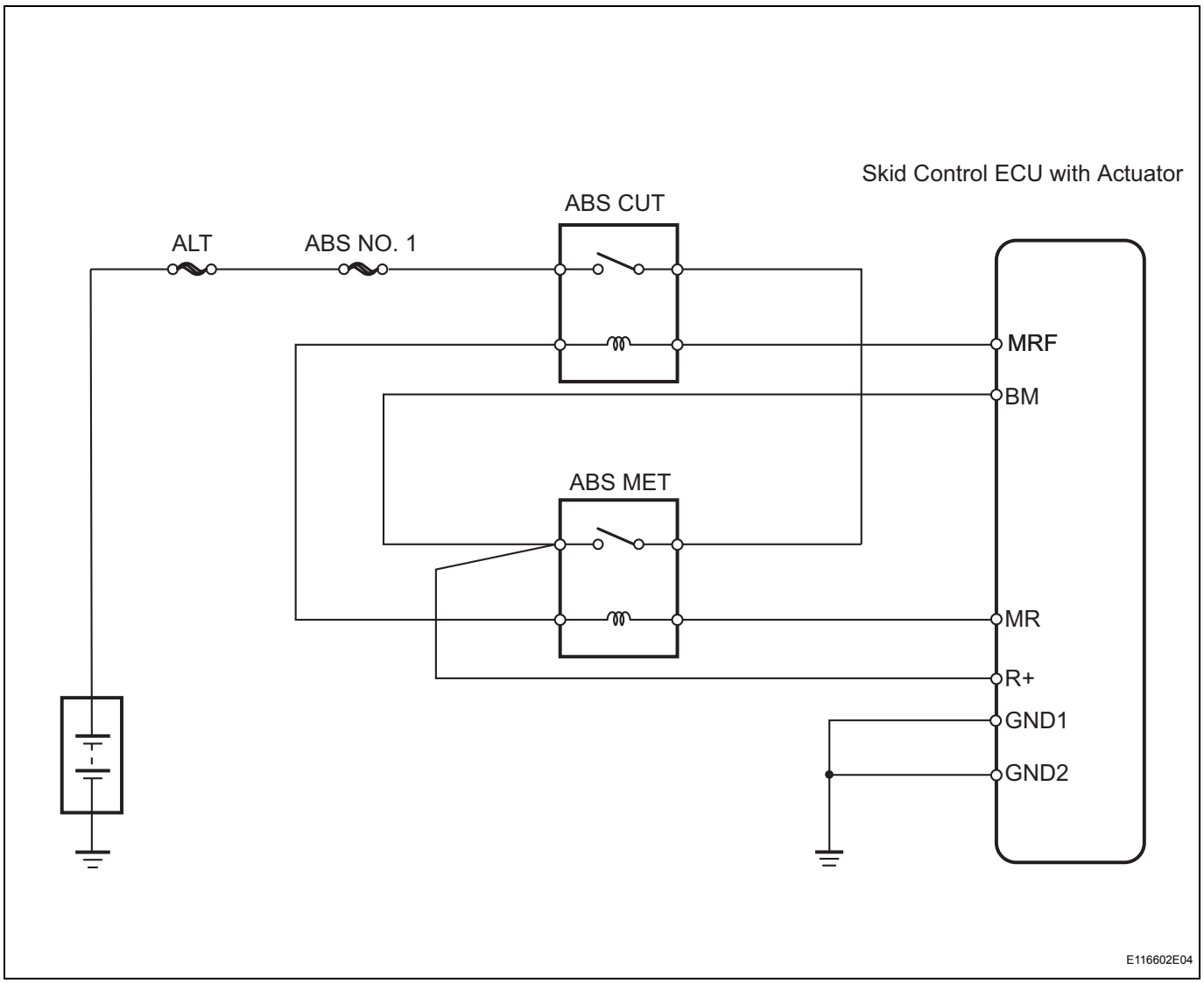
DTC	C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit

DESCRIPTION

The ABS MTR relay supplies power to the ABS pump motor. While the ABS is activated, the ECU turns the ABS MTR relay ON and operates the ABS pump motor.

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	When any of following (1 or 2) is detected: 1. All of following conditions continue for 0.12 seconds or more – IG1 terminal voltage is between 9.5 to 17.2 V – During initial check or ABS, BA, TRAC, and VSC are in operation – Relay contact is open when relay is ON 2. Both of following conditions continue for 0.12 seconds or more – IG1 terminal voltage is 9.5 V or less – Relay contact remains open when relay is ON	• ABS MTR relay • ABS MTR relay circuit • Skid control relay • ABS NO. 1 H-fuse • ABS MTR relay power source circuit
C0274/14	When motor relay is OFF, motor relay remains closed for 4 seconds or more	• ABS MTR relay • ABS MTR relay circuit • Skid control relay • ABS NO. 1 H-fuse
C1361/91	All of following conditions continue for at least 4 seconds: • Immediately after turning ignition switch ON • Relay contact is closed when fail-safe relay is OFF	• ABS MTR relay • ABS MTR relay circuit • Skid control relay • ABS NO. 1 H-fuse

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 3**

A

BC

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS motor relay operates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard

OK:
Operation sound of motor can be heard.
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

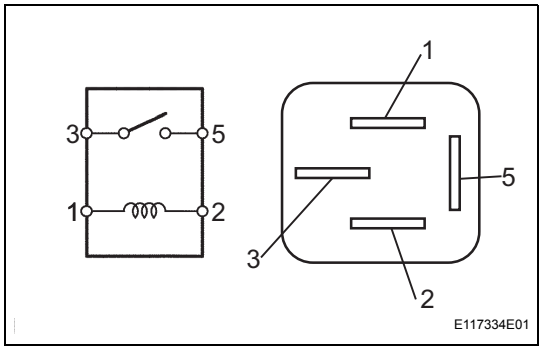
3	INSPECT FUSE (ABS)

(a) Remove the ABS H-fuse from the engine room relay block.
(b) Measure the resistance of the H-fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

4	INSPECT RELAY (Marking: ABS MTR)



(a) Remove the ABS MTR relay from the ABS relay block.
(b) Measure the resistance of the relay.
Standard resistance

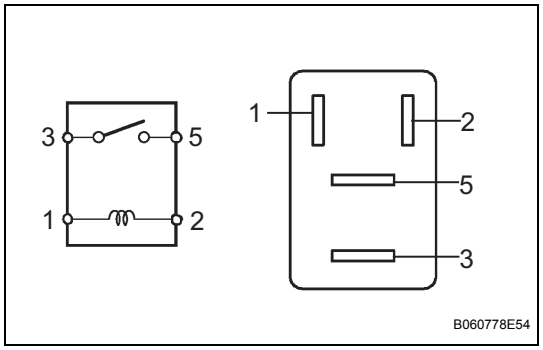
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

BC

5 INSPECT RELAY (Marking: ABS CUT)



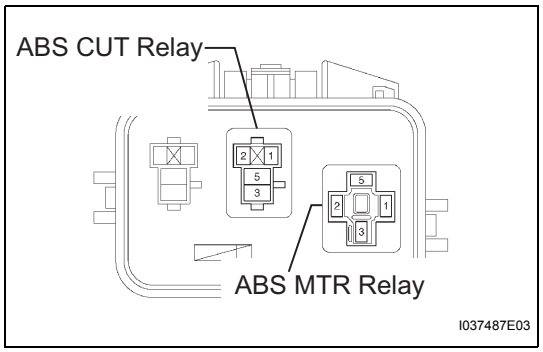
(a) Remove the ABS CUT relay from the ABS relay block.
(b) Measure the resistance of the relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

6 CHECK WIRE HARNESS (ABS CUT RELAY - ABS MTR RELAY AND BATTERY)



(a) Remove the ABS CUT relay and ABS MTR relay from the ABS relay block.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
ABS CUT relay terminal 5 - Body ground	10 to 14 V

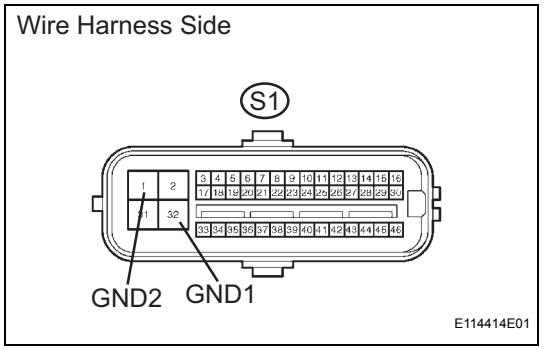
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
ABS CUT relay terminal 3 - ABS MTR relay terminal 5	Below 1 Ω
ABS CUT relay terminal 1 - ABS MTR relay terminal 1	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

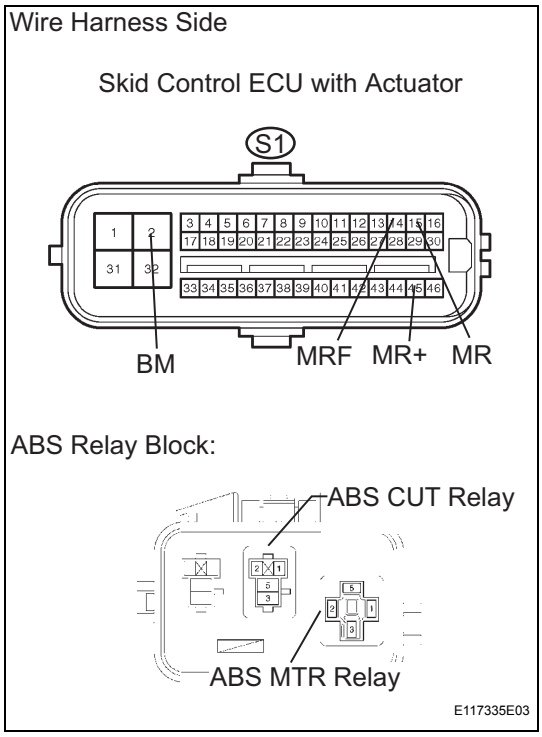
Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

BC

OK

8	CHECK WIRE HARNESS (SKID CONTROL ECU - ABS CUT RELAY AND ABS MTR RELAY)



(a) Disconnect the S1 ECU connector.
(b) Remove the ABS CUT relay and ABS MTR relay from the ABS relay block.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
S1-14 (MRF) - ABS CUT relay terminal 2	Below 1 Ω
S1-2 (BM) - ABS MTR relay terminal 3	
S1-15 (MR) - ABS MTR relay terminal 2	
S1-45 (R+) - ABS MTR relay terminal 3	

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0278/11	Open in ABS Solenoid Relay Circuit

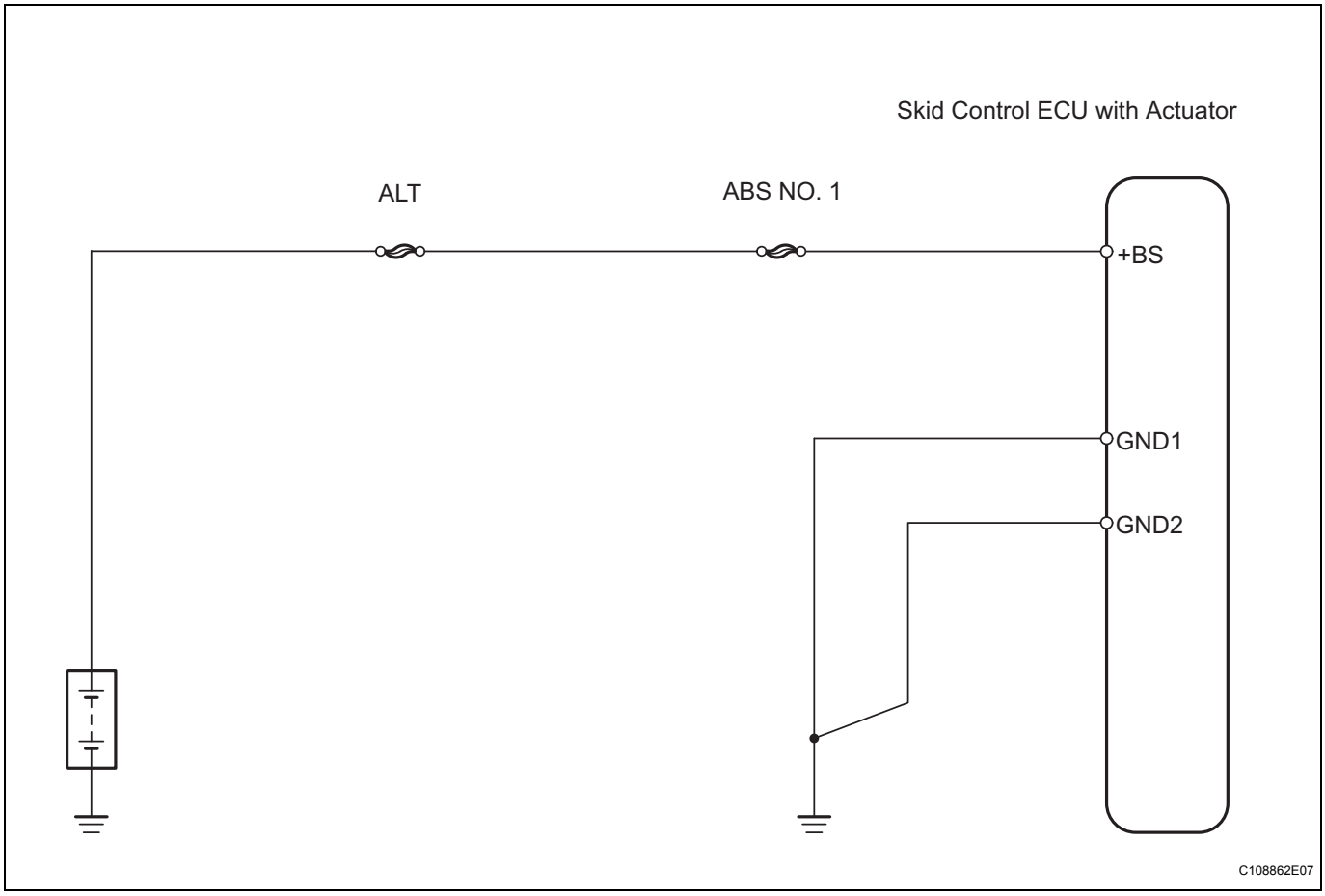
DTC	C0279/12	Short to B+ in ABS Solenoid Relay Circuit

DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the ABS initial check completes, the skid control ECU turns the ABS solenoid relay on.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When either of following is detected: 1. Both conditions continue for at least 0.2 seconds • IG voltage is between 9.5 and 17.2 V • Relay contact is open when relay is ON 2. Both conditions continue for at least 0.2 seconds • IG voltage is less than 9.5 V • Relay contact remains open when relay is ON	• Skid control ECU with actuator • ABS solenoid relay circuit
C0279/12	When relay is OFF, turning ignition switch ON closes relay contact immediately and continues for at least 0.2 seconds	• Skid control ECU with actuator • ABS solenoid relay circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

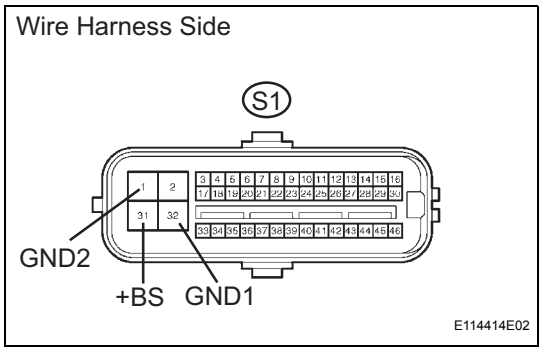
1	INSPECT FUSE (ALT, ABS NO. 1)

(a) Remove the ALT and ABS NO. 1 H-fuses from the engine room junction block.
(b) Measure the resistance of the H-fuses.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S1-31 (+BS) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the ABS motor relay is built into the brake actuator assembly, ABS motor relay and solenoid unit inspection cannot be performed.
Be sure to check if the DTC is output before replacing the brake actuator assembly.
(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at 6 km/h (4 mph) or more.
(c) Check for DTCs (see page BC-74).
Result

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

BC

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → END

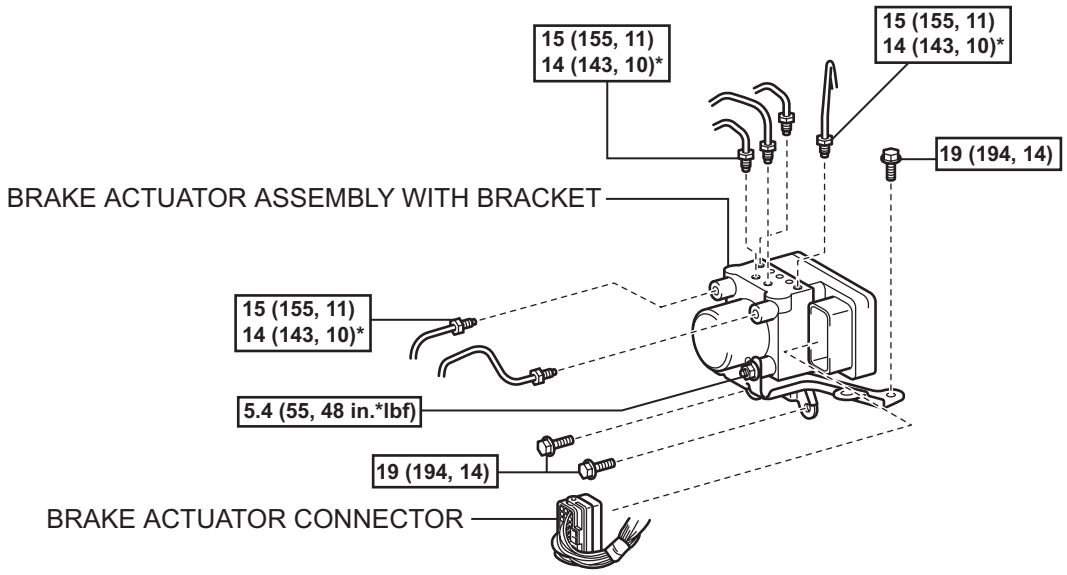
A

REPLACE BRAKE ACTUATOR ASSEMBLY

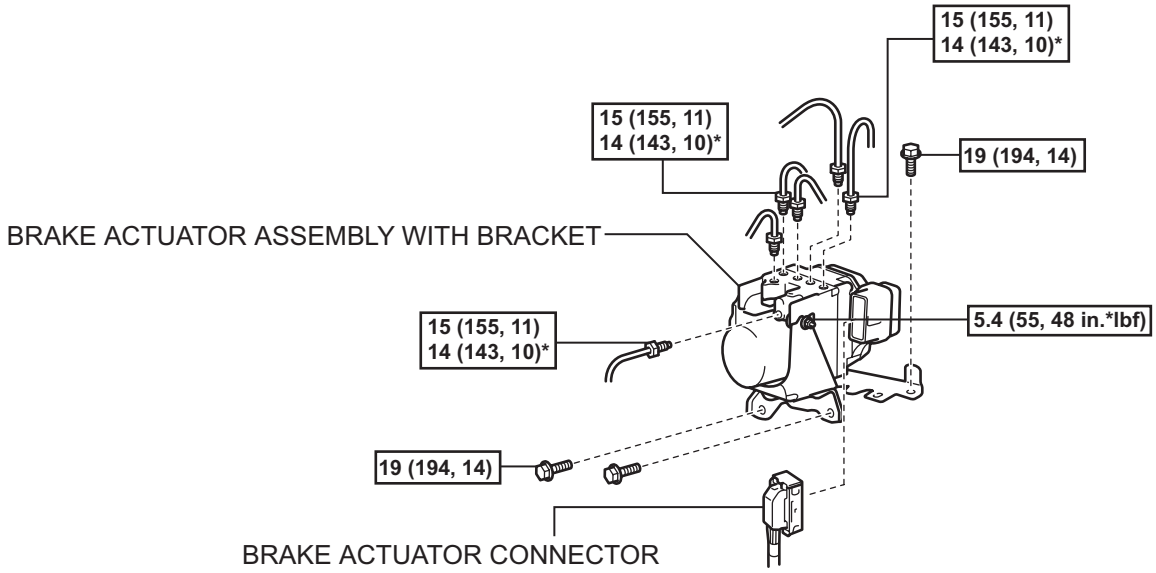
BRAKE ACTUATOR

COMPONENTS

w/o VSC



w/ VSC



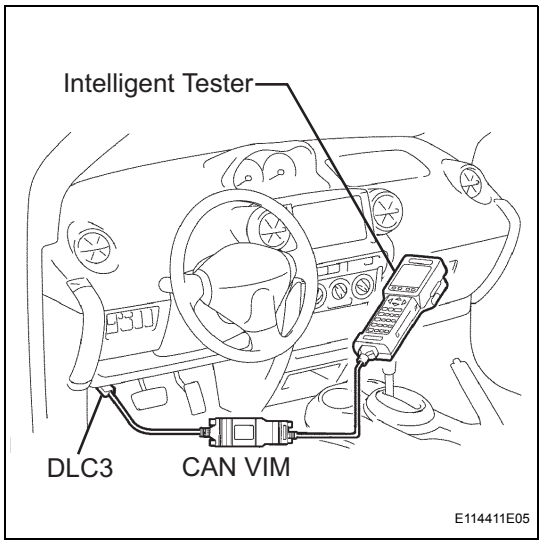
N*m (kgf*cm, ft.*lbf) : Specified torque

* For use with SST

H

C117784E01

BC



ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and idle it.
(c) Select the Active Test mode on the intelligent tester.
HINT:
Please refer to the intelligent tester operator's manual for further details.

2. CHECK ACTUATOR MOTOR OPERATION

NOTICE:
Do not keep a motor relay ON for more than 5 seconds. When operating it consecutively, wait 20 seconds between each operation.

(a) Turn the motor relay ON and check the actuator motor operation noise.
(b) Turn the motor relay OFF.
(c) Fully depress the brake pedal and hold it for approximately 15 seconds. Check that the pedal's initial depth is maintained for the entire 15 seconds.
(d) Turn the motor relay ON and check that the pedal does not pulsate.
(e) Turn the motor relay OFF and release the pedal.

3. CHECK RIGHT FRONT WHEEL OPERATION

NOTICE:
- **Be sure to follow the procedures below when turning ON a solenoid.**
- **Do not keep a solenoid ON for more than 10 seconds. When operating it consecutively, wait 20 seconds between each operation.**

(a) With the pedal depressed as much as possible, perform the following operations.
(b) Turn the SFRH and SFRR solenoids ON simultaneously, and check that the pedal cannot be depressed further.
(c) Turn the SFRH and SFRR solenoids OFF simultaneously, and check that the pedal can be depressed further.
(d) Turn the motor relay ON. Check that the pedal returns to the "depressed as much as possible" position.
(e) Turn the motor relay OFF and release the pedal.

4. CHECK OTHER WHEEL OPERATION

(a) Using the same procedures, check the solenoids of the other wheels.
NOTICE:
The pedal must be depressed if only the reduction solenoid SFLR, SRRR or SRLR is turned on.
HINT:
Left front wheel: SFLH, SFLR
Right rear wheel: SRRH, SRRR
Left rear wheel: SRLH, SRLR

DTC C1201/51 Engine Control System Malfunction

DESCRIPTION

If trouble occurs in the engine control system, the skid control ECU prohibits TRAC and VSC control.

DTC No.	DTC Detection Condition	Trouble Area
C1201/51	At engine speed of 500 rpm or more, a trouble signal in engine control system continues for 5 seconds or more	Engine control system

INSPECTION PROCEDURE

1	CHECK DTC FOR ENGINE

Result

Result	Proceed to
Normal Code	A
Malfunction Code	B

B → REPAIR ENGINE CONTROL SYSTEM ACCORDING TO CODE OUTPUT

A

REPLACE ECM

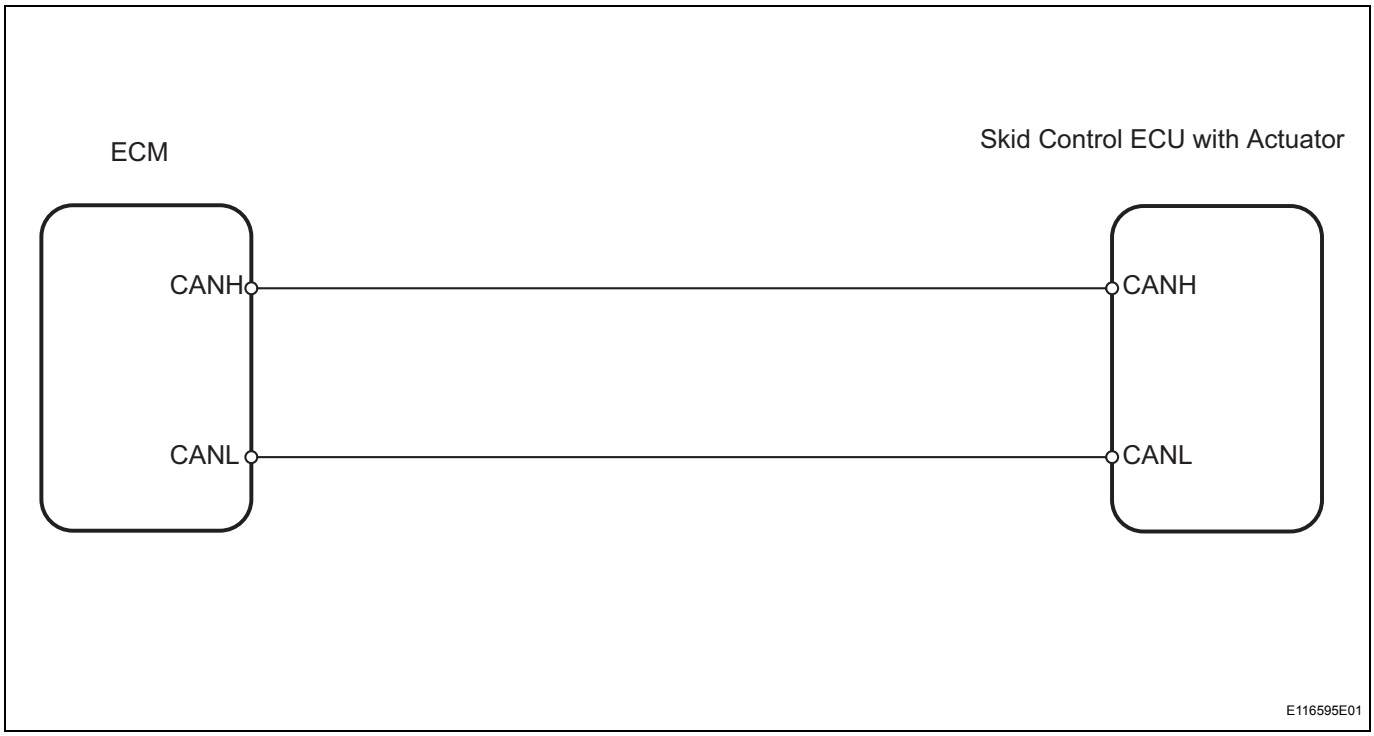
DTC	C1203/53	ECM Communication Circuit Malfunction

DESCRIPTION

This circuit is used to send TRAC & VSC control information from the skid control ECU to the ECM and engine control information from the ECM to the skid control ECU.

DTC No.	DTC Detection Condition	Trouble Area
C1203/53	Data about engine, drive system, and user country from ECM are not same as skid control ECU	• CAN Communication System • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

(a) Clear the DTC (see page BC-74).
(b) Turn the ignition switch ON.
(c) Drive the vehicle at a speed of 15 km/h (9 mph) and turn the steering wheel to the right and left.
(d) Check for DTC (see page BC-74). If a DTC of the ABS and VSC is output, make a note of them.

BC

Result

Result	Proceed to
DTC is output for CAN communication system CA-6	A
DTC is output (ABS and VSC DTCs are output)	B
DTC is not output	C

B	**REPAIR CIRCUIT INDICATED BY OUTPUT CODE**
C	**END**

A

GO TO CAN COMMUNICATION SYSTEM

DTC	C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone

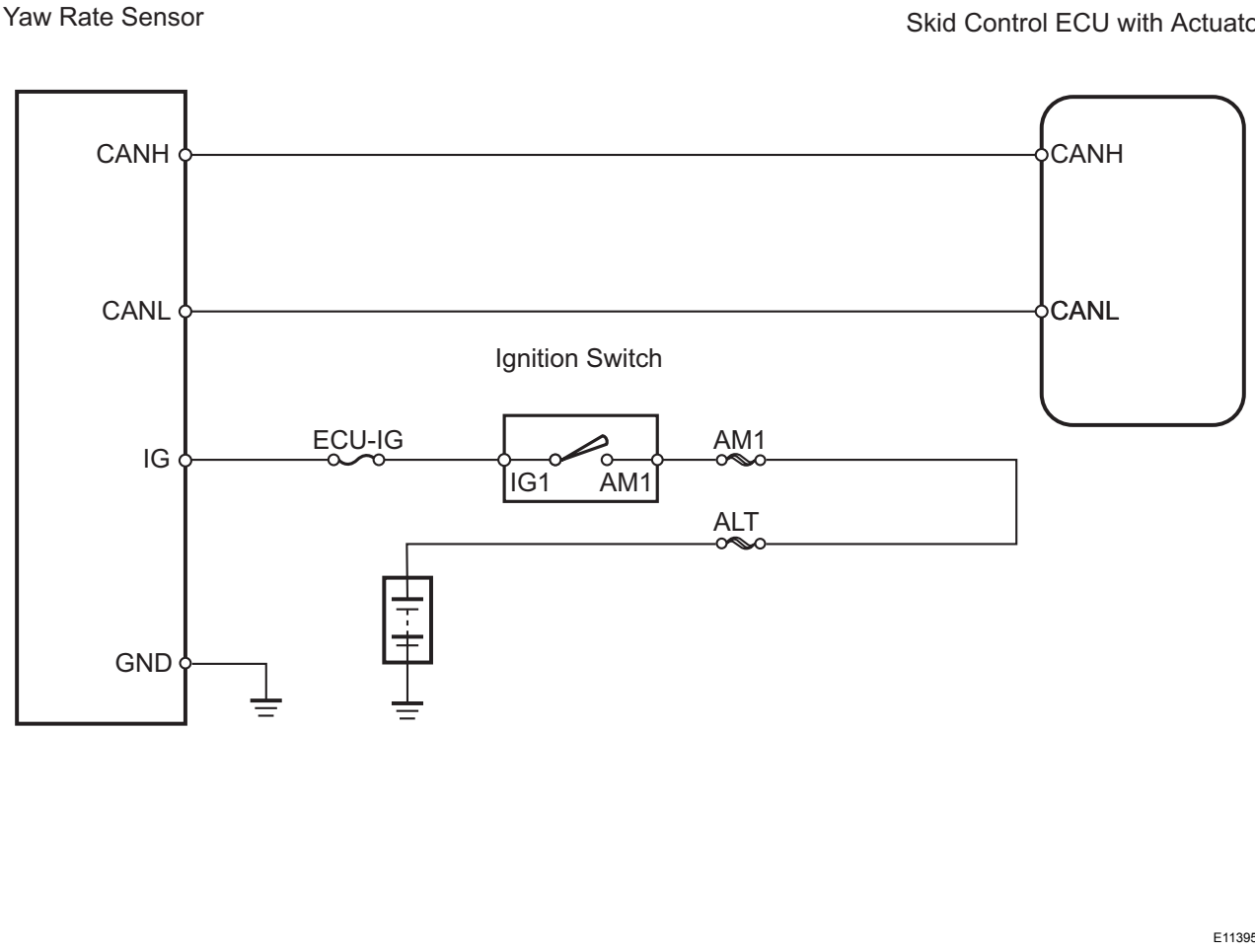
DTC	C1336/39	Zero Point Calibration of Acceleration Sensor Undone

DESCRIPTION

The deceleration sensor is built into the yaw rate sensor.

DTC No.	DTC Detection Condition	Trouble Area
C1210/36	When either condition below is met: • After ECU was replaced, shift lever was moved to position other than P within 15 seconds immediately after ECU terminal IG1 turns ON for first time. • Yaw rate sensor zero point recorded in ECU is deleted	• Yaw rate sensor • Yaw rate sensor circuit • Zero point calibration not done
C1336/39	After initial time after replacing ECU, or after erasing deceleration sensor memory by connecting terminals TS and CG of DLC3, ignition switch is turned ON and vehicle is driven in any mode except for test mode	• Yaw rate sensor • Yaw rate sensor circuit (Deceleration sensor) • Zero point calibration not done

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
When U0121/94, U0123/62, U0124/95 or U0126/63 is output along with C1210/36 or C1336/98, inspect and repair the trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.

1	**PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR (DECELERATION SENSOR)**

(a) Perform the zero point calibration of the yaw rate sensor (see page BC-69).

NEXT

2	**CHECK YAW RATE SENSOR (INSTALLATION)**

(a) Check that the yaw rate sensor has been installed properly.

BC

NG → **INSTALL YAW RATE SENSOR CORRECTLY**

OK

3	**RECONFIRM DTC**

(a) Clear the DTCs (see page BC-74).
(b) Turn the ignition switch ON.
(c) Check for DTCs (see page BC-74).
OK:
Same DTCs are output.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **END**

OK

REPLACE YAW RATE SENSOR

DTC	C1223/43	ABS Control System Malfunction

DESCRIPTION

This DTC is displayed when the VSC system receives the malfunction signal from the ABS.

DTC No.	DTC Detection Condition	Trouble Code
C1223/43	Malfunction in anti-lock brake system	Anti-lock brake system

INSPECTION PROCEDURE

1	CHECK DTC

(a) Check that the DTCs for the ABS other than C1223/43 are recorded (see page BC-74).

NEXT

REPAIR CIRCUIT INDICATED BY OUTPUT CODE

DTC	C1224/44	NE Signal Circuit

DESCRIPTION

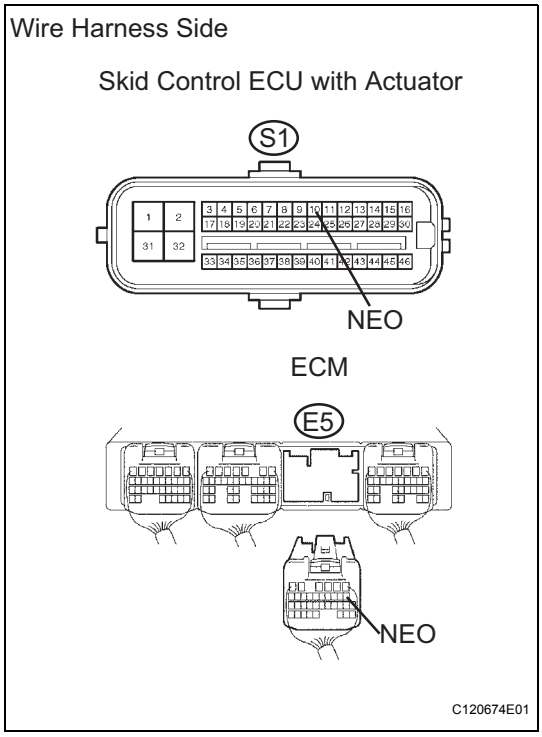
The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detection Condition	Trouble Area
C1224/44	Detection of either condition 1. or 2.: 1. When vehicle speed is 30 km/h (19 mph) or more and data reception from ECM is in normal condition, open or short circuit of engine revolution signal continues for 10 seconds or more 2. When TRAC is in operation, open or short circuit of engine revolution signal continues for 0.24 seconds or more	• NEO circuit • ECM • Skid control ECU with actuator

WIRING DIAGRAM

INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (SKID CONTROL ECU - ECM)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

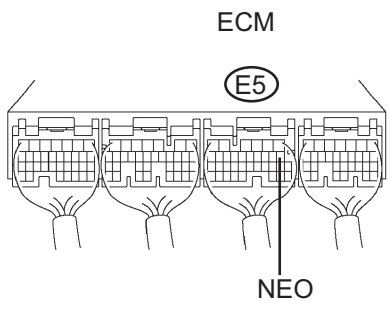
Standard resistance

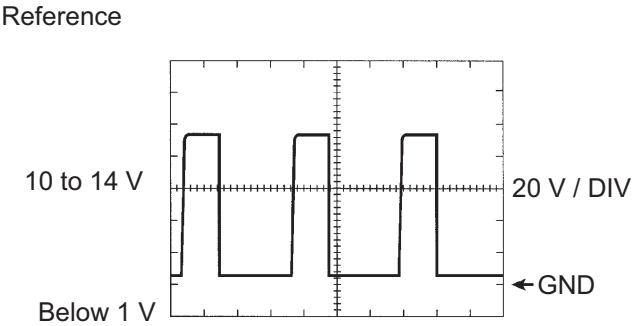
Tester Connection	Specified Condition
S1-10 (NEO) - E5-7 (NEO)	Below 1 Ω
S1-10 (NEO) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2 CHECK ECM (NEO TERMINAL)





(a) Measure the voltage of the ECM.

Standard voltage

Tester Connection	Engine Condition	Specified Condition
E5-7 (NEO) - Body ground	OFF (Ignition switch ON)	Alternating between 10 to 14 V and below 1 V
	ON (Idling)	

BC

	NG	**REPLACE ECM**
OK		

IF SAME CODE IS STILL OUTPUT AFTER DTC IS DELETED, CHECK CONTACT CONDITION OF EACH CONNECTION

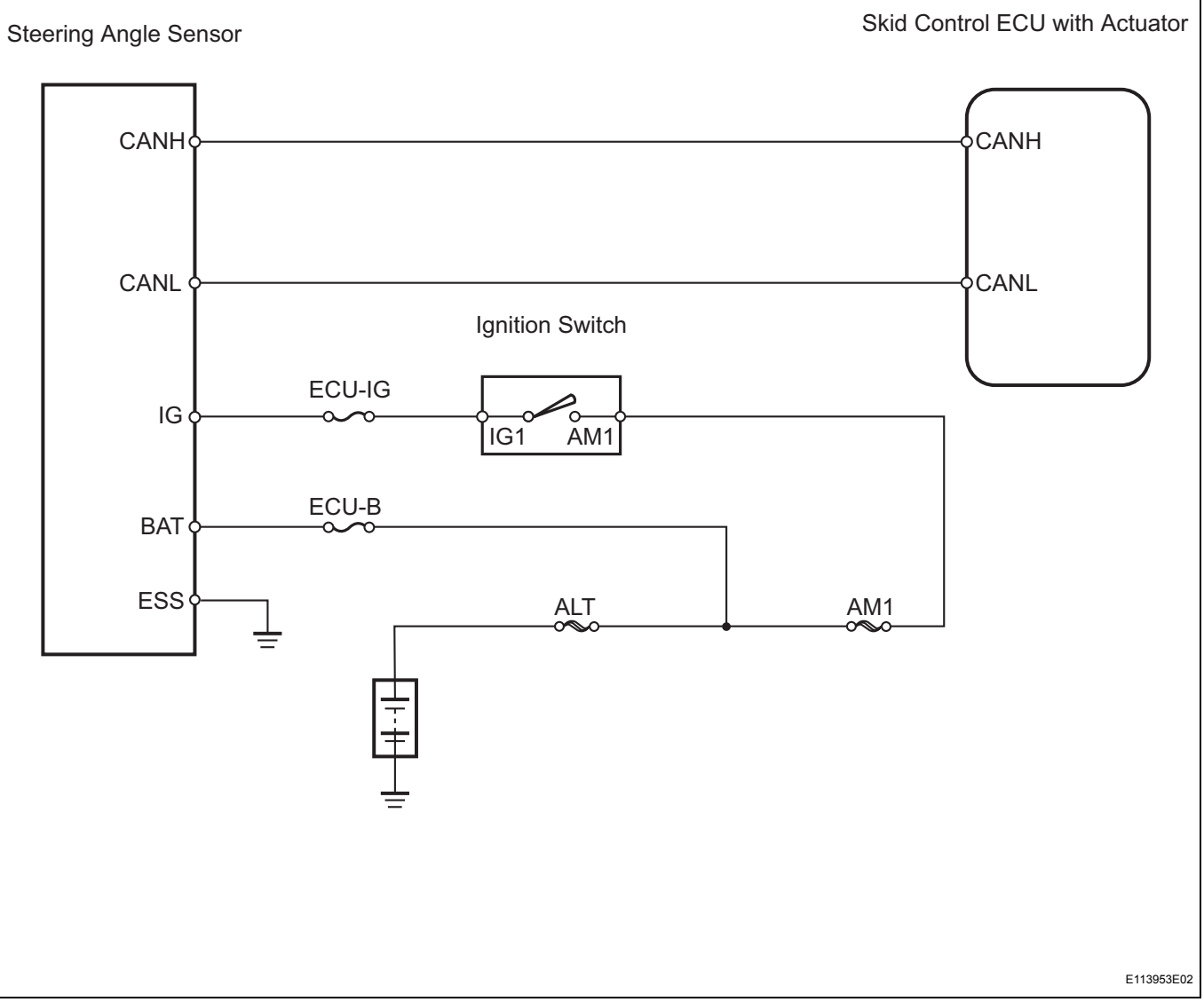
DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU through the CAN communication system. When there is a malfunction in the communication system, the DTC will be detected by the diagnosis function.

DTC No.	DTC Detection Condition	Trouble Area
C1231/31	When ECU IG1 terminal voltage is 9.5 V or more, steering angle sensor malfunction signal is received	• Steering angle sensor • Steering angle sensor circuit • Power source circuit

WIRING DIAGRAM

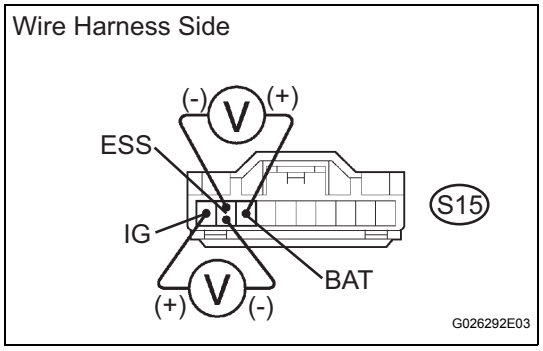


INSPECTION PROCEDURE

HINT:

- When U0121/94, U0123/62, U0124/95 or U0126/63 is output along with C1210/36 or C1336/98, inspect and repair the trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.
- When the speed sensor or the yaw rate sensor has a problem, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate sensor are output with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate sensor first. Then inspect and repair the steering angle sensor.

1 CHECK WIRE HARNESS (STEERING ANGLE SENSOR - BATTERY)



(a) Disconnect the S15 sensor connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
S15-1 (IG) - S15-2 (ESS)	Ignition switch ON	10 to 14 V
S15-3 (BAT) - S15-2 (ESS)	Always	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE STEERING ANGLE SENSOR

DTC	C1232/32	Stuck in Deceleration Sensor

DTC	C1234/34	Yaw Rate Sensor Malfunction

DTC	C1243/43	Acceleration Sensor Stuck Malfunction

DTC	C1244/44	Open or Short in Deceleration Sensor Circuit

DTC	C1245/45	Acceleration Sensor Output Malfunction

DTC	C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)

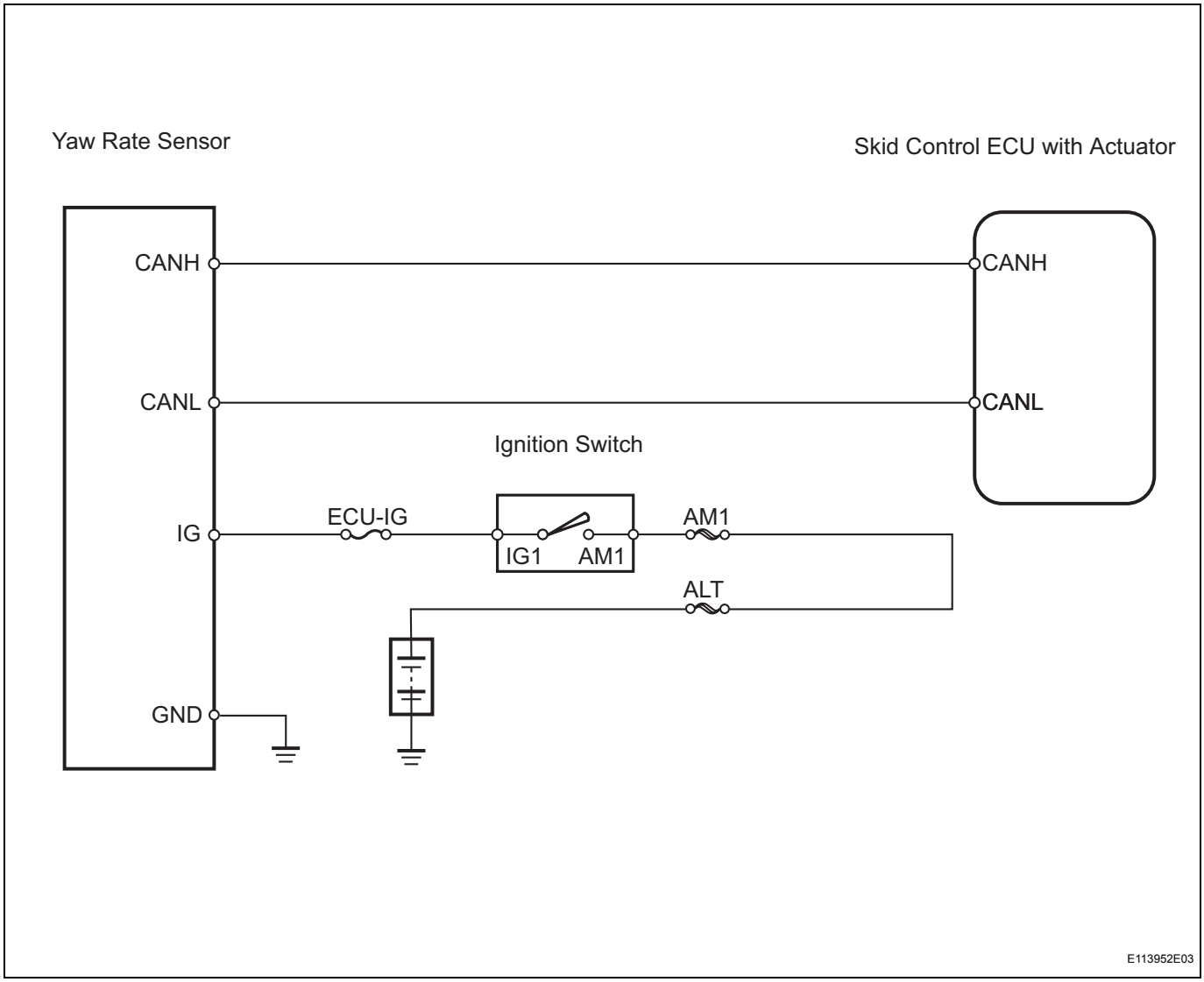
DTC	C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction

DESCRIPTION

The deceleration sensor is built into the yaw rate sensor.
The yaw rate sensor signal is sent to the skid control ECU through the CAN communication system. When there is a malfunction in communication, it will be detected by the diagnosis function.

DTC No.	DTC Detection Condition	Trouble Area
C1232/32	While vehicle speed becomes 0 km/h (0 mph) from 30 km/h (18 mph), the condition that GL1 and GL2 signals of ECU terminals do not change to 0.04 V or less occurs 16 times in a row	• Yaw rate sensor (Deceleration sensor) • Yaw rate sensor (Deceleration sensor) circuit • Wire harness
C1234/34	Yaw rate sensor malfunction signal is received	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness
C1243/43	While the vehicle speed changes from 30 km/h (19 mph) to 0 km/h (0 mph), the condition that either GL1 or GL2 does not change occurs 16 times in a row	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness for deceleration sensor system
C1244/44	Either condition (1 or 2) is detected 1. While the vehicle is not running, the condition that the difference between GL1 and GL2 once became 0.6 G or more but has not become below 0.4 G since then continues for 60 seconds or more 2. Data malfunction signal is received from G sensor	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness
C1245/45	With vehicle speed at 30 km/h (19 mph) or more, the condition that the difference between acceleration and deceleration values of computation from deceleration sensor and vehicle speed becomes more than 0.35 G continues for 60 seconds or more	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness for deceleration sensor system
C1381/97	With vehicle speed at 3 km/h (2 mph) or more, malfunction signal of deceleration sensor battery has been received constantly for 10 seconds or more	• Battery • Power source circuit • Charging system
C1279/79	Detected only during test mode	• Deceleration sensor • Sensor installation

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
When U0121/94, U0123/62, U0124/95 or U0126/63 are output along with C1210/36 or C1336/39, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

1	CHECK YAW RATE SENSOR (INSTALLATION)

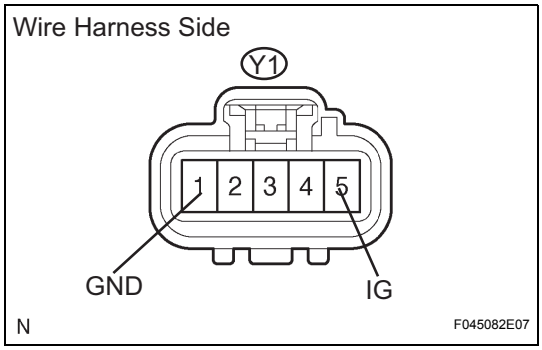
(a) Check that the yaw rate sensor has been installed properly.

NG → INSTALL YAW RATE SENSOR CORRECTLY

OK

BC

2	CHECK WIRE HARNESS (YAW RATE SENSOR - BATTERY AND BODY GROUND)



(a) Disconnect the Y1 sensor connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
Y1-5 (IG) - Body ground	Ignition switch ON	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
Y1-1 (GND) - Body ground	Below 1 Ω

HINT:
When replacing the yaw rate sensor, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

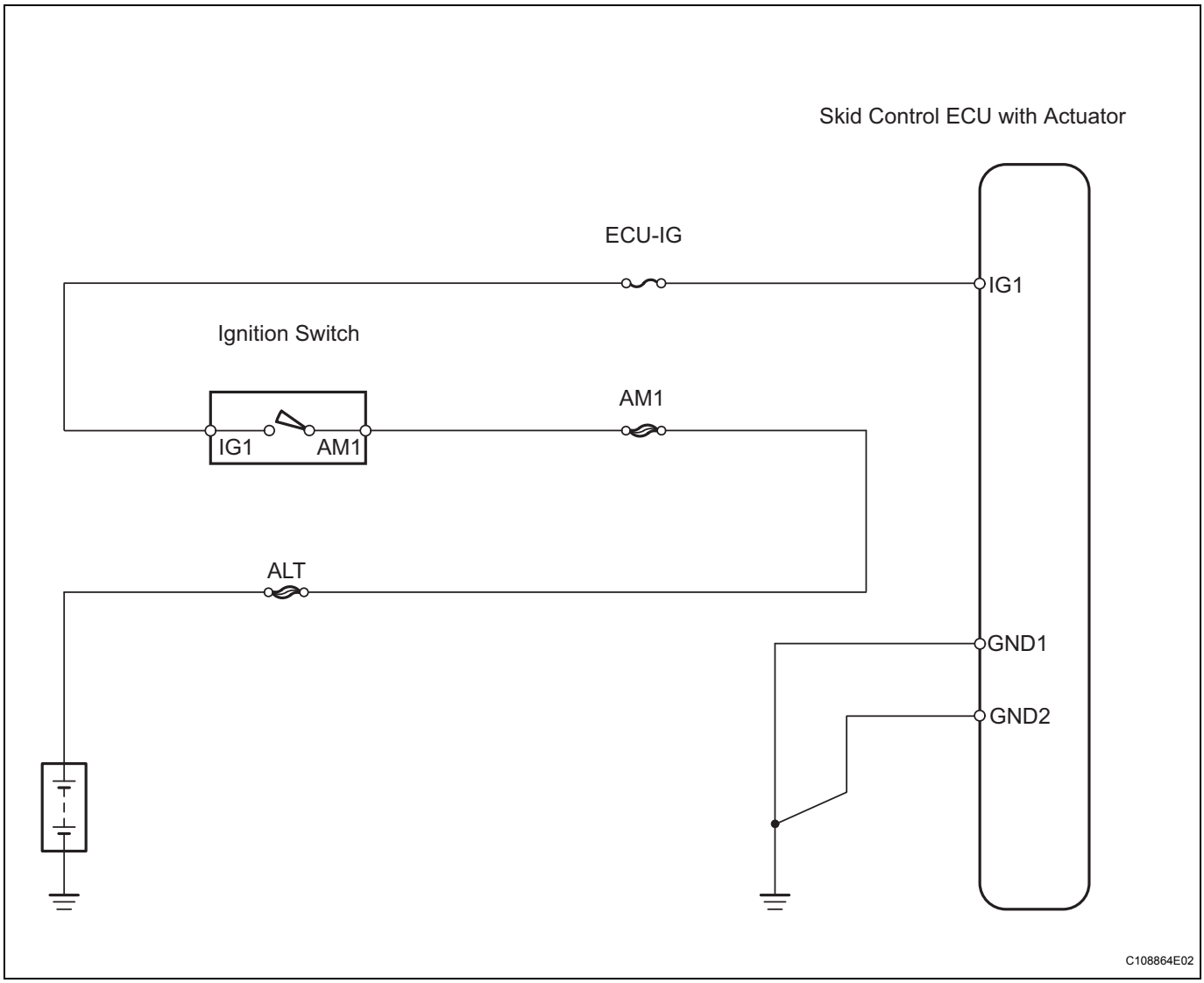
REPLACE YAW RATE SENSOR

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When either of following is detected: 1. Both conditions continue for at least 10 seconds • Vehicle speed is more than 3 km/h (2 mph) • IG1 terminal voltage is less than 9.5 V 2. All conditions continue for at least 0.2 seconds • Solenoid relay remains ON • Relay contact is open • IG1 terminal voltage is less than 9.5 V	• Battery • Charging system • Power source circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

1	INSPECT FUSE (ECU-IG)

(a) Remove the ECU-IG fuse from the instrument panel junction block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω
Result

Result	Proceed to
OK (when using intelligent tester)	A
OK (when not using intelligent tester)	B
NG	C

B → **Go to step 3**

C → **REPLACE FUSE**

A

2	READ DATA LIST (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 9.5 to 14 V TOO LOW: Below 9.5 V	-

Result

Result	Proceed to
Display is not NORMAL	A
Display is NORMAL	B

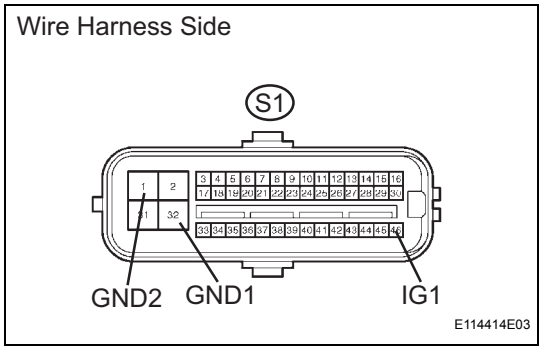
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

BC

3 CHECK WIRE HARNESS (SKID CONTROL ECU- BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DTC	C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)

DESCRIPTION

The master cylinder pressure sensor is connected to the skid control ECU with actuator.
DTC C128181 can be deleted when the master cylinder pressure sensor sends a master cylinder pressure signal or the test mode ends. DTC C1281/81 is output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C1246/46	• When vehicle speed is 7 km/h (4 mph) or more and PMC terminal voltage of skid control ECU exceeds 0.86 V, condition that voltage does not change by 0.005 V or more continues for 30 seconds • Noise in terminal PMC of skid control ECU occurs 7 times or more within 5 seconds • When stop light switch is OFF, condition that PMC terminal voltage of skid control ECU is 0.86 V or more, or less than 0.3 V continues for 5 seconds or more • When IG1 terminal voltage is 9.5 to 17.2 V, condition that VCM terminal voltage of skid control ECU is out of range from 4.4 to 5.6 V continues for 1.2 seconds or more • When VCM terminal voltage of skid control ECU is 4.4 to 5.6 V, condition that PMC terminal voltage of skid control ECU is out of range from 0.14 to 4.85 V continues for 1.2 seconds or more	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C121/81	Detected only during test mode	Master cylinder pressure sensor

INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

BC

B → Go to step 3

A

2	READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

(a) Check the DATA LIST for proper functioning of the master cylinder pressure sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / Min.: 0 V, Max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed

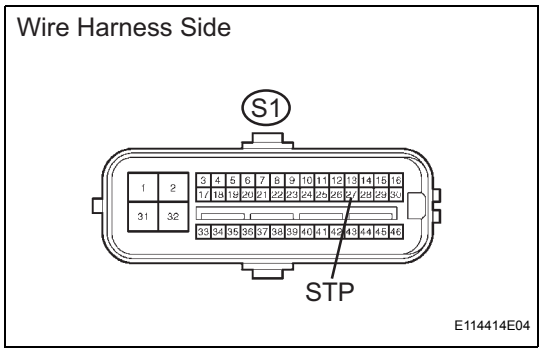
OK:
Brake fluid pressure value (voltage) changes from 0.3 to 0.9 V.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-27 (STP) - Body ground	Brake pedal is depressed	8 to 14 V
	Brake pedal is released	Below 1 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

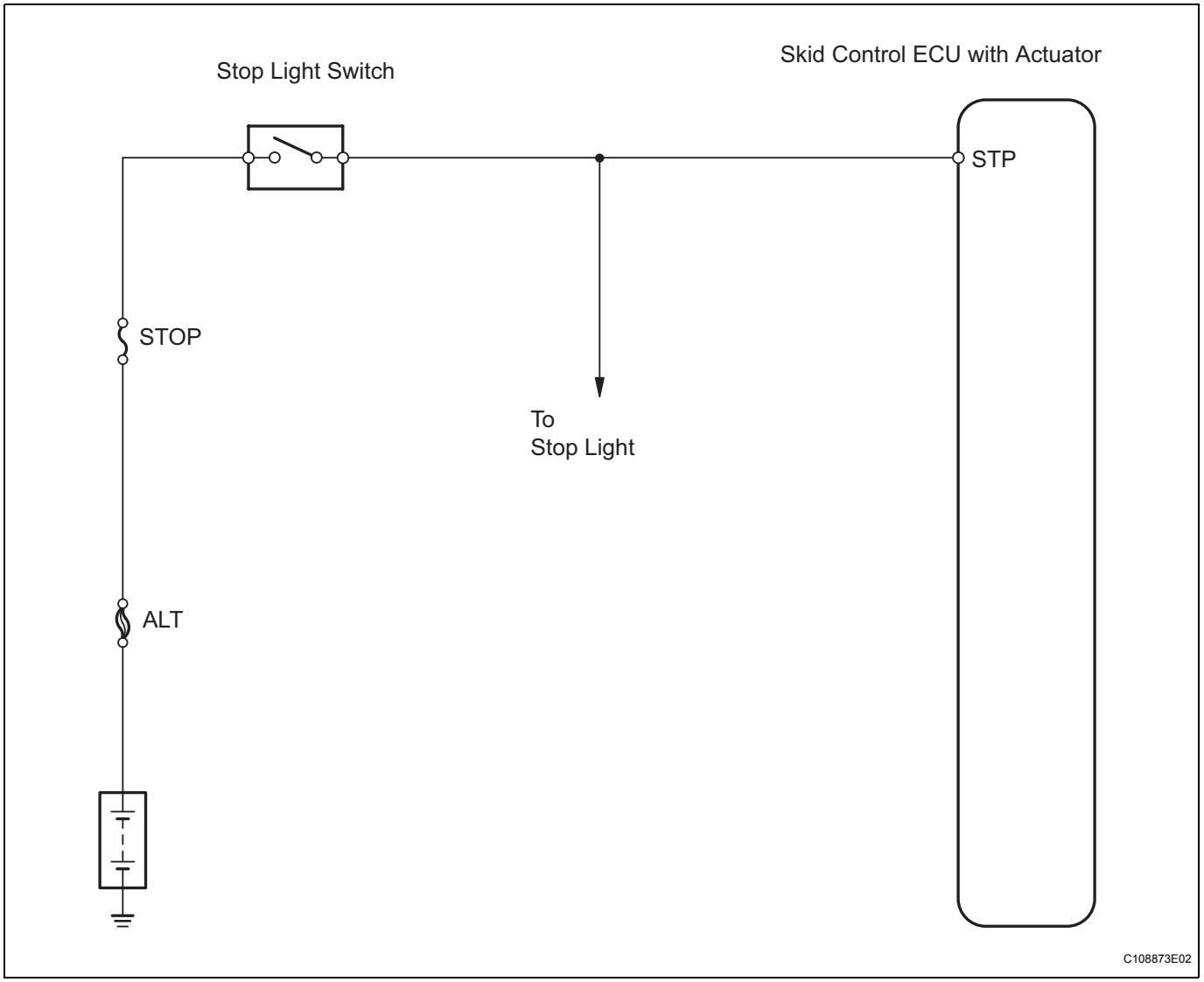
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.

DTC No.1	DTC Detection Condition	Trouble Area
C1249/49	Both conditions continue for at least 0.3 seconds: • IG1 terminal voltage is between 9.5 and 17.2 V • Open in stop light switch circuit	• Stop light switch assembly • Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK STOP LIGHT SWITCH ASSEMBLY (OPERATION)

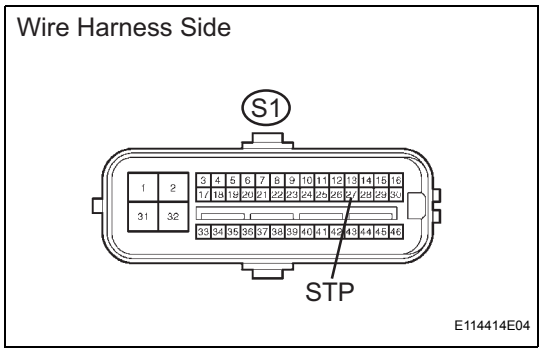
(a) Check that the stop light illuminates when the brake pedal is depressed, and turns off when the brake pedal is released.
OK

Condition	Stop Light Condition
Brake pedal depressed	Illuminates
Brake pedal released	Turns off

NG → **Go to step 4**

OK

2 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
S1-27 (STP) - Body ground	Brake pedal depressed	10 to 14 V
	Brake pedal released	Below 1 V

NG → **Go to step 5**

OK

3 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-69).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-74).

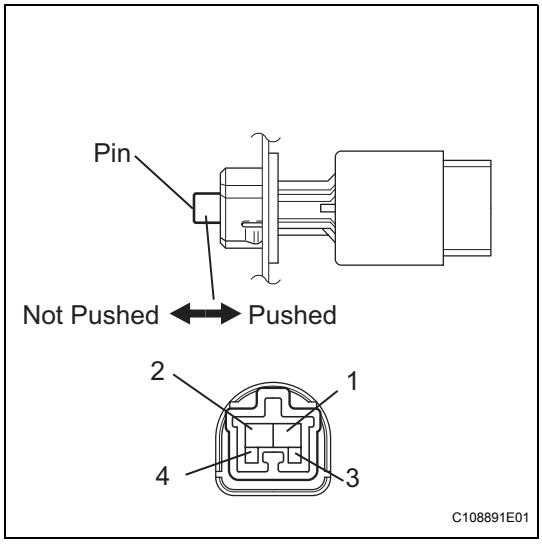
B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

4 INSPECT STOP LIGHT SWITCH ASSEMBLY



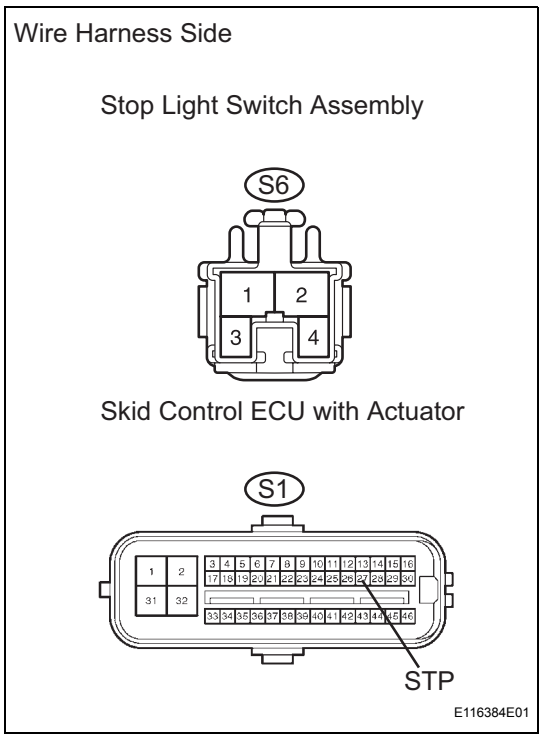
(a) Disconnect the S6 switch connector.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin not pushed	Below 1 Ω
	Pin pushed	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

5 CHECK WIRE HARNESS (STOP LIGHT SWITCH - SKID CONTROL ECU AND BATTERY)



(a) Disconnect the S6 switch connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S6-2 - Body ground	10 to 14 V

(d) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S6-1 - S1-27 (STP)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.

BC

(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → END

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:
When removing parts, turn the ignition switch OFF.
HINT:

- Using SST 09843-18040, connect terminals TC and CG of the DLC3.
- If any abnormality is not found when inspecting parts, inspect the ECU and ground points for poor contact.
- If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, turn to the page shown under the "See page" for respective "DTC No." in the DTC chart.
- When 2 or more DTCs are recorded and the problem is not identified, perform circuit inspection of the other DTCs.

Anti-lock brake system

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor RH - Front speed sensor RH circuit - Front speed sensor rotor RH - Sensor installation	BC-16
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor LH - Front speed sensor LH circuit - Front speed sensor rotor LH - Sensor installation	BC-16
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor RH - Rear speed sensor RH circuit - Rear speed sensor rotor RH - Sensor installation	BC-22
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor LH - Rear speed sensor LH circuit - Rear speed sensor rotor LH - Sensor installation	BC-22
C0226/21	SFR Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SFRR or SFRH circuit	BC-27
C0236/22	SFL Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SFLR or SFLH circuit	BC-27
C0246/23	SRR Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SRRR or SRRH circuit	BC-27
C0256/24	SRL Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SRLR or SRLH circuit	BC-27
C0273/13	Open in ABS Motor Relay Circuit	- ABS motor relay - ABS motor relay circuit	BC-29
C0274/14	Short to B+ in ABS Motor Relay Circuit	- ABS motor relay - ABS motor relay circuit	BC-29
C0278/11	Open in ABS Solenoid Relay Circuit	- ABS solenoid relay - ABS solenoid relay circuit - Skid control ECU with actuator (Brake actuator assembly)	BC-32
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	- ABS solenoid relay - ABS solenoid relay circuit - Skid control ECU with actuator (Brake actuator assembly)	BC-32
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	- Front speed sensor RH - Front speed sensor rotor RH	BC-16
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	- Front speed sensor LH - Front speed sensor rotor LH	BC-16

DTC No.	Detection Item	Trouble Area	See page
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	- Rear speed sensor RH - Rear speed sensor rotor RH	BC-22
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	- Rear speed sensor LH - Rear speed sensor rotor LH	BC-22
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	- Battery - Charging system - Power source circuit	BC-34
C1249/49	Open in Stop Light Switch Circuit	- Stop light switch - Stop light swich circuit	BC-37
C1251/51	Open in Pump Motor Circuit	- ABS pump motor	BC-41

DTC chart of sensor check function

DTC No.	Detection Item	Trouble Area	See page
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor RH - Sensor installation - Sensor rotor	BC-16
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor LH - Sensor installation - Sensor rotor	BC-16
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor RH - Sensor installation - Sensor rotor	BC-22
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor LH - Sensor installation - Sensor rotor	BC-22
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor rotor RH	BC-16
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor rotor LH	BC-16
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor rotor RH	BC-22
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor rotor LH	BC-22

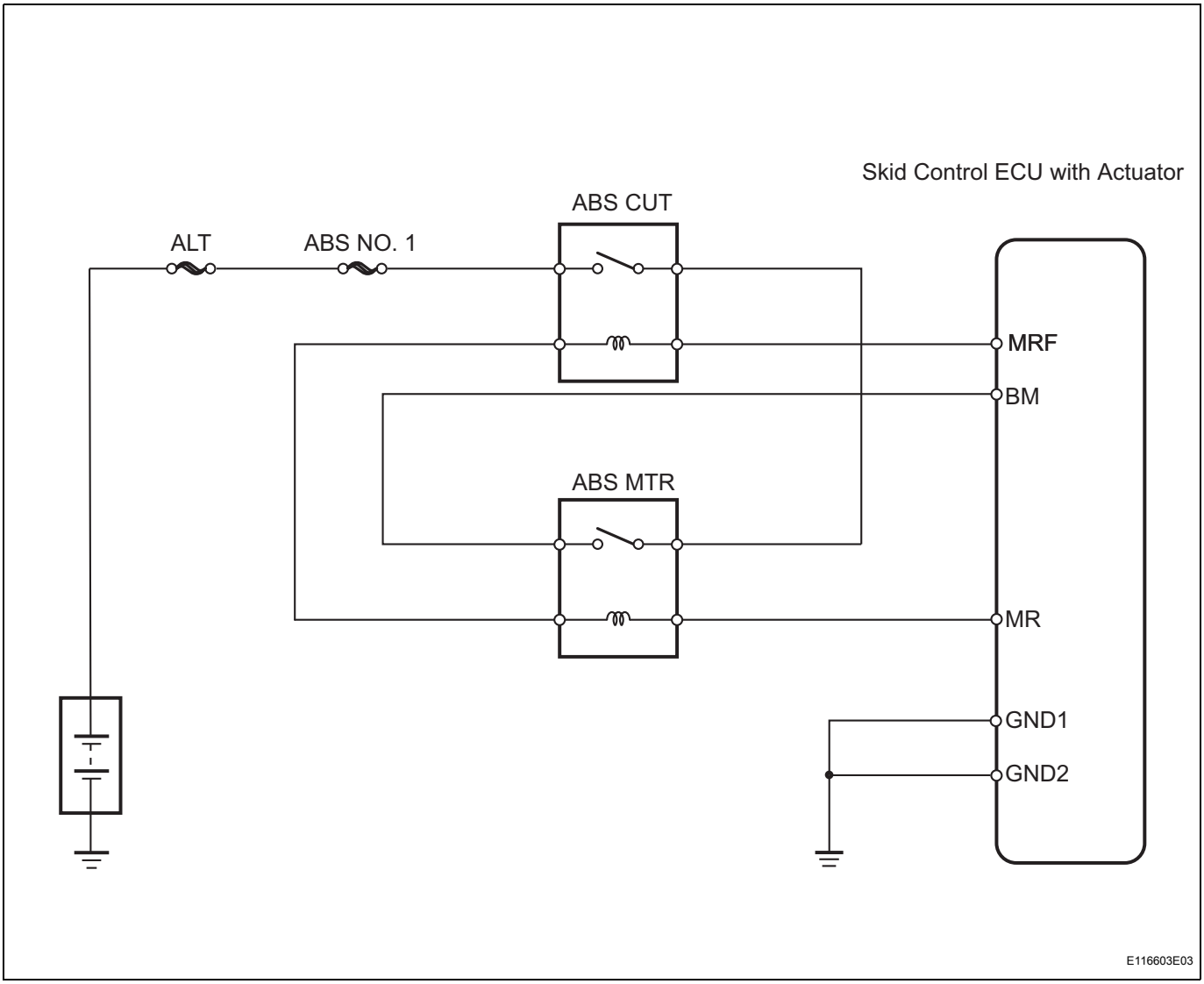
DTC	C1251/51	Open in Pump Motor Circuit

DESCRIPTION

The ABS pump motor is located inside the brake actuator.

DTC No.	DTC Detection Condition	Trouble Area
C1251/51	When either condition below is met: • Actuator pump motor does not operate properly • Actuator pump motor circuit remains open for at least 2 seconds	• Skid control ECU with actuator • Skid control ECU with actuator circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

BC

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 3**

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MTR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS MTR relay operates.

Skid control ECU with actuator

Item	Vehicle Condition / Test Details	Diagnostics Note
ABS MOT RELAY	Turn ABS MTR relay ON / OFF	Operation sound of motor can be heard

OK:

Operation sound of ABS motor is heard.

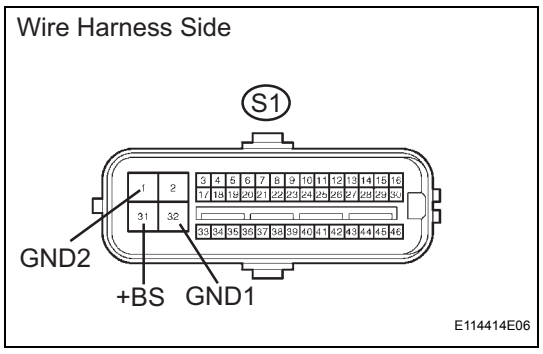
HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.

(b) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Specified Condition
S1-31 (+BM) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

DTC	U0100/65	Lost Communication with ECM / PCM
DTC	U0121/94	CAN Communication Function Fault
DTC	U0123/62	Lost Communication with Yaw Rate Sensor Module
DTC	U0124/95	Lost Communication with Lateral Acceleration Sensor Module
DTC	U0126/63	Lost Communication with Steering Angle Sensor Module

INSPECTION PROCEDURE

1	RECONFIRM DTC

(a) Clear the DTC (see page BC-74).
(b) Turn the ignition switch ON.
(c) Drive the vehicle at a speed of 15 km/h (9 mph) and turn the steering wheel to the right and left.
(d) Check for DTC (see page BC-74). If a DTC of the ABS and VSC is output, make a note of them.

Result

Result	Proceed to
DTC is output fot the CAN communication systemCA-6	A
DTC is output (ABS and VSC DTCs are output)	B
DTC is not output	C

B → REPLACE CIRCUIT INDICATOR BY OUTPUT CODE

C → END

A

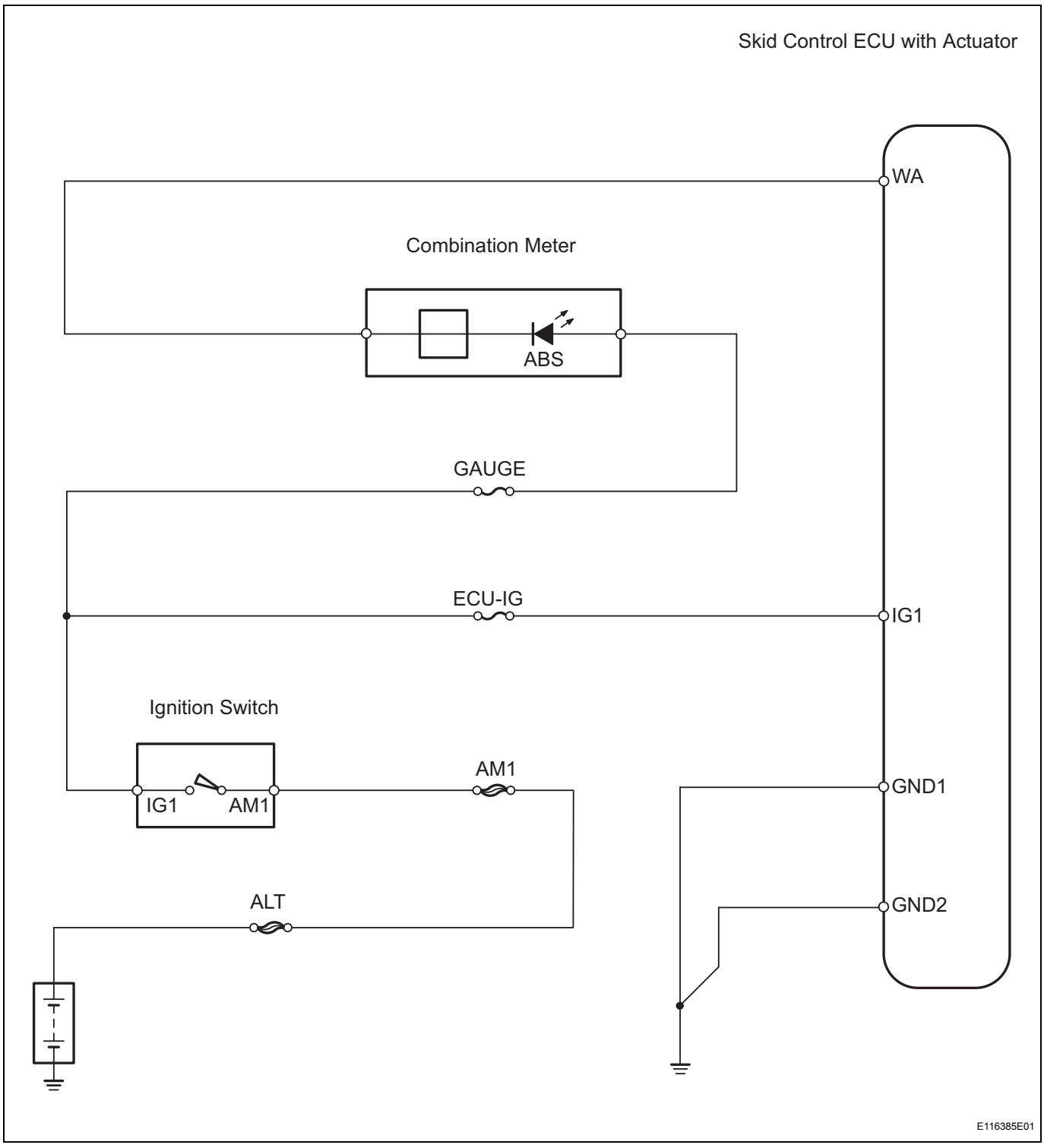
BC GO TO CAN COMMUNICATION SYSTEM

ABS Warning Light Remains ON

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
Always ON	Either condition (1. or 2.) is detected: 1. Voltage of ECU terminal IG1 remains at more than 17 V 2. There is a malfunction in ECU internal circuit	• Power source circuit • ABS warning light circuit • Skid control ECU with actuator • Charging system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**CHECK FOR DTC**

(a) Turn the ignition switch ON.
(b) Check that the ABS warning light illuminates.
(c) Check for DTCs (see page BC-74).

BC

Result

Result	Proceed to
DTC is not output (when using intelligent tester)	A
DTC is not output (when not using intelligent tester)	B
DTC is output	C

B → Go to step 7

C → REPAIR CIRCUIT INDICATED BY OUTPUT DTC

A

2 INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.
OK:
Each ECU connector is properly installed.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3 READ VALUE OF INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 9.5 to 14 V TOO LOW: Below 9.5 V	-

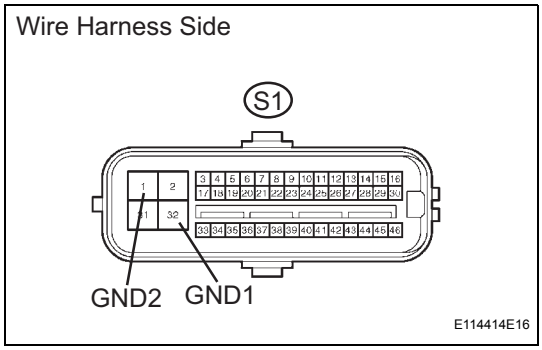
Result

Result	Proceed to
Display is NORMAL	A
Display is not NORMAL	B

B → Go to step 11

A

4	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

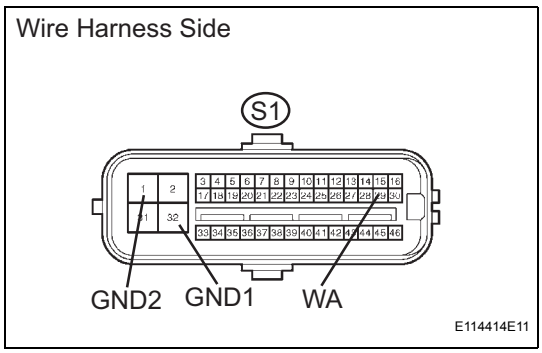
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK ABS WARNING LIGHT



(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-29) to GND1 (S1-32) or GND2 (S1-1) of the connector. Check the ABS warning light.

OK:

ABS warning light turns off.

(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.

OK:

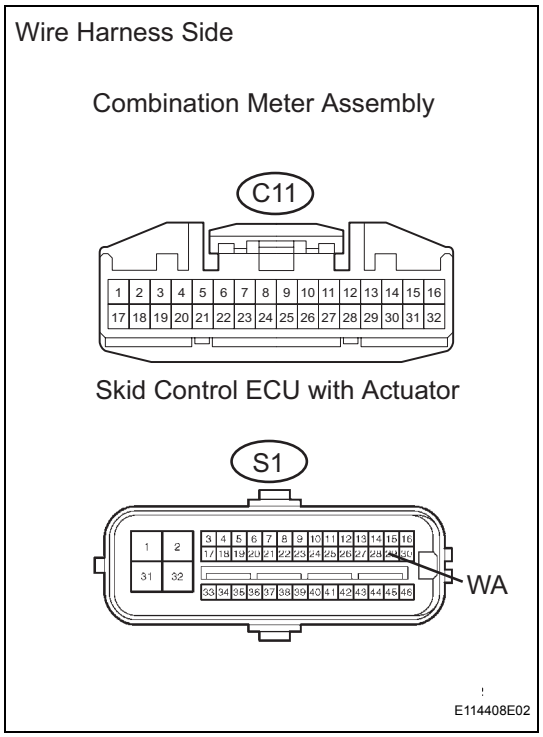
ABS warning light illuminates.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

6	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
S1-29 (WA) - C11-11	Below 1 Ω
S1-29 (WA) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

7	INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.

OK:

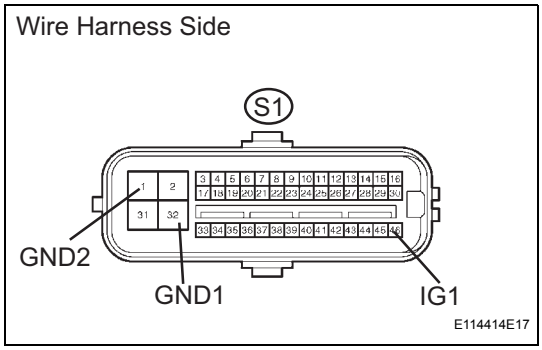
Each ECU connector is properly installed.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

BC

8 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

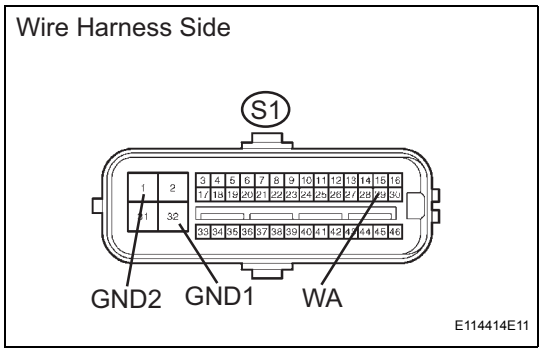
(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

9 CHECK ABS WARNING LIGHT



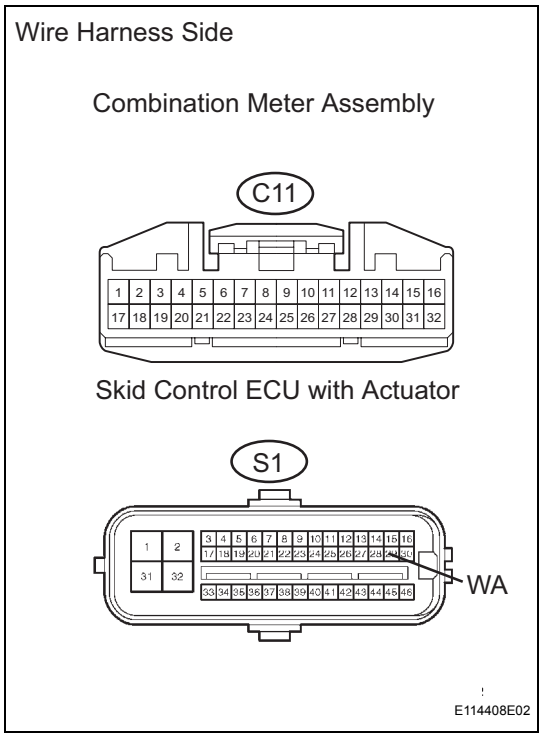
(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-29) to GND1 (S1-32) or GND2 (S1-1) of the S1 ECU connector.
Check the ABS warning light.
OK:
ABS warning light turns off.
(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.
OK:
ABS warning light illuminates.
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

BC

10 CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

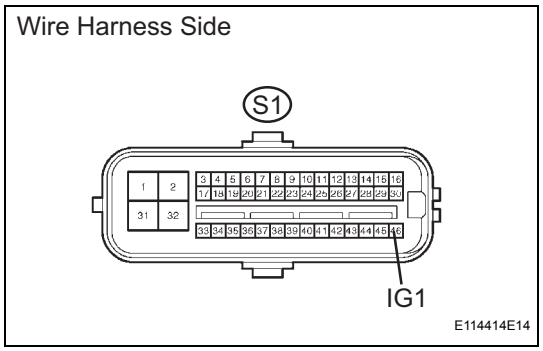
Tester Connection	Specified Condition
S1-29 (WA) - C11-11	Below 1 Ω
S1-29 (WA) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

11 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

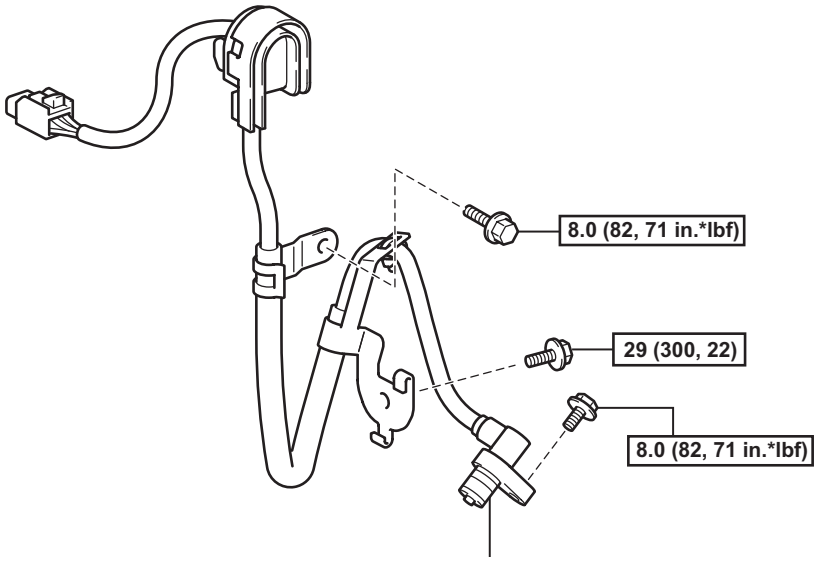
OK

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

FRONT SPEED SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

H

C117773E01

REMOVAL

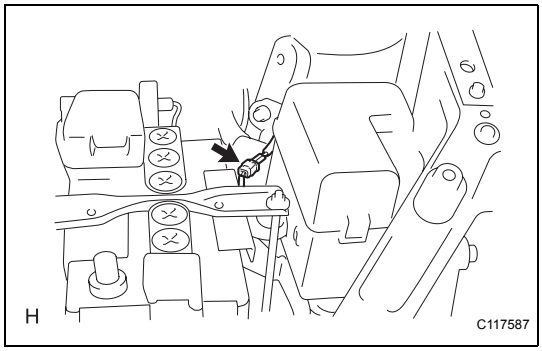
HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE FRONT WHEEL

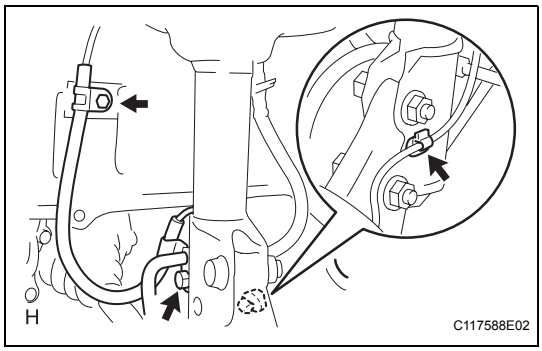
3. REMOVE FRONT SPEED SENSOR LH

(a) Disconnect the speed sensor connector.

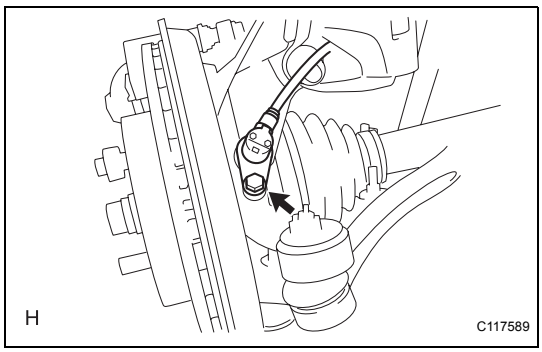


(b) Remove the 2 clamp bolts holding the speed sensor wire harness from the body and shock absorber.

(c) Disconnect the resin clip and speed sensor wire harness from shock absorber.



(d) Remove the bolt and speed sensor.
NOTICE:
Keep the sensor tip and sensor installation hole free from foreign matter.



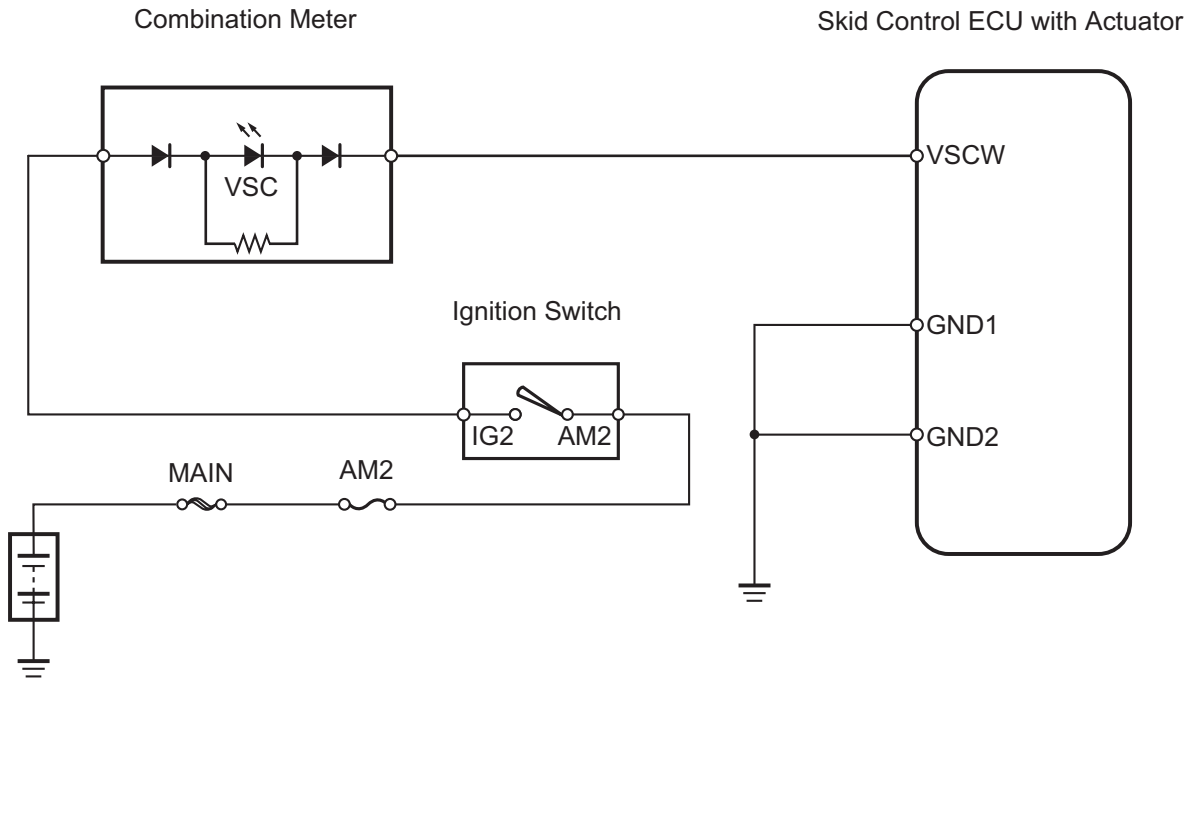
VSC Warning Light Remains ON

DESCRIPTION

If the ECU stores a DTC, the VSC illuminates.

DTC No.	DTC Detection Condition	Trouble Area
Always ON	Malfunction in skid control ECU with actuator	• VSC warning light circuit • Power source circuit • Skid control ECU with actuator

WIRING DIAGRAM



INSPECTION PROCEDURE

BC

1	CHECK FOR DTC

(a) Check for DTCs (see page BC-74).

Result

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

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

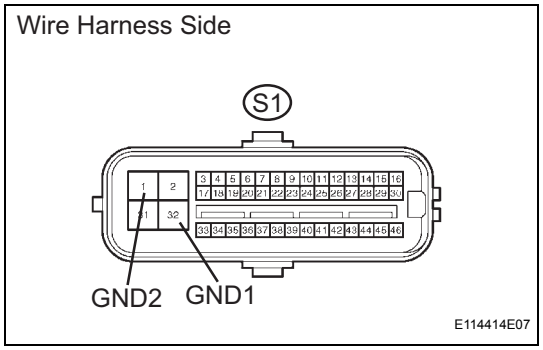
A

2 INSPECT SKID CONTROL ECU CONNECTOR SECURELY CONNECTED

NO → **CONNECT CONNECTOR TO ECU**

YES

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

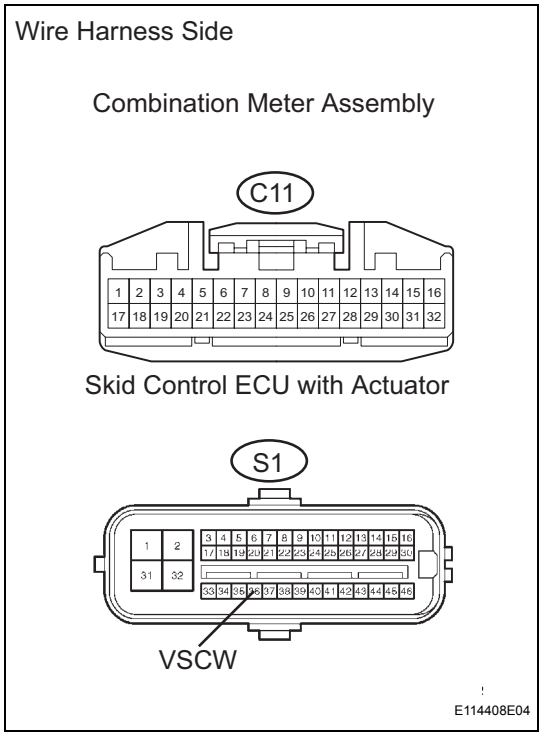
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C11-10 - S1-36 (VSCW)	Below 1 Ω
C11-10 - Body ground	10 kΩ or higher

Result

Result	Proceed to
OK (when using intelligent tester)	A
OK (when not using intelligent tester)	B
NG	C

B → **Go to step 7**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

BC

5	READ VALUE OF INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG power voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 10 to 14 V TOO LOW: Below 10 V	-

OK:
NORMAL is displayed.

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (VSC WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the VSC warning light illuminates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Operation of solenoid (clicking sound) can be heard

OK:
VSC warning light illuminates.

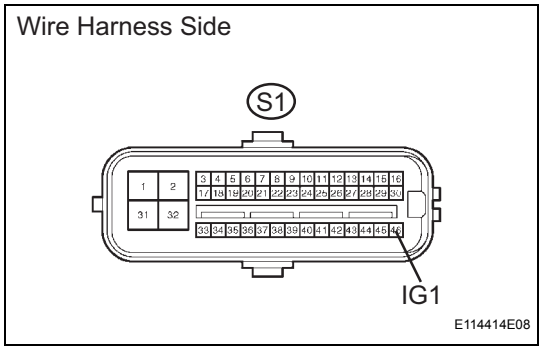
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

7	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



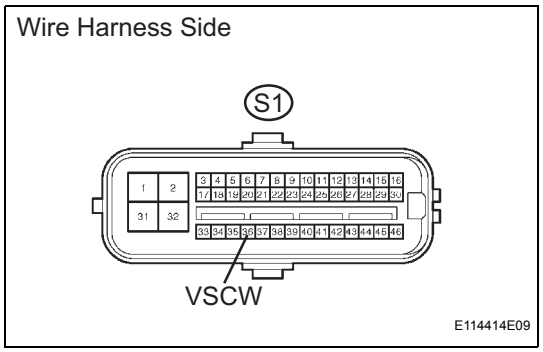
(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

8	CHECK VSC WARNING LIGHT



(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Check that the VSC warning light turns off.
OK:
VSC warning light turns off.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

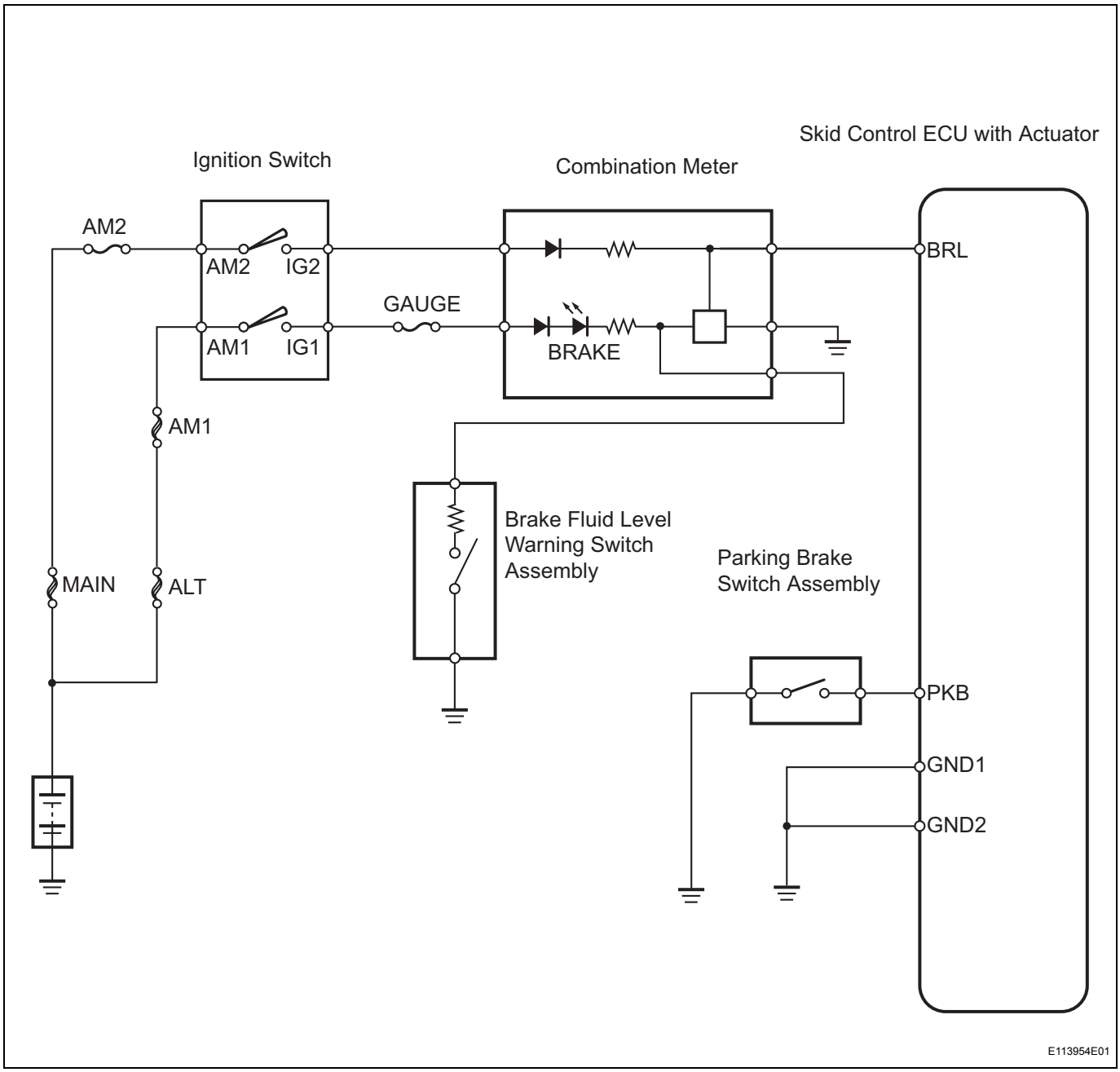
REPLACE BRAKE ACTUATOR ASSEMBLY

Brake Warning Light Circuit

DESCRIPTION

The brake warning light turns on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (BRAKE WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the BRAKE warning light illuminates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
BRAKE WRN LIGHT	Turns brake warning light ON / OFF	Operation of solenoid (clicking sound) can be heard

OK:

Brake warning light illuminates.

HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 CHECK DTC FOR ABS

(a) Check for DTCs (see page BC-74).

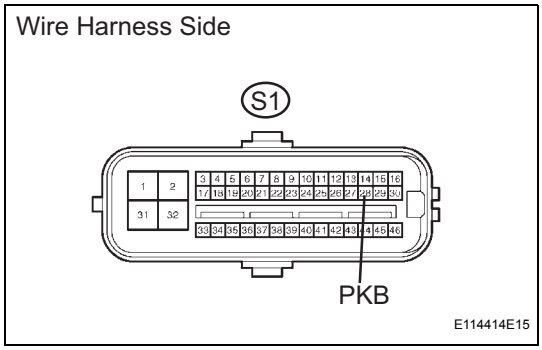
Result

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

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

A

4 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

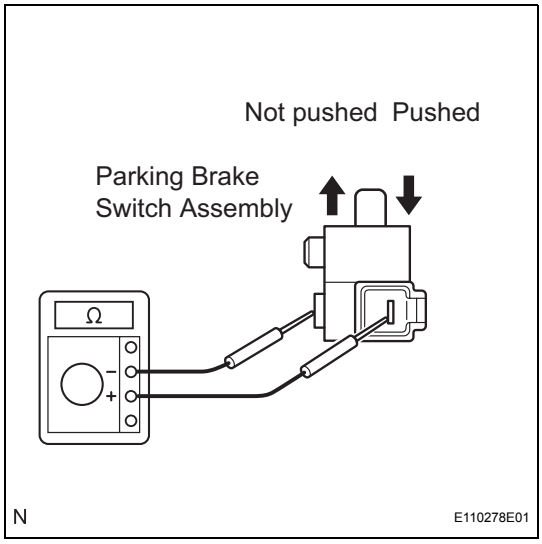
Standard resistance

Tester Connection	Switch Condition	Specified Condition
S1-28 (PKB) - Body ground	Parking brake switch ON	Below 1 Ω
	Parking brake switch OFF	10 kΩ or higher

OK → **Go to step 7**

NG

5 INSPECT PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the parking brake switch.
(b) Measure the resistance of the switch.

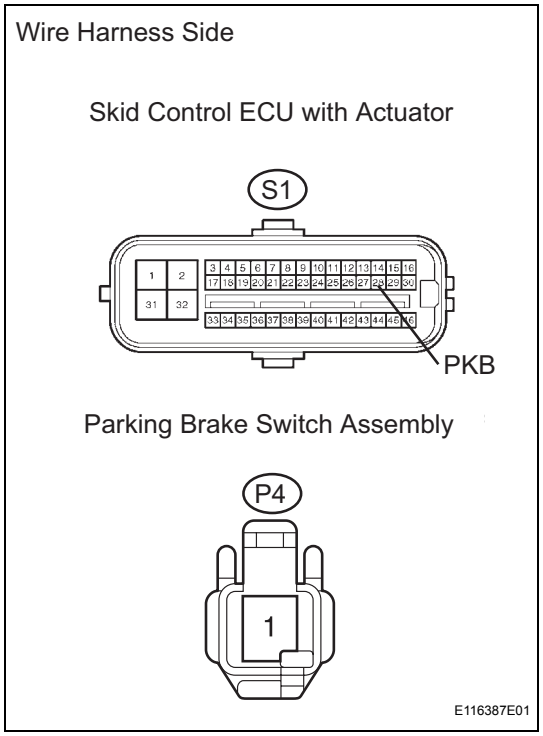
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	Pushed	Below 1 Ω
	Not pushed	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

6 CHECK WIRE HARNESS (SKID CONTROL ECU - PARKING BRAKE SWITCH)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the P4 switch connector.
(c) Measure the resistance of the wire harness side connectors.

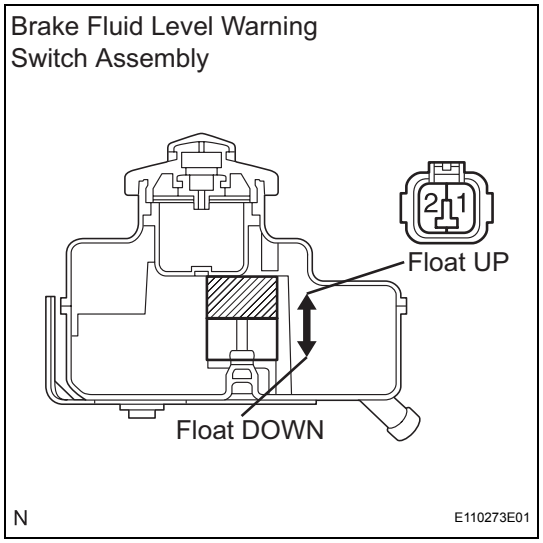
Standard resistance

Tester Connection	Specified Condition
S1-28 (PKB) - P4-1	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7 INSPECT BRAKE FLUID LEVEL WARNING SWITCH ASSEMBLY



(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the B2 switch connector.
(c) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Float DOWN	Below 1 Ω
	Float UP	10 kΩ or higher

NG → **REPLACE BRAKE MASTER CYLINDER SUB-ASSEMBLY**

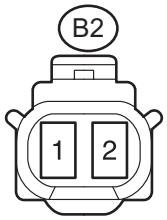
OK

BC

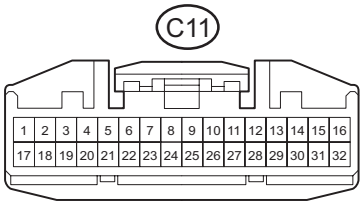
8	CHECK WIRE HARNESS (WARNING SWITCH - COMBINATION METER AND BODY GROUND)

Wire Harness Side

Brake Fluid Level Warning Switch Assembly



Combination Meter Assembly



E116388E01

(a) Disconnect the B2 switch connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
B2-1 - C11-15	Below 1 Ω
B2-2 - Body ground	

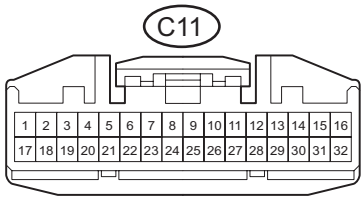
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

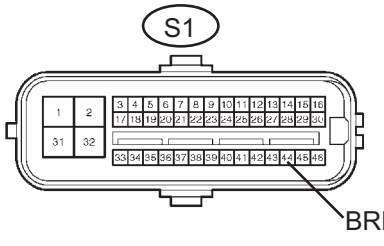
9	CHECK WIRE HARNESS (SKID CONTROL ECU - COMBINATION METER)

Wire Harness Side

Combination Meter Assembly



Skid Control ECU with Actuator



E114408E05

(a) Disconnect the S1 ECU connector.
(b) Disconnect the C11 meter connector.
Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
S1-44 (BRL) - C11-14	Below 1 Ω

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

BC

OK

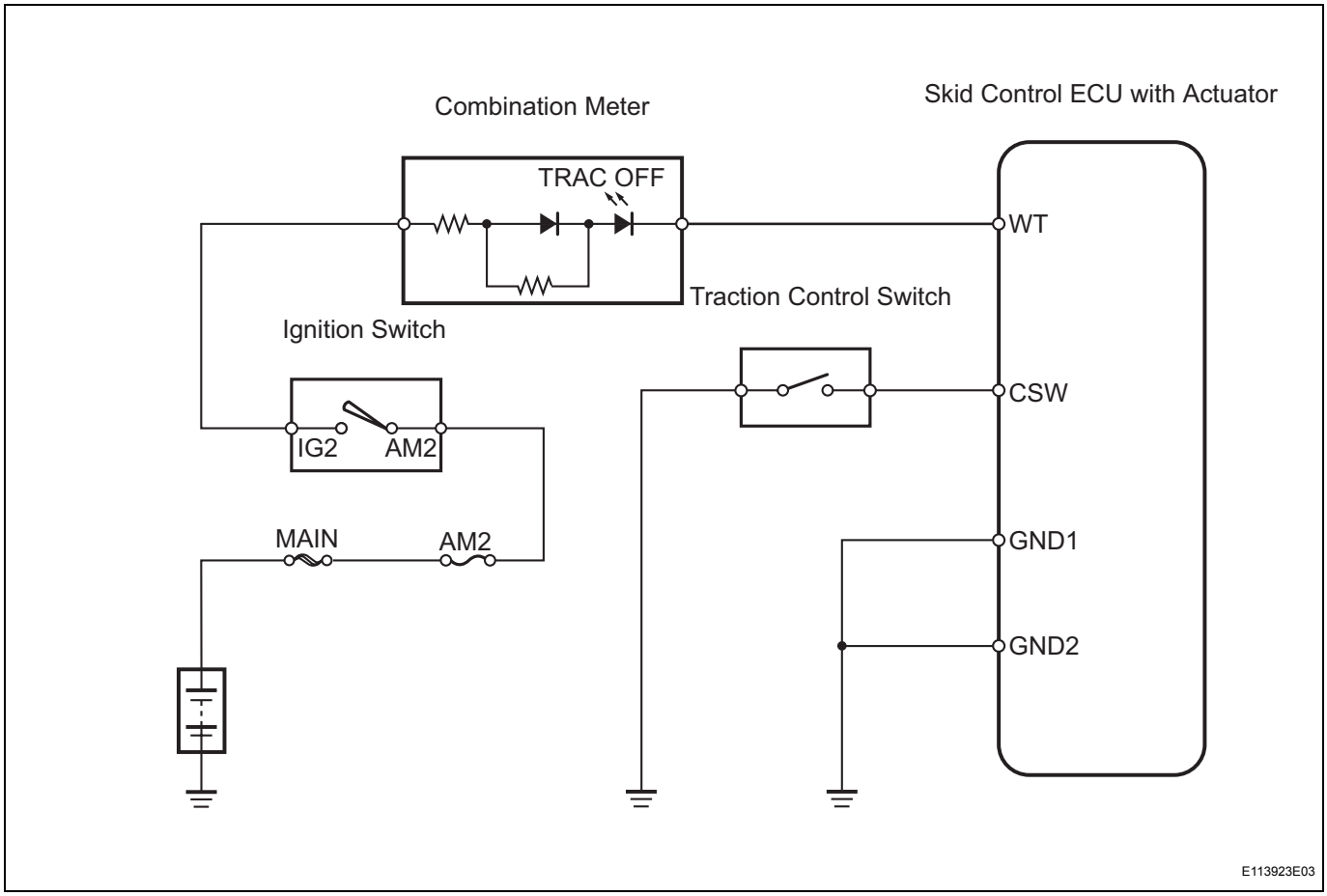
REPLACE BRAKE ACTUATOR ASSEMBLY

TRAC OFF Indicator Light, TRAC OFF Switch Circuit

DESCRIPTION

This is the TRAC control main switch. When the TRAC control switch is pushed, TRAC control turns off and the TRAC OFF indicator light turns on. When the ignition switch is turned OFF and then turned ON, the TRAC control automatically turns on again.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

BC

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 3**

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (TRAC OFF INDICATOR LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the TRAC OFF indicator light illuminates.

Skid control ECU with actuator

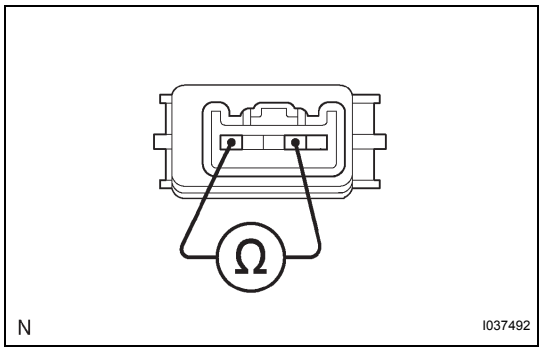
Item	Measurement Item / Range (Display)	Diagnostic Note
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator light ON / OFF	Observe combination meter

OK:
VSC / TRAC OFF indicator light illuminates.

NG → **Go to step 5**

OK

3	INSPECT TRACTION CONTROL SWITCH



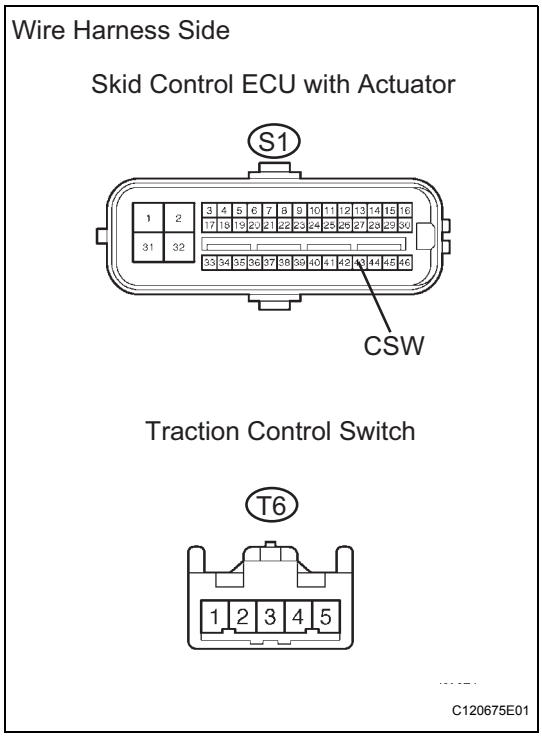
(a) Remove the traction control switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
2 - 5	Pushed (ON)	Below 1 Ω
	Not pushed (OFF)	10 kΩ or higher

NG → **REPLACE TRACTION CONTROL SWITCH**

OK

4	CHECK WIRE HARNESS (TRACTION CONTROL SWITCH - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the T6 switch connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
T6-5 - S1-43 (CSW)	Below 1 Ω
T6-2 - Body ground	

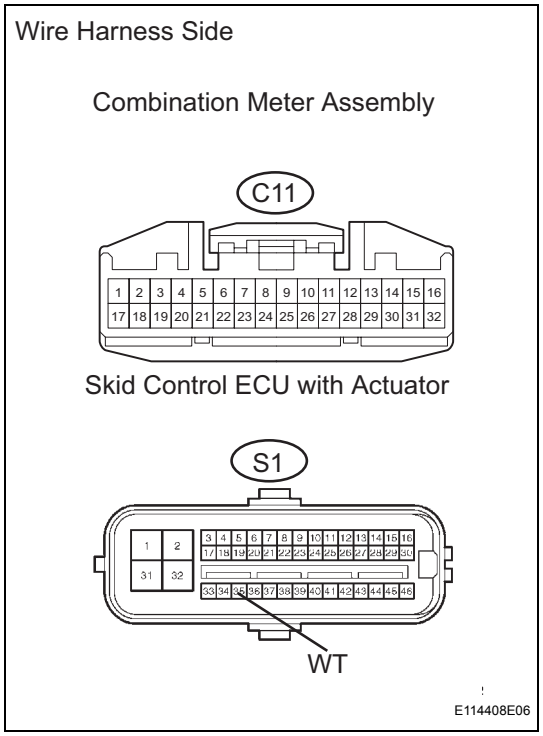
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

5	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C1-30 - S1-35 (WT)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

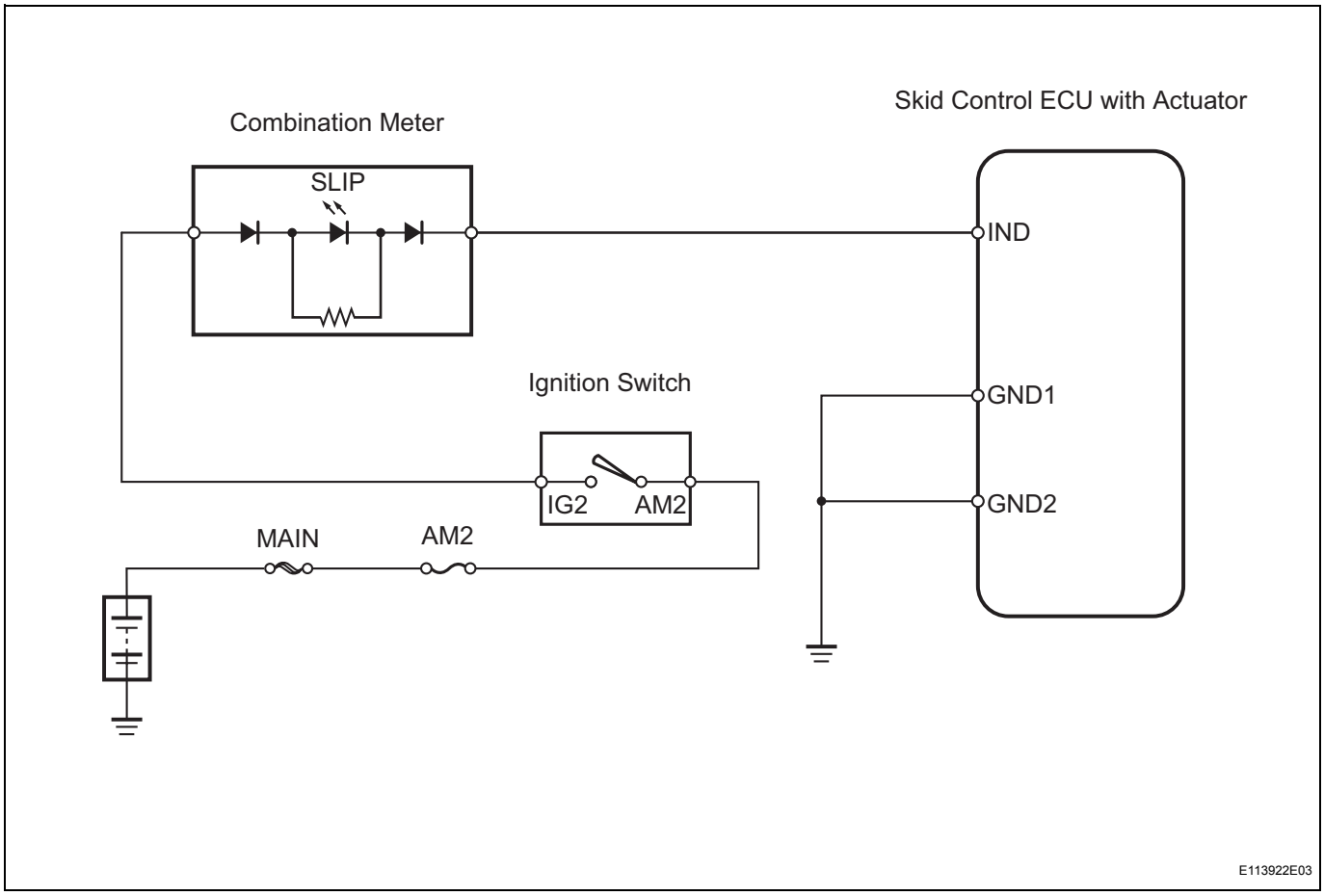
OK → **REPLACE COMBINATION METER ASSEMBLY**

Slip Indicator Light Circuit

DESCRIPTION

The SLIP indicator light blinks during TRAC and VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 4**

A

BC

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SLIP INDICATOR LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the SLIP indicator light illuminates.

Skid control ECU with actuator

Item	Vehicle Condition/Test Details	Diagnostic Note
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter

NG → Go to step 4

OK

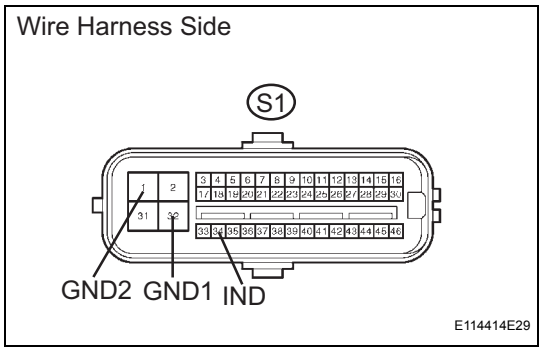
3	CHECK SLIP INDICATOR LIGHT

(a) Check that the SLIP indicator light turns on for 3 seconds soon after the ignition switch is turned ON.

OK → END

NG

4	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connector	Condition	Specified Condition
S1-34 (IND) - S1-32 (GND1) or S1-1 (GND2)	Ignition switch ON	10 to 14 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

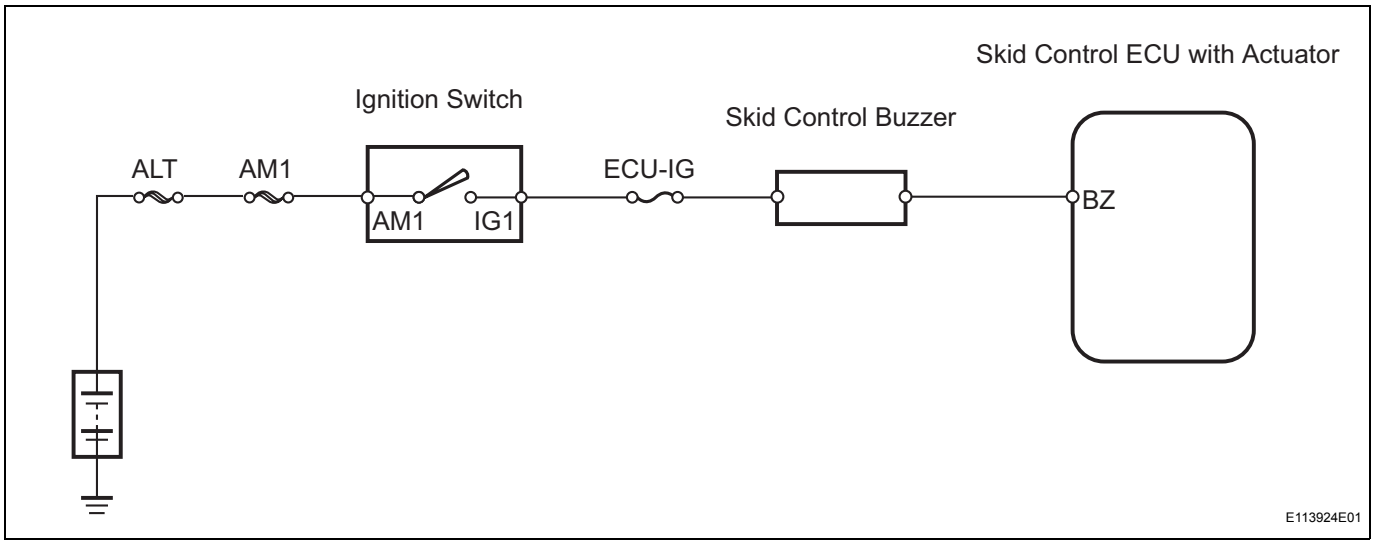
REPLACE BRAKE ACTUATOR ASSEMBLY

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds during VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 3**

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

BC

(a) Select the ACTIVE TEST, generate a control command, and then check that the skid control buzzer sounds.

Skid control ECU with actuator

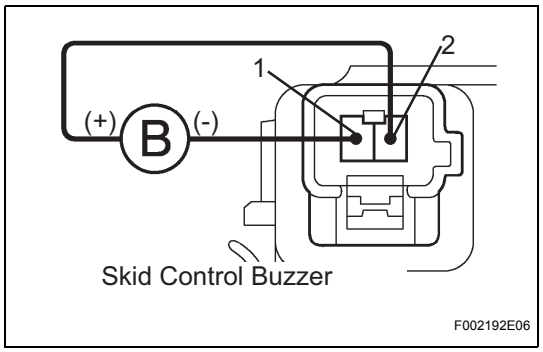
Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

OK:
Normal operation.
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 INSPECT SKID CONTROL BUZZER ASSEMBLY

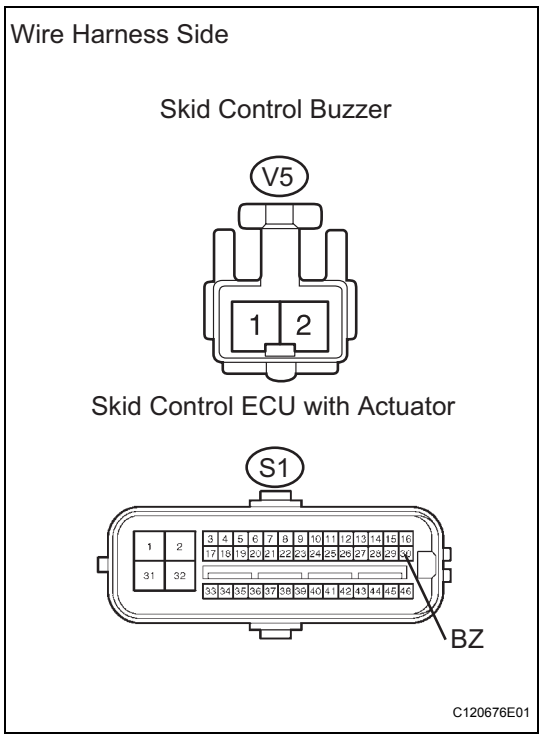


(a) Disconnect the skid control buzzer connector.
(b) Apply positive (+) battery voltage to terminals 1 and 2 of the skid control buzzer connector. Check that the buzzer sounds.
OK:
Skid control buzzer sound is heard.

NG → REPLACE SKID CONTROL BUZZER ASSEMBLY

OK

4 CHECK WIRE HARNESS (SKID CONTROL BUZZER - SKID CONTROL ECU AND BATTERY)



(a) Disconnect the V5 buzzer connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
V5-1 - S1-30 (BZ)	Below 1 Ω

(d) Measure the voltage of the wire harness side connectors.
Standard voltage

Tester Connection	Specified Condition
V5-2 - Body ground	10 to 14 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

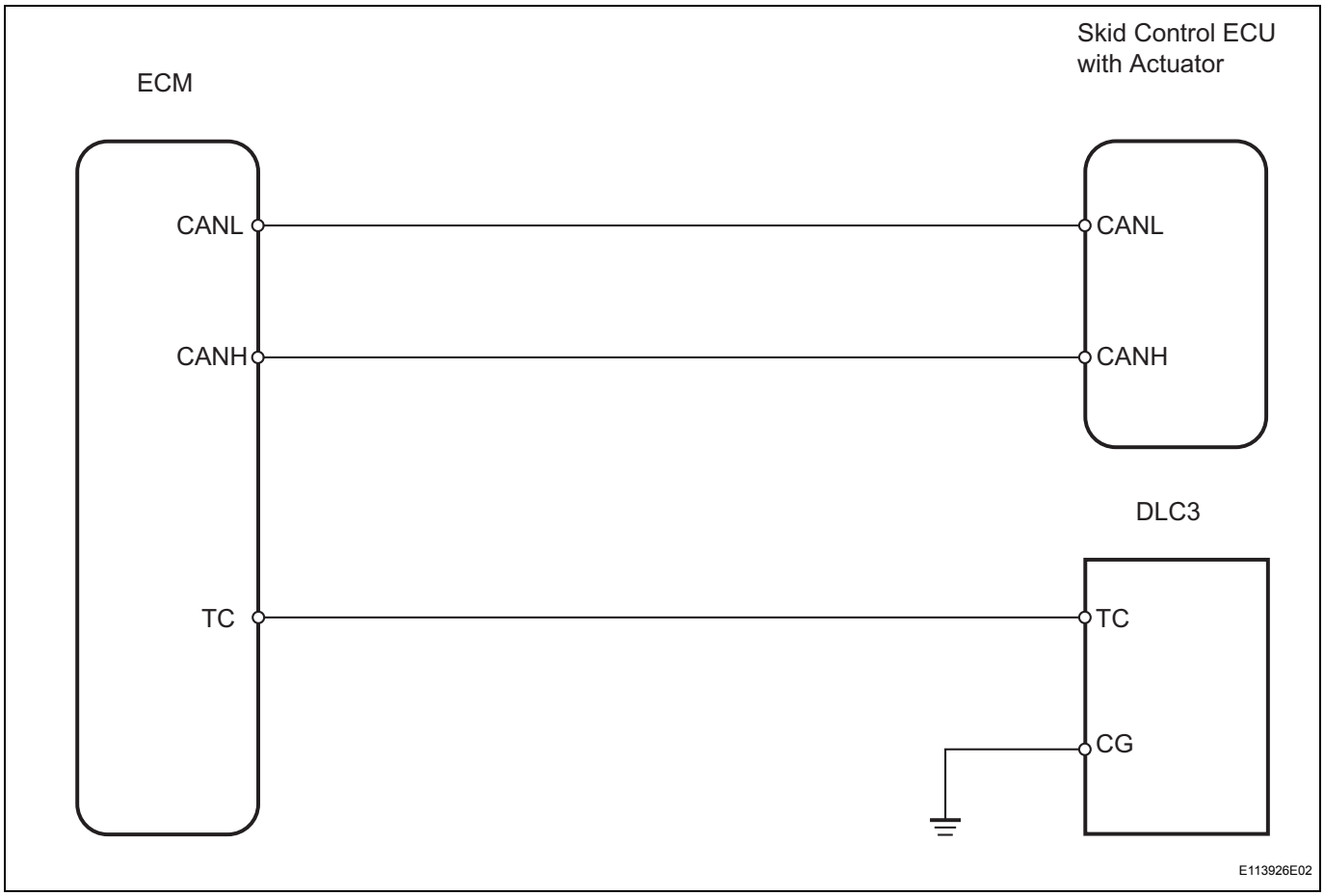
BC

TC and CG Terminal Circuit

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display DTCs by flashing the ABS warning light.

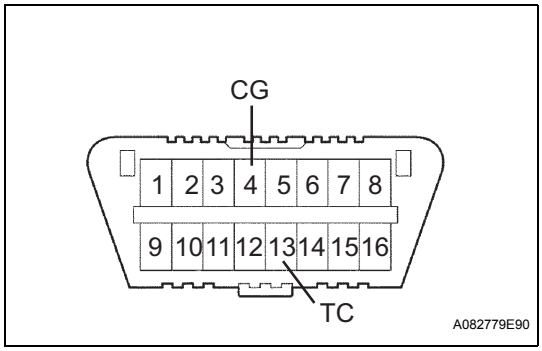
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DLC3 (TC VOLTAGE)

BC



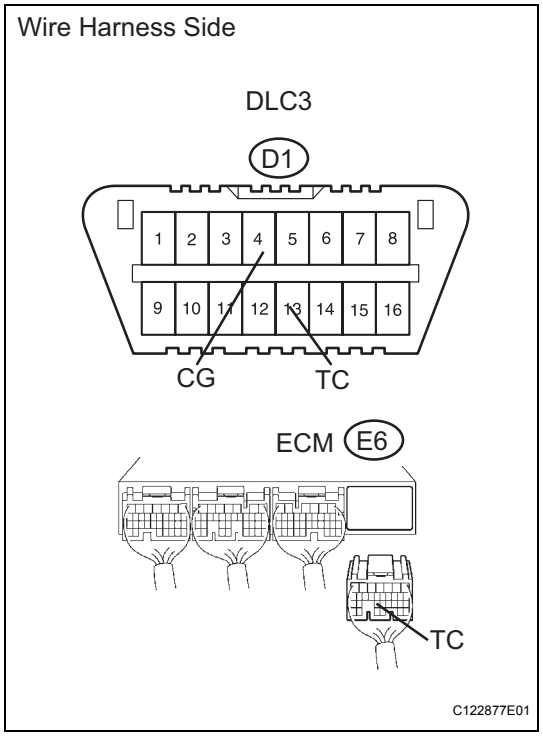
(a) Measure the voltage of the connector.
Standard voltage

Tester Connection	Condition	Specified Condition
D1-13 (TC) - D1-4 (CG)	Ignition switch ON	10 to 14 V

OK → **GO TO CAN COMMUNICATION SYSTEM**

NG

2	CHECK WIRE HARNESS (DLC3 - ECM AND BODY GROUND)



(a) Disconnect the D1 DLC3 connector.
(b) Disconnect the E6 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
D1-13 (TC) - E6-20 (TC)	Below 1 Ω
D1-4 (CG) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

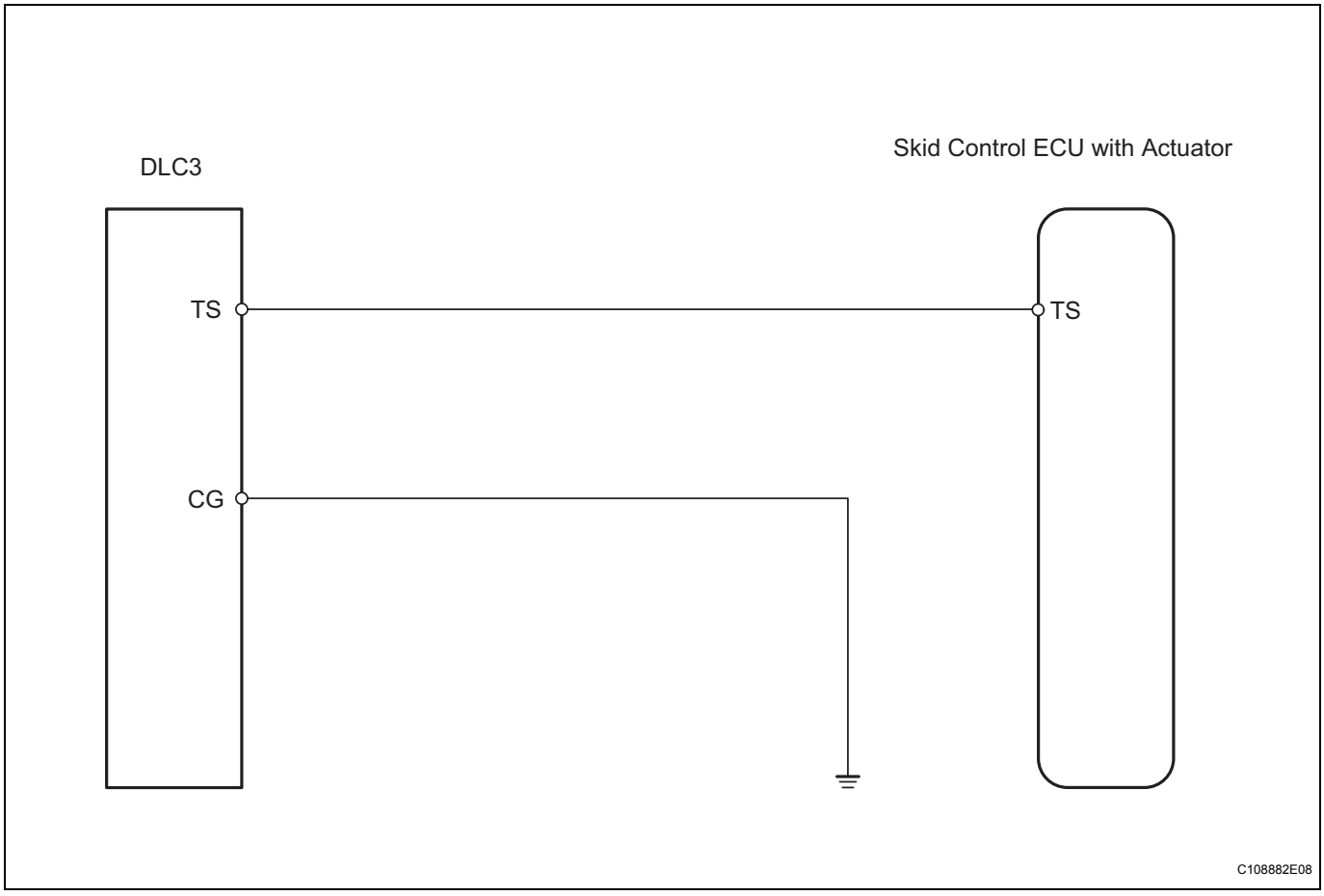
GO TO CAN COMMUNICATION SYSTEM

TS and CG Terminal Circuit

DESCRIPTION

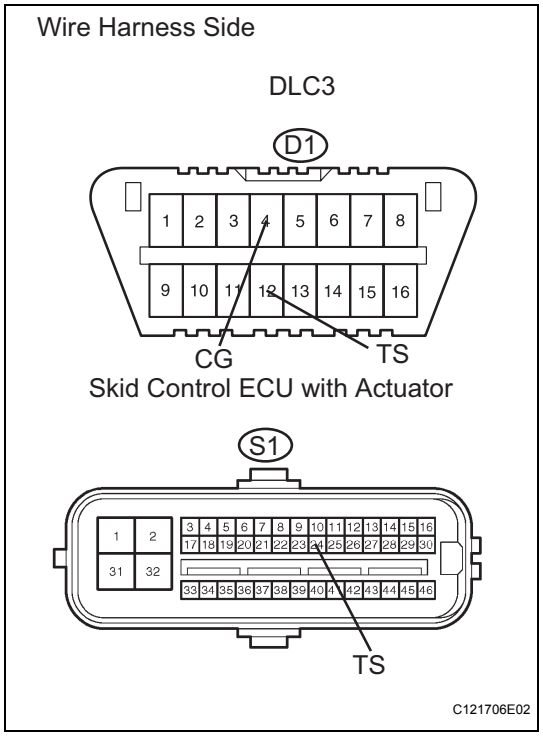
The sensor check circuit detects abnormalities in the sensor signal when they cannot be detected with the DTC check.
Connecting terminals TS and CG of the DLC3 starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (DLC3 - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the D1 DLC3 connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
D1-4 (CG) - Body ground	Below 1 Ω
D1-12 (TS) - S1-24 (TS)	

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

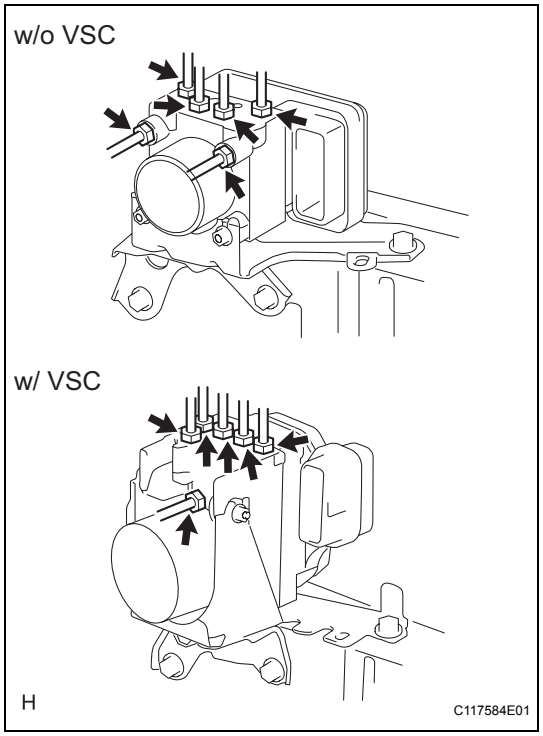
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

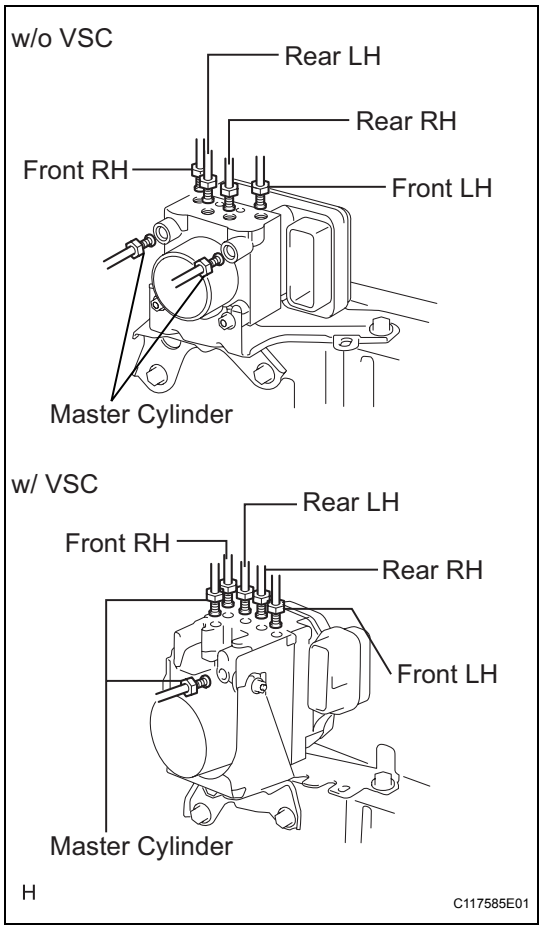
OK

REPLACE BRAKE ACTUATOR ASSEMBLY

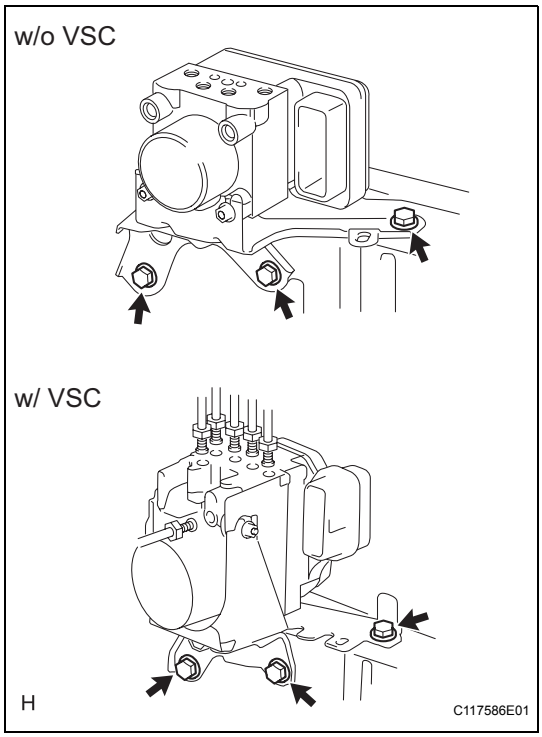
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash off brake fluid immediately if it comes in contact with any painted surface.
3. **REMOVE BRAKE ACTUATOR ASSEMBLY WITH BRACKET**
   (a) Release the latch of the actuator connector and disconnect the connector.
   (b) Using SST, disconnect the 6 brake lines from the brake actuator.
   SST 09023-00101





(c) Place tags or marks to identify the installation locations of each brake line.



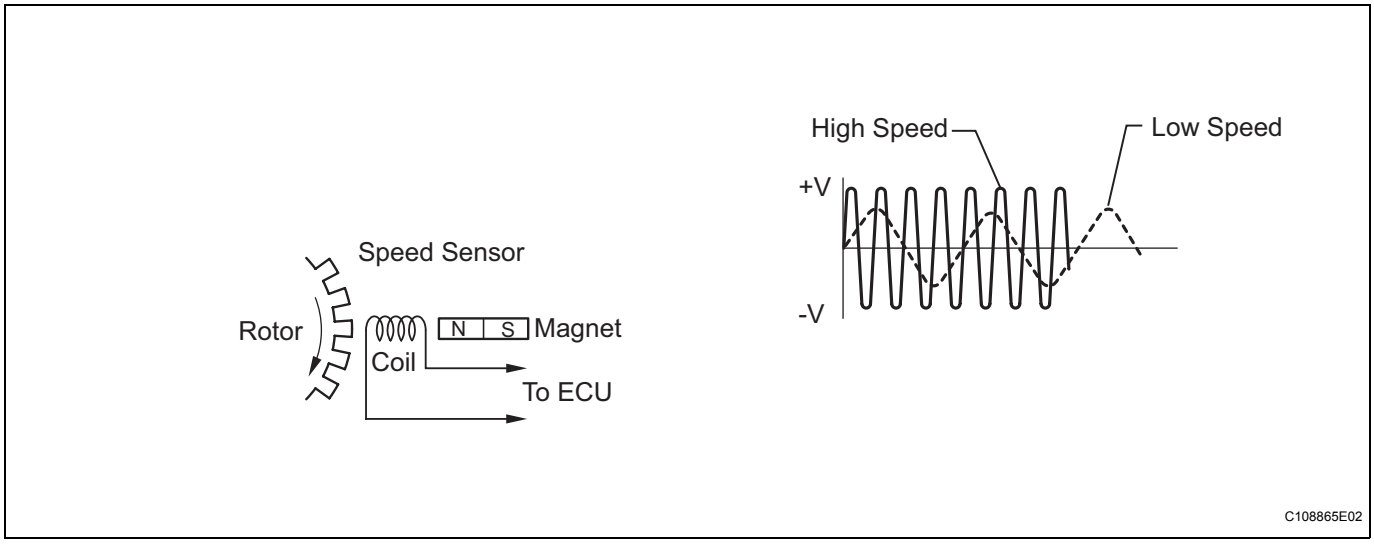
(d) Remove the 3 bolts and brake actuator with the bracket.

4. REMOVE BRAKE ACTUATOR ASSEMBLY

(a) Remove the 2 nuts and brake actuator from the bracket.

DTC	C0200/31	Right Front Wheel Speed Sensor Signal Malfunction
DTC	C0205/32	Left Front Wheel Speed Sensor Signal Malfunction
DTC	C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH
DTC	C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH
DTC	C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)
DTC	C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)

DESCRIPTION



The speed sensor detects wheel speed and transmits the appropriate signals to the ECU. These signals are used for control of the ABS.

BC

Each of the front and rear rotors have 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor produces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71, C1272/72, C1275/75 and C1276/76 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1271/71, C1272/72, C1275/75 and C1276/76 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 1 second or more • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.5 seconds or more	• Front speed sensor • Front speed sensor circuit • Speed sensor rotor
C1235/35 C1236/36	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more	• Front speed sensor • Front speed sensor circuit
C1271/71	Detected only during test mode	• Front speed sensor RH • Sensor installation • Sensor rotor
C1272/72	Detected only during test mode	• Front speed sensor LH • Sensor installation • Sensor rotor
C1275/75	Detected only during test mode	Front speed sensor rotor RH
C1276/76	Detected only during test mode	Front speed sensor rotor LH

HINT:
- DTCs C0200/31 and C1235/35 are for the front speed sensor RH.
- DTCs C0205/32 and C1236/36 are for the front speed sensor LH.

WIRING DIAGRAM

BC

INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 4

A

2 READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Check DATA LIST for proper functioning of the front speed sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → Go to step 4

OK

3 CHECK DTC OUTPUT RECUR

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

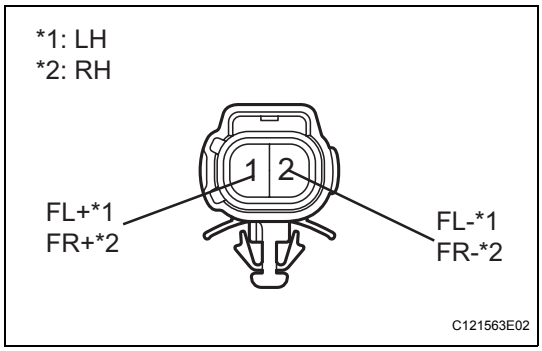
Result	Proceed to
DTC is output	A
DTC is not output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT FRONT SPEED SENSOR



(a) Disconnect the A3 and A4 sensor connectors.
(b) Measure the resistance of the speed sensors.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (FL+) - 2 (FL-)	1.4 to 1.8 kΩ at 20 °C
1 (FL+) - Body ground	10 kΩ or higher
2 (FL-) - Body ground	

RH

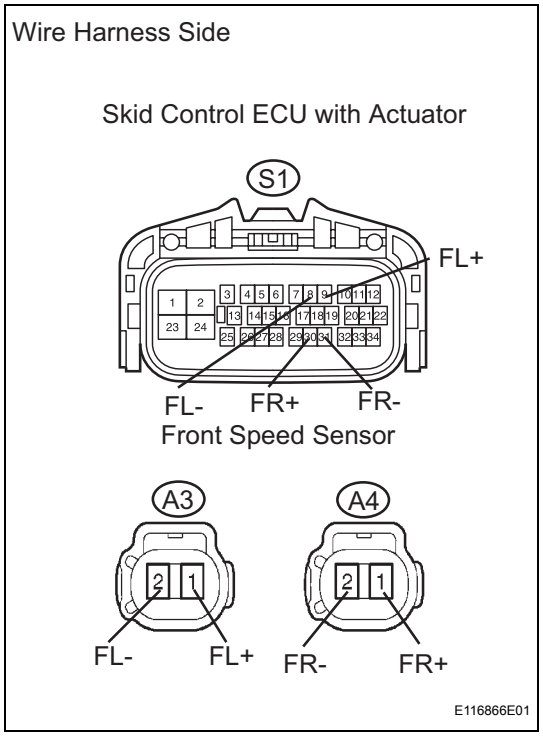
Tester Connection	Specified Condition
1 (FR+) - 2 (FR-)	1.4 to 1.8 kΩ at 20 °C
1 (FR+) - Body ground	10 kΩ or higher
2 (FR-) - Body ground	

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-5).

NG → **REPLACE FRONT SPEED SENSOR**

OK

5 CHECK WIRE HARNESS (SKID CONTROL ECU - FRONT SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A3 and A4 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance:

LH

Tester Connection	Specified Condition
S1-9 (FL+) - A3-1 (FL+)	Below 1 Ω
S1-8 (FL-) - A3-2 (FL-)	
A3-1 (FL+) - Body ground	10 kΩ or higher
A3-2 (FL-) - Body ground	

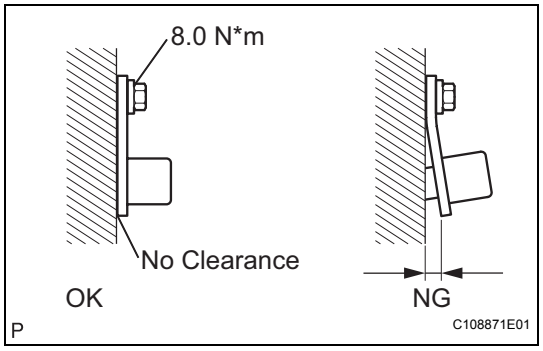
RH

Tester Connection	Specified Condition
S1-31 (FR+) - A4-1 (FR+)	Below 1 Ω
S1-30 (FR-) - A4-2 (FR-)	
A4-1 (FR+) - Body ground	10 kΩ or higher
A4-2 (FR-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 INSPECT FRONT SPEED SENSOR (INSTALLATION)



(a) Check the speed sensor installation.

OK:

The installation bolt is tightened properly.
There is no clearance between the sensor and front steering knuckle.
Torque:
8.0 N*m (82 kgf*cm, 71 in.*lbf)

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-5).

NG → **SECURELY REINSTALL FRONT SPEED SENSOR**

OK

7 INSPECT SPEED SENSOR (TIP)

(a) Remove the front speed sensor.
(b) Check the sensor tip.

OK:

No scratches or foreign matter on sensor tip.

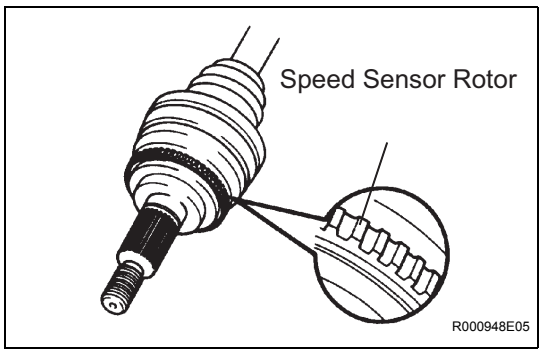
BC

HINT:
Check the speed sensor signal after cleaning or replacing the speed sensor (see page BC-5).

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

8 INSPECT SPEED SENSOR ROTOR



(a) Remove the front axle hub.
(b) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter on sensor rotor.
HINT:
- If foreign matter is attached, remove it and check the output waveform after reassembly.
- Check the speed sensor signal after cleaning or replacing the speed sensor rotor (see page BC-5).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

9 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

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

NG → **END**

A

BC **REPLACE BRAKE ACTUATOR ASSEMBLY**

INSTALLATION

1. INSTALL BRAKE ACTUATOR ASSEMBLY

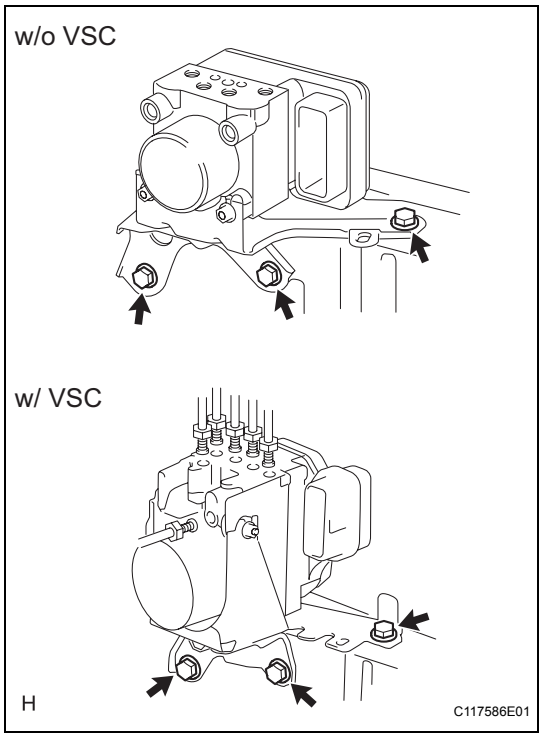
(a) Install the brake actuator to the bracket with the 2 nuts.

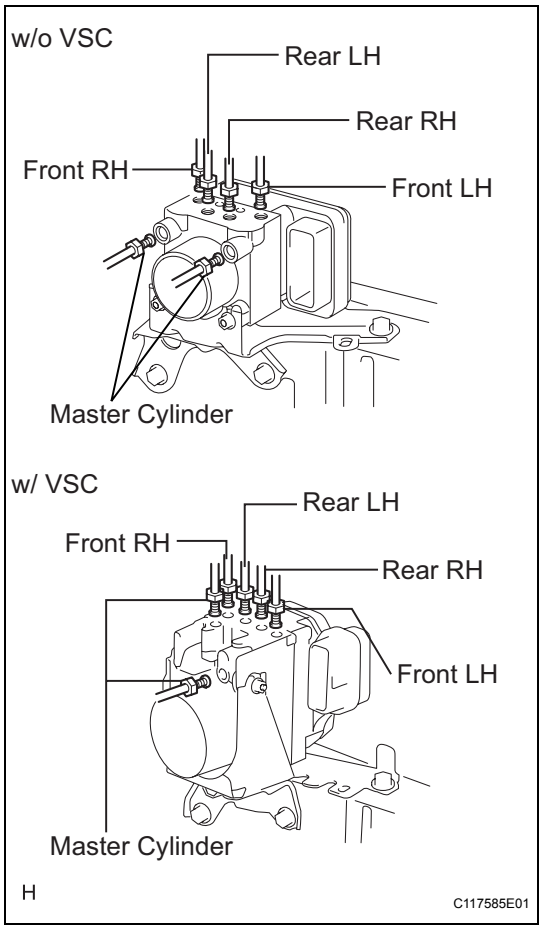
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

2. INSTALL BRAKE ACTUATOR ASSEMBLY WITH BRACKET

(a) Install the brake actuator with bracket with the 3 bolts.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)





(b) Using SST, connect the 6 brake lines to the correct positions of the brake actuator, as shown in the illustration.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf) without SST
14 N*m (143 kgf*cm, 10 ft.*lbf) with SST
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

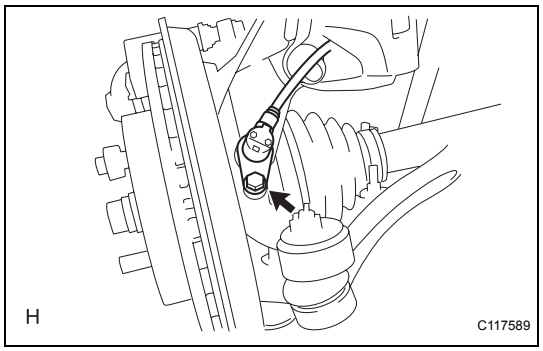
(c) Connect the brake actuator connector.

3. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-3)**
4. **BLEED AIR FROM BRAKE MASTER CYLINDER (See page BR-3)**
5. **BLEED AIR FROM BRAKE LINE (See page BR-4)**
6. **BLEED AIR FROM BRAKE ACTUATOR (w/ VSC) (See page BR-4)**
7. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-6)**
8. **CHECK FOR BRAKE FLUID LEAKAGE**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
10. **CHECK BRAKE ACTUATOR WITH INTELLIGENT TESTER**
    (a) Check the brake actuator with the intelligent tester (see page BC-162).
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

INSTALLATION

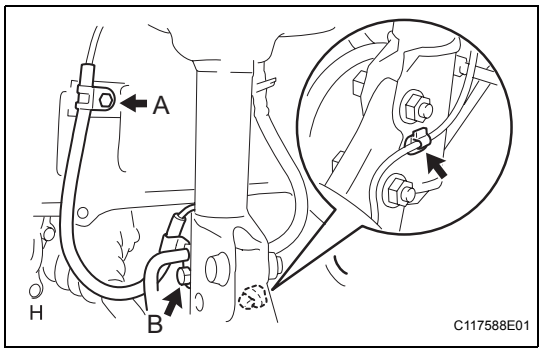
HINT:

- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.



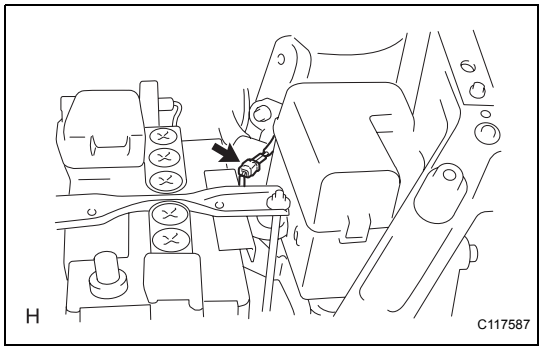
1. INSTALL FRONT SPEED SENSOR LH

(a) Install the speed sensor with the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Keep the sensor tip and sensor installation hole free from foreign matter.



(b) Install the speed sensor wire harness to the body and shock absorber with the 2 clamp bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf) for bolt A
29 N*m (300 kgf*cm, 21 ft.*lbf) for bolt B
NOTICE:
Do not twist the sensor wire when installing it.

(c) Connect the resin clip and speed sensor wire harness to the shock absorber.
NOTICE:
Do not twist the sensor wire when installing it.



(d) Connect the speed sensor connector.
NOTICE:
Do not twist the sensor wire when installing it.

2. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION

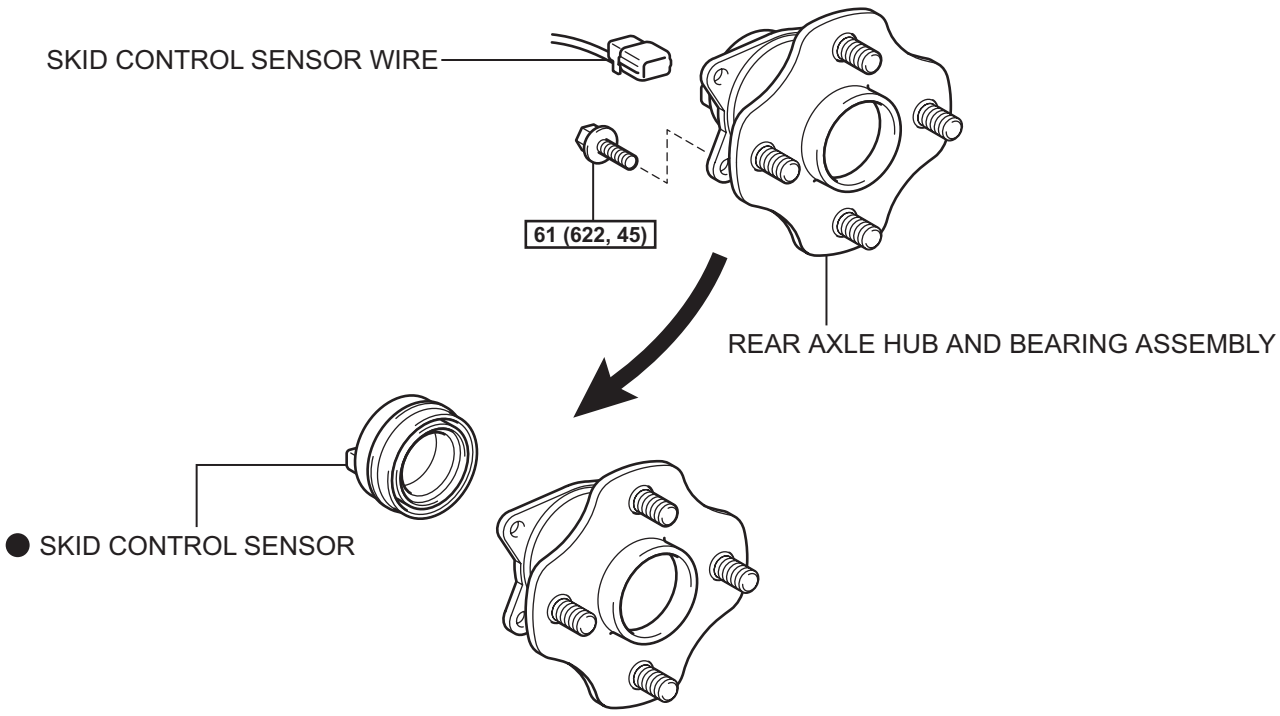
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

5. CHECK ABS SPEED SENSOR SIGNAL

(a) Check the ABS speed sensor signal (see page BC-73).

SKID CONTROL SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

H

C117774E01

REMOVAL

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

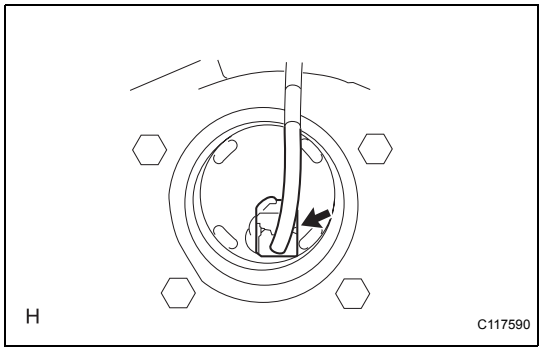
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE REAR WHEEL

3. DISCONNECT SKID CONTROL SENSOR WIRE

(a) Disconnect the connector from the skid control sensor.



4. REMOVE REAR BRAKE DRUM SUB-ASSEMBLY

(a) Put matchmarks on the rear brake drum and axle hub.

(b) Remove the rear brake drum.

5. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY

6. REMOVE SKID CONTROL SENSOR

(a) Mount the hub and bearing in a soft jaw vise.

NOTICE:
Replace the hub and bearing if it is dropped or receives a strong shock.

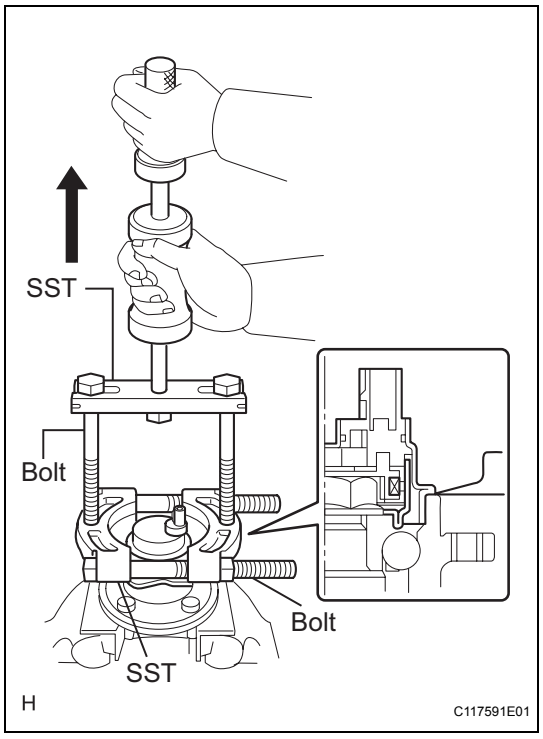
(b) Using a pin punch and hammer, drive out the 2 pins of SST, and remove the 2 attachments from SST.

SST 09520-00031

(c) Using SST and 2 bolts (Diameter: 12 mm, pitch: 1.5 mm), remove the skid control sensor from the rear axle hub.

SST 09520-00031 (09520-00040), 09521-00020, 09950-00020

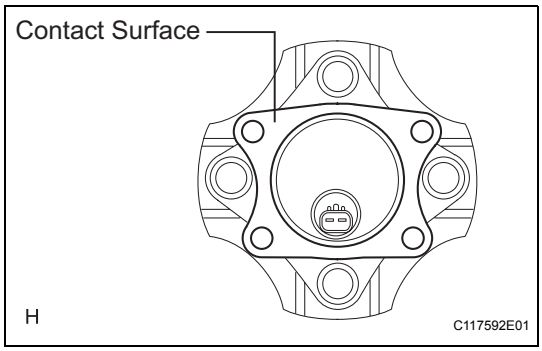
NOTICE:
- **If the sensor rotor is damaged, replace the hub and bearing.**
- **Do not scratch the contacting surface of the axle hub and speed sensor.**



BC

INSTALLATION

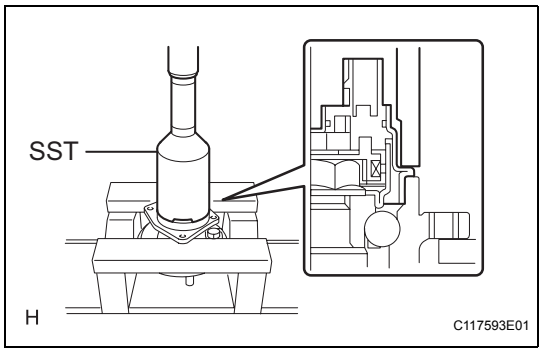
HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.



1. INSTALL SKID CONTROL SENSOR

(a) Clean the contacting surface of the rear axle hub and a new skid control sensor.
NOTICE:
Keep the sensor rotor clean.

(b) Place the skid control sensor on the rear axle hub so that the connector is as low as possible when installed to the vehicle.

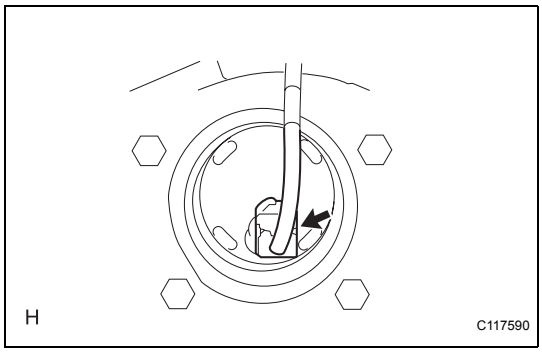


(c) Using SST and a press, install the skid control sensor on the rear axle hub.
SST 09214-76011
NOTICE:
- **Do not tap the skid control sensor directly with a hammer.**
- **Check that there is no foreign matter on the skid control sensor detection portion.**
- **Press in the skid control sensor straight and slowly.**

2. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY (See page AH-15)

3. INSPECT REAR AXLE DEVIATION AND BACKLASH (See page AH-15)

4. INSTALL REAR BRAKE DRUM SUB-ASSEMBLY



5. CONNECT SKID CONTROL SENSOR WIRE

(a) Connect the connector to the skid control sensor.

6. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

8. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

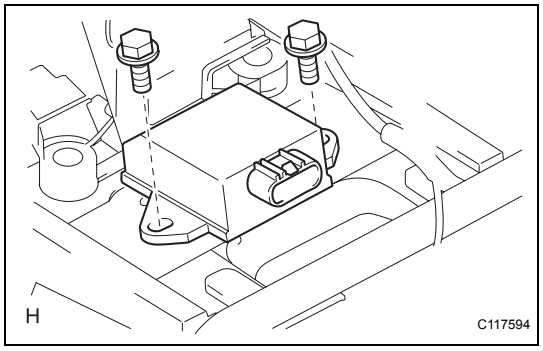
9. CHECK ABS SPEED SENSOR SIGNAL

(a) Check the ABS speed sensor signal (see page BC-73).

INSTALLATION

NOTICE:

- **Do not use the dropped or damaged yaw rate sensor.**
- **Keep the area between the yaw rate sensor bracket and body free from foreign matter.**
- **Make sure of the sensor direction.**



1. **INSTALL YAW RATE SENSOR**
   (a) Install the yaw rate sensor with the 2 bolts.
   Torque: 14 N*m (143 kgf*cm, 10 ft.*lbf)
   (b) Connect the yaw rate sensor connector.
2. **INSTALL REAR CONSOLE BOX ASSEMBLY**
   (a) Install the rear console box (see pageIP-27).
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
5. **PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION**
   (a) Perform yaw rate sensor zero point calibration (see page BC-69).
6. **CHECK VSC SENSOR SIGNAL**
   (a) Check the VSC sensor signal (see page BC-73).

DTC	C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction

DTC	C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction

DTC	C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH

DTC	C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH

DTC	C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)

DTC	C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DTC	C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)

DTC	C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DESCRIPTION

Refer to DTCs C0200/31, C0205/32, C1235/35 and C1236/36.

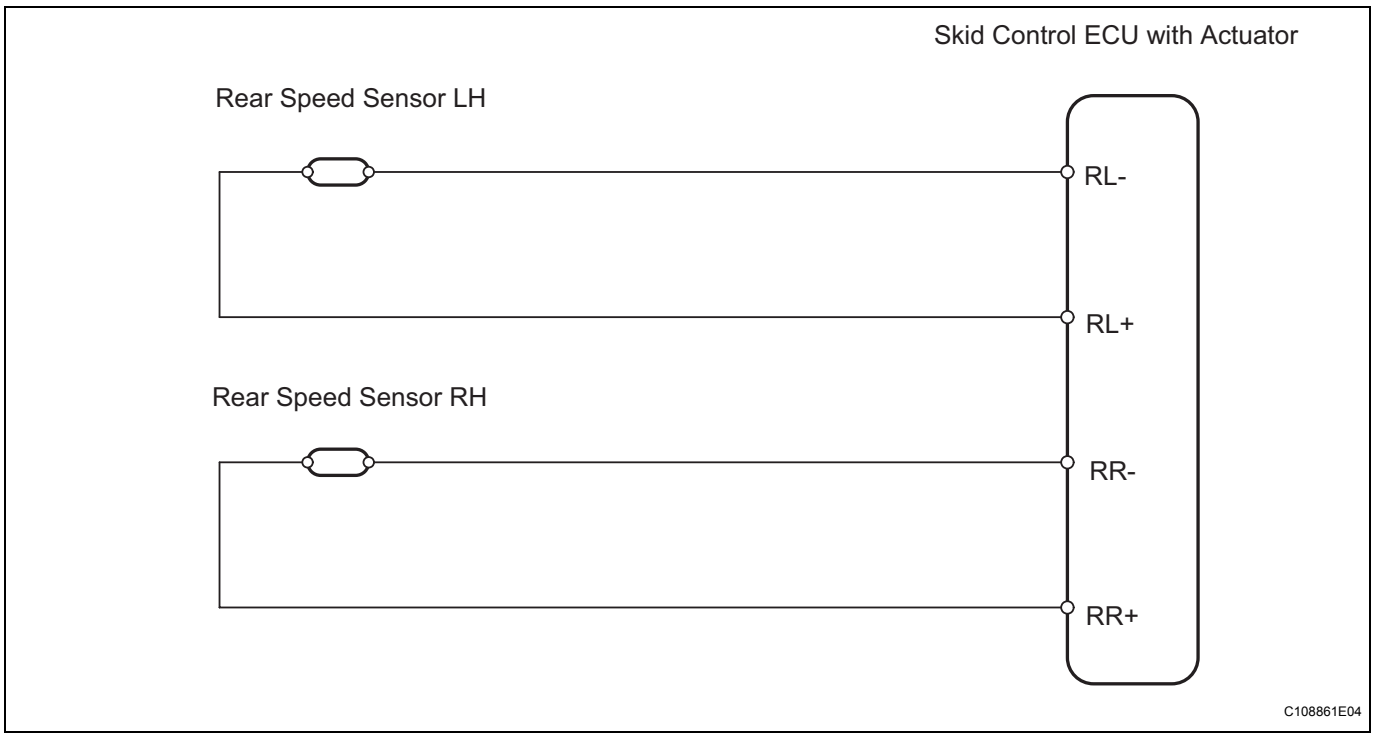
DTCs C1273/73, C1274/74, C1277/77 and C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1273/73, C1274/74, C1277/77 and C1278/78 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 15 seconds • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.2 seconds or more	• Rear speed sensor • Rear speed sensor circuit • Speed sensor rotor
C1238/38 C1239/39	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more	• Rear speed sensor • Rear speed sensor circuit
C1273/73	Detected only during test mode	• Rear speed sensor RH • Sensor installation • Sensor rotor
C1274/74	Detected only during test mode	• Rear speed sensor LH • Sensor installation • Sensor rotor

DTC No.	DTC Detection Condition	Trouble Area
C1277/77	Detected only during test mode	Rear speed sensor rotor RH
C1278/78	Detected only during test mode	Rear speed sensor rotor LH

HINT:
- DTCs C0210/33 and C1238/38 are for the rear speed sensor RH.
- DTCs C0215/34 and C1239/39 are for the rear speed sensor LH.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 4**

A

2 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Check the DATA LIST for proper functioning of the rear speed sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → **Go to step 4**

OK ↓

3 CHECK DTC OUTPUT RECUR

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

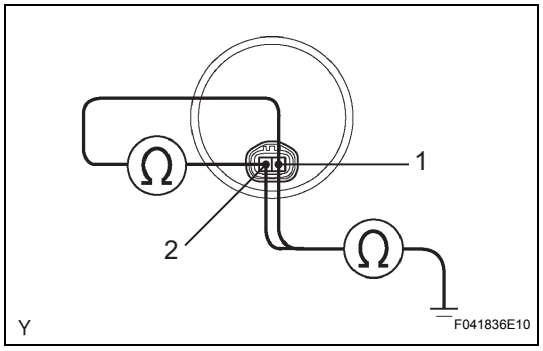
Result	Proceed to
DTC is output	A
DTC is not output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A ↓

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT REAR SPEED SENSOR



(a) Disconnect the A15 and A16 sensor connectors.
(b) Measure the resistance of the speed sensors.
Standard resistance:
LH

Tester Connection	Specified Condition
1 (RL-) - 2 (FL+)	Below 2.2 Ω
1 (RL-) - Body ground	10 kΩ or higher
2 (RL+) - Body ground	

RH

Tester Connection	Specified Condition
1 (RR-) - 2 (RR+)	Below 2.2 Ω
1 (RR-) - Body ground	10 kΩ or higher
2 (RR+) - Body ground	

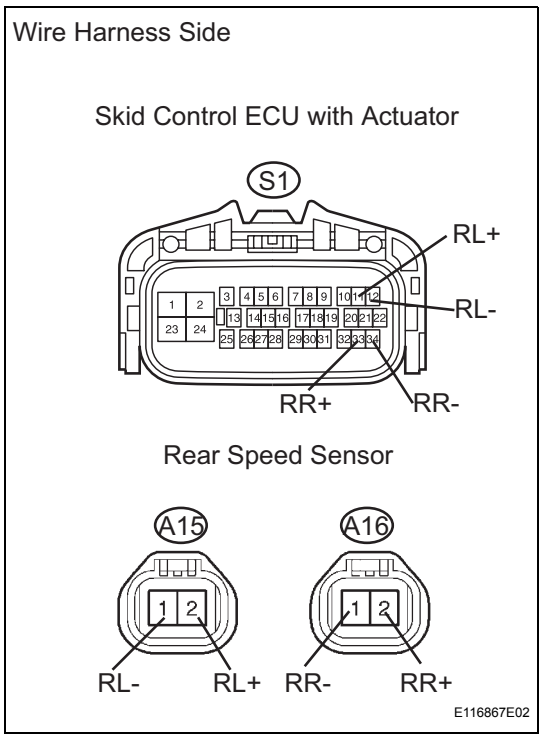
BC

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-5).

NG → REPLACE REAR SPEED SENSOR

OK

5 CHECK WIRE HARNESS (SKID CONTROL ECU - REAR SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A15 and A16 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance:

LH

Tester Connection	Specified Condition
S1-11 (RL+) - A15-2 (RL+)	Below 1 Ω
S1-12 (RL-) - A15-1 (RL-)	
A15-2 (RL+) - Body ground	10 kΩ or higher
A15-1 (RL-) - Body ground	

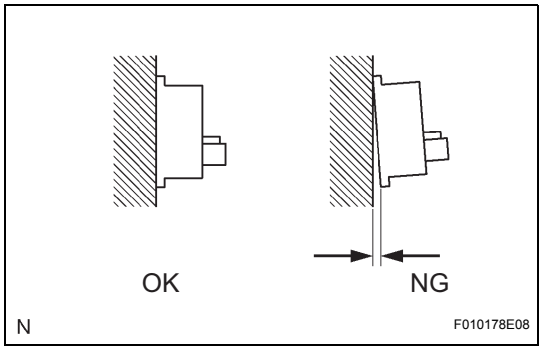
RH

Tester Connection	Specified Condition
S1-33 (RR+) - A16-2 (RR+)	Below 1 Ω
S1-34 (RR-) - A16-1 (RR-)	
A16-2 (RR+) - Body ground	10 kΩ or higher
A16-1 (RR-) - Body ground	

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 INSPECT REAR SPEED SENSOR (INSTALLATION)



(a) Check the sensor installation.

OK:

There is no clearance between the sensor and rear axle carrier.

HINT:
Check the speed sensor signal after replacement (see page BC-5).

NG → REPLACE REAR SPEED SENSOR

OK

7 INSPECT SPEED SENSOR (TIP)

(a) Remove the rear speed sensor.

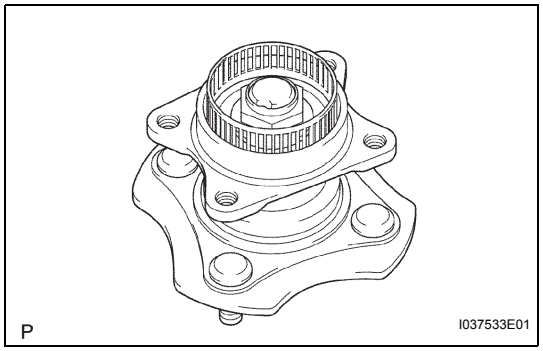
BC

(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
HINT:
Check the speed sensor signal after replacement (see page BC-5).

NG → **REPLACE REAR SPEED SENSOR**

OK

8 INSPECT REAR AXLE HUB AND BEARING ASSEMBLY



(a) Remove the axle hub and disconnect the rear speed sensor.
(b) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter.
Do not reuse skid control sensor.
HINT:
Check the speed sensor signal after replacement (see page BC-5).

NG → **REPLACE REAR AXLE HUB & BEARING ASSEMBLY**

OK

9 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

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

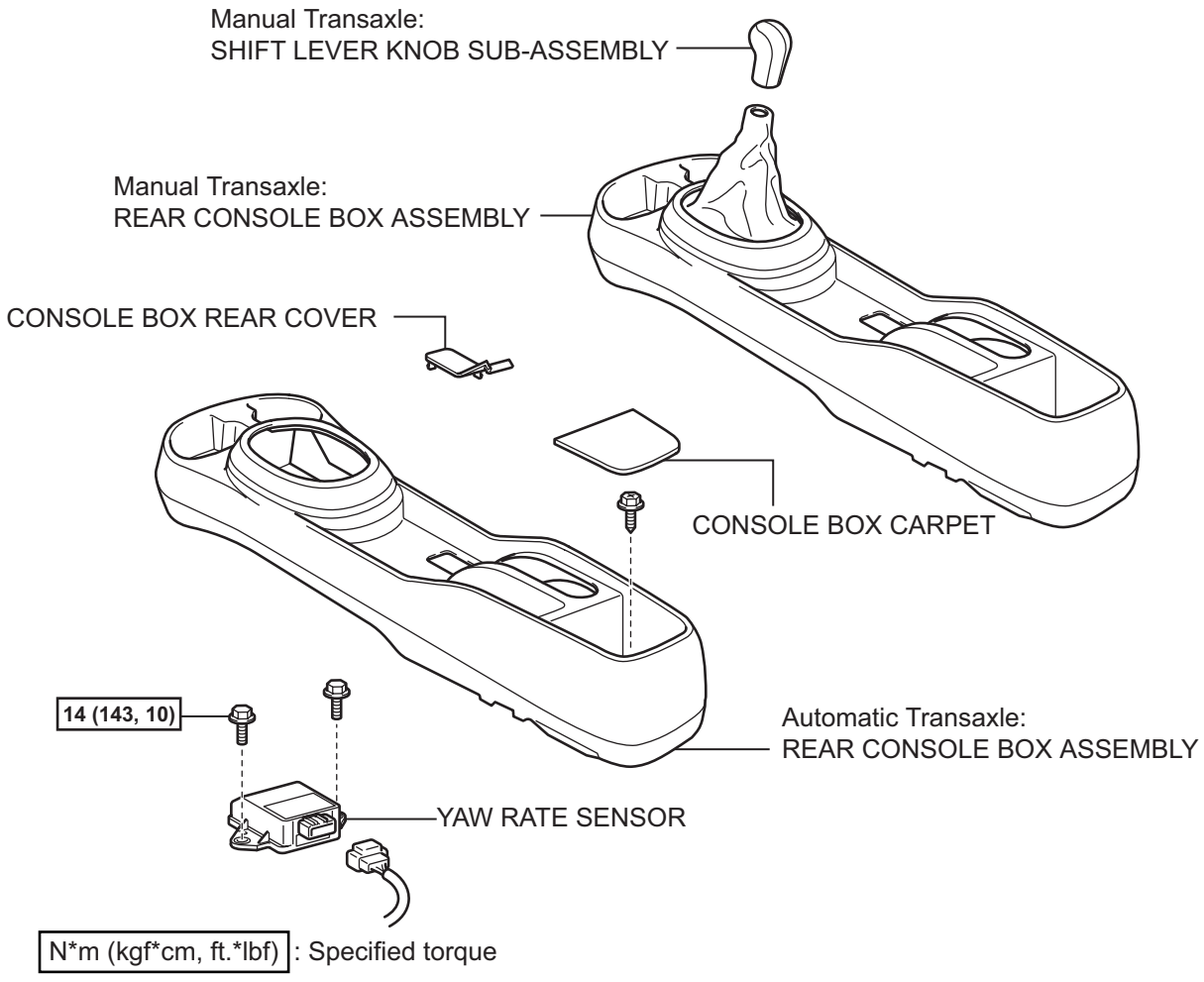
B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

YAW RATE AND ACCELERATION SENSOR (w/ VSC)

COMPONENTS



BC

REMOVAL

NOTICE:

- **Do not use the dropped or damaged yaw rate sensor.**
- **Keep the area between the yaw rate sensor bracket and body free from foreign matter.**
- **Make sure of the sensor direction.**

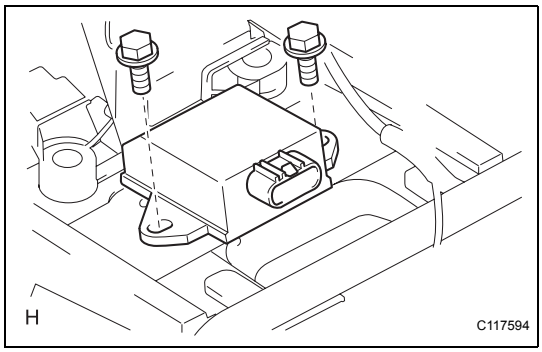
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE REAR CONSOLE BOX ASSEMBLY

(a) Remove the rear console box (see page IP-26).



3. REMOVE YAW RATE SENSOR

(a) Disconnect the yaw rate sensor connector.

(b) Remove the 2 bolts and yaw rate sensor.

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

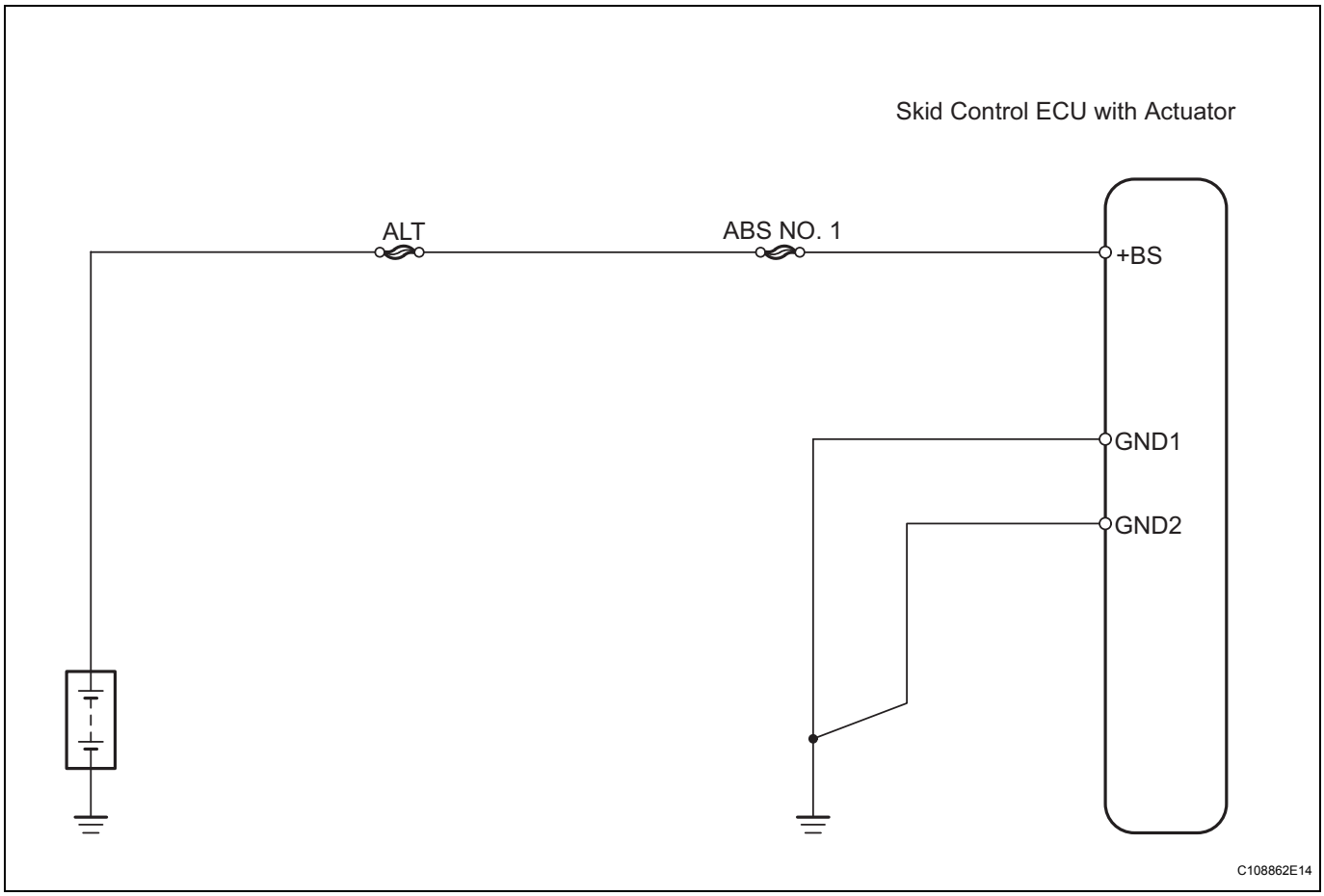
DTC	C0256/24	SRL Solenoid Circuit

DESCRIPTION

ABS solenoids turn on when receiving signals from the ECU. They control braking force by adjusting the pressure applied to the wheel cylinders.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	When either condition below is met: 1. With IG1 terminal voltage at 10 to 16 V, solenoid circuit is open or short for 0.05 seconds or longer 2. With IG1 terminal voltage at 10 to 16 V, ABS control solenoid relay contact is OFF for 0.05 seconds or longer	• Each solenoid circuit • Skid control ECU with actuator

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the solenoid circuit is built into the brake actuator assembly, solenoid circuit inspection and solenoid unit inspection cannot be performed.
Be sure to check if a DTC is output before replacing the brake actuator assembly.

(a) Clear the DTCs (see page BC-8).
(b) Turn the ignition switch ON and check that the ABS warning light illuminates for approximately 3 seconds.
(c) Check for DTCs (see page BC-8).

Result

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

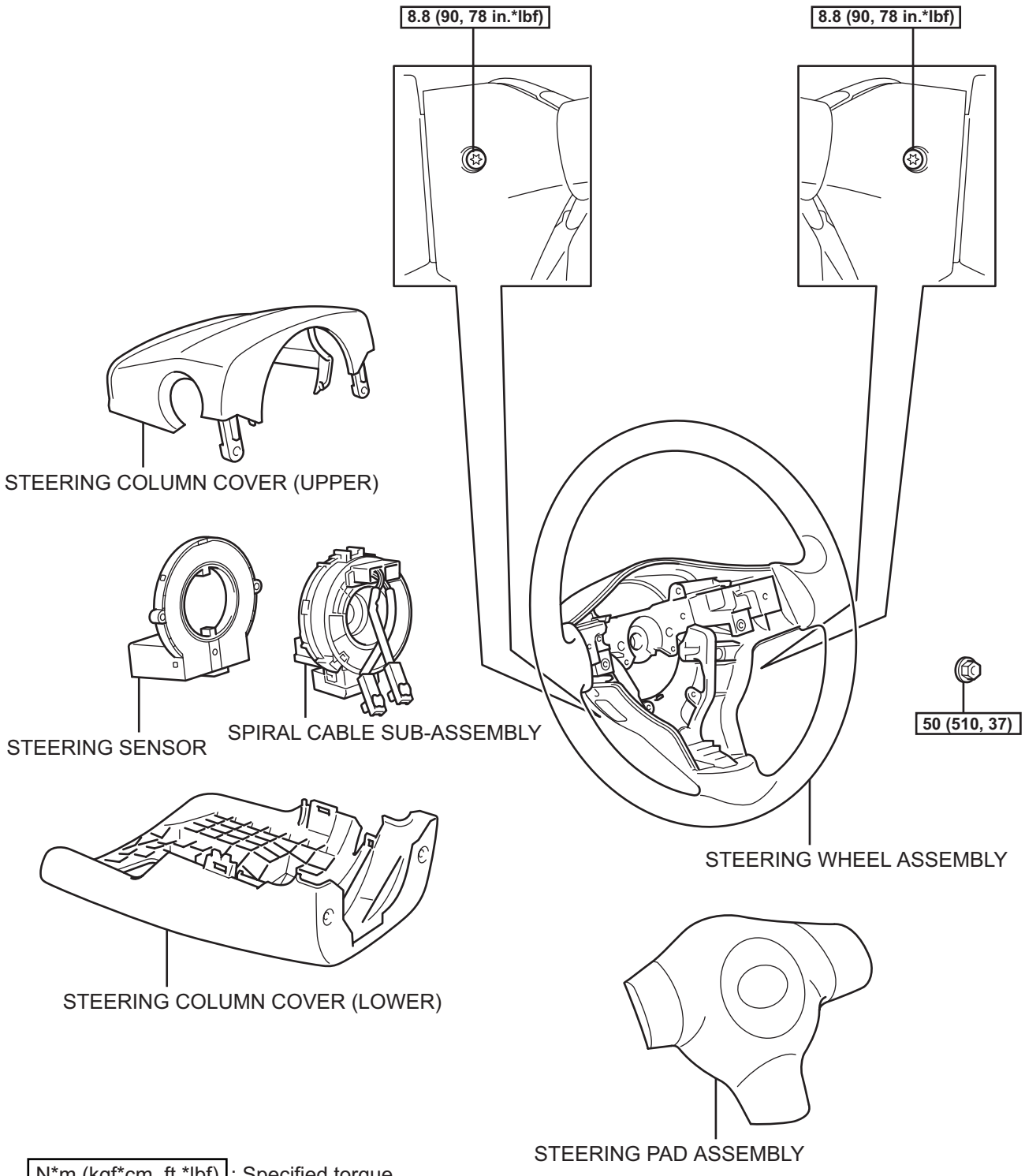
B → REPLACE BRAKE ACTUATOR ASSEMBLY

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

STEERING ANGLE SENSOR (w/ VSC)

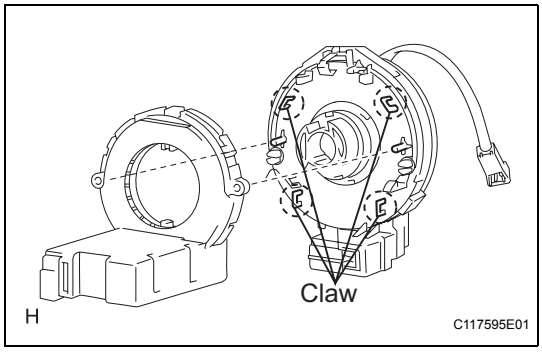
COMPONENTS



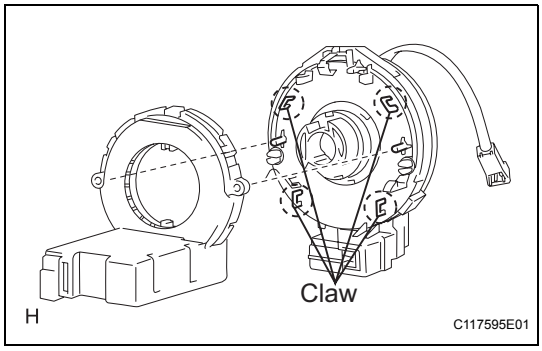
BC

REMOVAL

1. **PRECAUTION**
   (a) Follow the PRECAUTION (see page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE STEERING PAD ASSEMBLY**
5. **REMOVE STEERING WHEEL ASSEMBLY**
6. **REMOVE STEERING COLUMN COVER**
7. **REMOVE SPIRAL CABLE SUB-ASSEMBLY**
8. **REMOVE STEERING SENSOR**
   (a) Release the 4 claw fittings and remove the steering sensor from the spiral cable.



INSTALLATION



1. **INSTALL STEERING SENSOR**
   (a) Install the steering sensor to the spiral cable.
   NOTICE:
   - **Install the claw securely.**
   - **Do not damage the claw fittings.**
2. **ADJUST FRONT WHEEL TO CENTER**
3. **ADJUST SPIRAL CABLE SUB-ASSEMBLY**
4. **INSTALL STEERING COLUMN COVER**
5. **INSTALL STEERING WHEEL ASSEMBLY**
6. **INSPECT STEERING WHEEL CENTER POINT**
7. **INSTALL STEERING PAD ASSEMBLY**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **INSPECT STEERING PAD ASSEMBLY**
10. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

11. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

12. PERFORM VSC SYSTEM CALIBRATION

(a) Perform VSC system calibration (see page BC-69).

13. CHECK ABS WARNING LIGHT

(a) Check the ABS warning light (see page).

14. CHECK VSC WARNING LIGHT

(a) Check the VSC warning light (see page BC-73).

DTC	C0273/13	Open in ABS Motor Relay Circuit

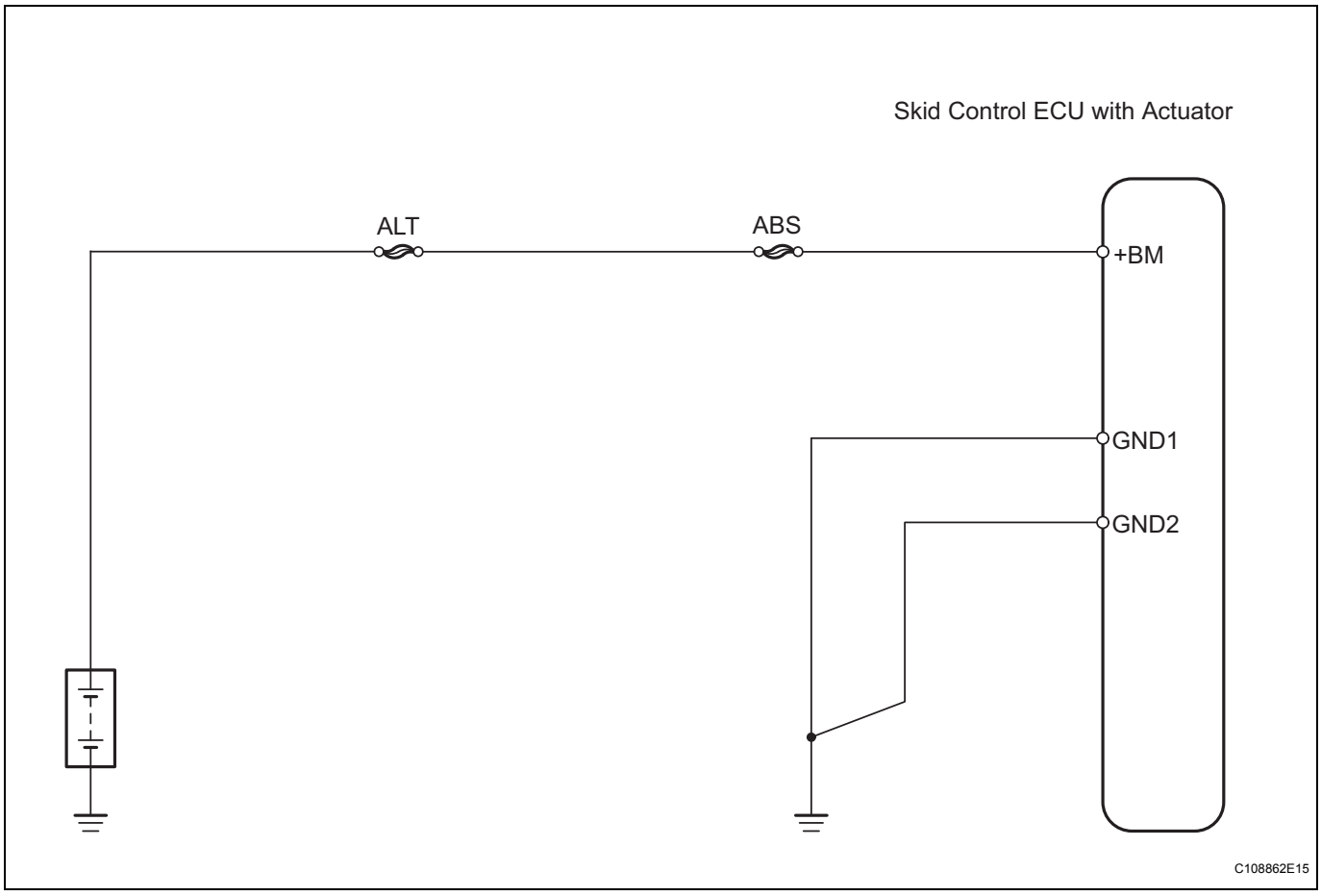
DTC	C0274/14	Short to B+ in ABS Motor Relay Circuit

DESCRIPTION

The ABS MTR relay supplies power to the ABS pump motor. While the ABS is activated, the ECU turns the ABS MTR relay ON and operates the ABS pump motor.

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	With IG1 voltage 10 V or below during initial check or ABS control, pump motor relay is turned on, and relay contact is not on for 0.2 seconds or longer	• ABS motor relay • ABS motor relay circuit
C0274/14	When pump motor relay is turned off, relay contact is on for 3 seconds or longer	• ABS motor relay • ABS motor relay circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

BC

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS motor relay operates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard

OK:
Operation sound of motor can be heard.

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

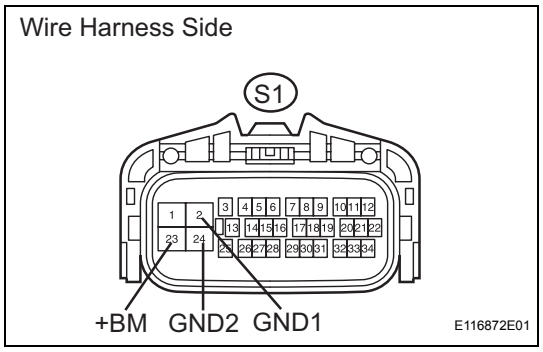
3 INSPECT FUSE (ABS)

(a) Remove the ABS H-fuse from the fusible link block.
(b) Measure the resistance of the H-fuse.
Standard resistance:
Below 1 Ω

NG → REPLACE FUSE

OK

4 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connectors.
Standard voltage

Tester Connection	Specified Condition
S1-23 (+BM) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

BC

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 RECONFIRM DTC

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at a speed of 4 mph (6 km/h) or more.
(c) Check for DTCs (see page BC-8).

Result

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

HINT:
- The skid control ECU inspects the motor relay circuit when the stop light switch is turned off and the vehicle is running at a speed of 4 mph (6 km/h) or more.
- These DTCs may be memorized due to a malfunction in the connector terminal condition, etc.

B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0278/11	Open in ABS Solenoid Relay Circuit

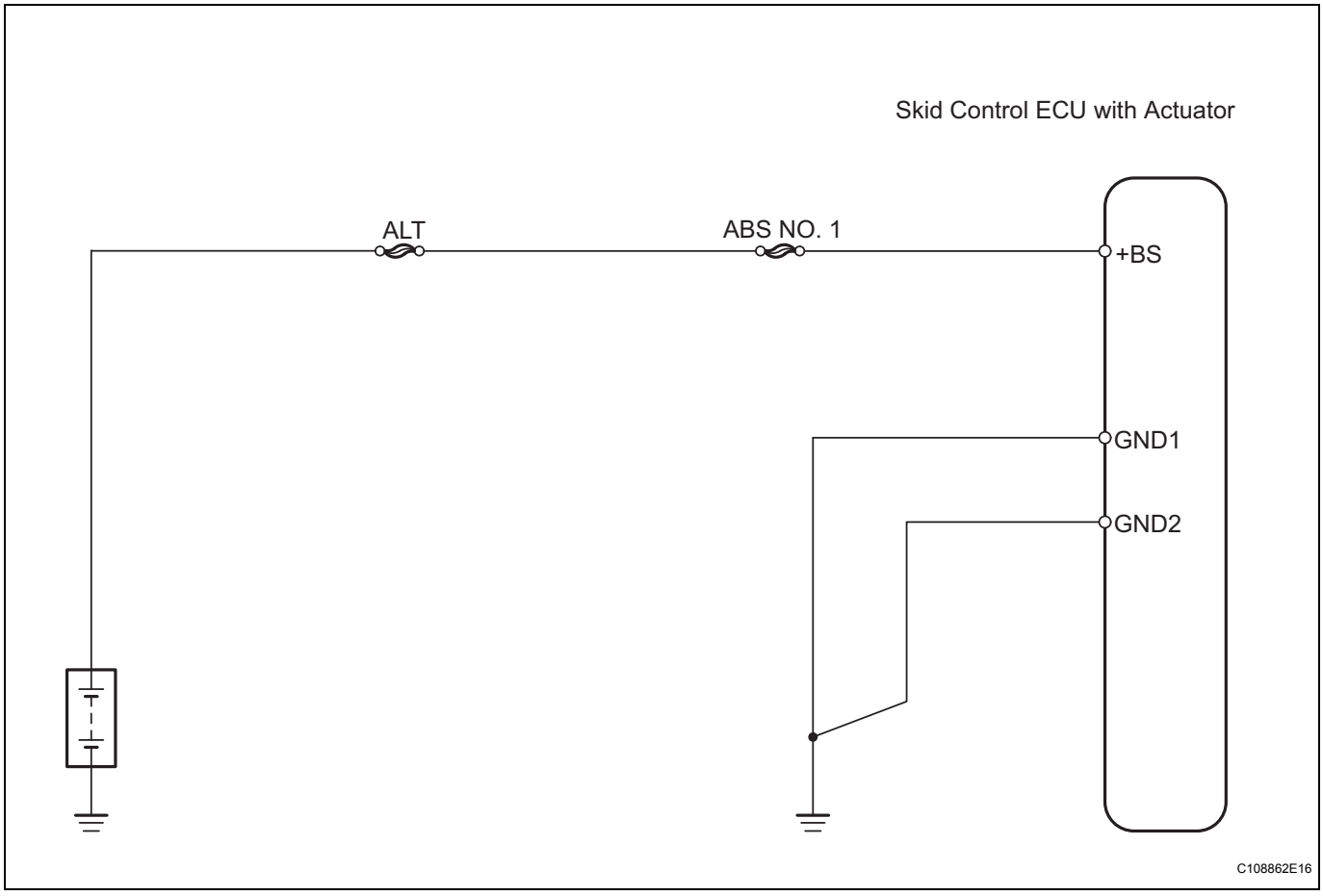
DTC	C0279/12	Short to B+ in ABS Solenoid Relay Circuit

DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the ABS initial check completes, the skid control ECU turns the ABS solenoid relay on.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When solenoid relay is turned on, relay contact is off for 0.2 seconds or longer	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU with actuator
C0279/12	Immediately after IG1 is turned on, when solenoid relay is turned off, relay contact is on for 0.2 seconds or longer	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU with actuator

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (ALT, ABS NO. 1)

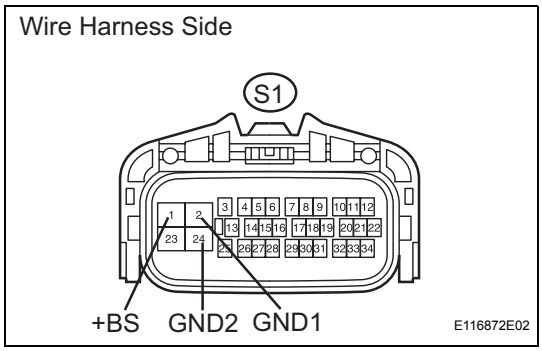
(a) Remove the ALT and ABS NO. 1 H-fuses from the engine room junction block.
(b) Measure the resistance of the H-fuses.

Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S1-1 (+BS) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the ABS motor relay is built into the brake actuator assembly, ABS motor relay and solenoid unit inspection cannot be performed.
Be sure to check if a DTC is output before replacing the brake actuator assembly.
(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at 6 km/h (4 mph) or more.
(c) Check for DTCs (see page BC-8).
Result

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

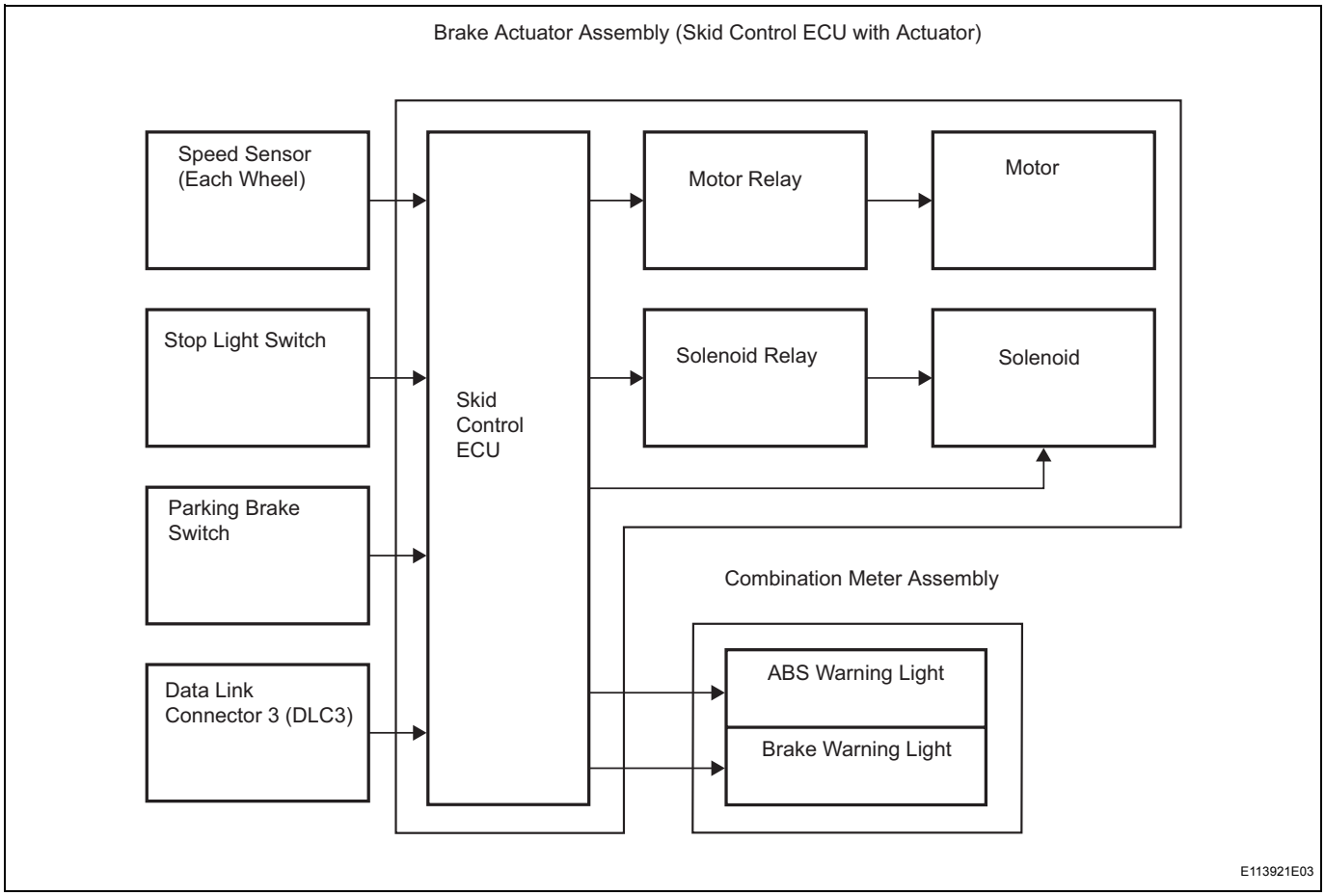
B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

The skid control ECU has a built-in brake actuator.

(a) The ABS helps to prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

2. ABS OPERATION

(a) Using each wheel's speed sensor signal, the skid control ECU calculates wheel speed and deceleration to check each wheel's slipping condition. Depending on the slipping condition, the ECU will control the pressure holding valve and pressure reduction valve to adjust the fluid pressure of each wheel cylinder.

3. FAIL-SAFE FUNCTION

(a) When a failure occurs in the ABS, the ABS warning light illuminates and ABS operation is prohibited.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
- Use these procedures to troubleshoot the anti-lock brake system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3 CHECK AND CLEAR DTC*

NEXT

4 PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → Go to step 6

A

5 SYMPTOM SIMULATION

NEXT

6 CHECK FOR DTC*

Result

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

B → Go to step 9

A

7 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 9

A

8 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (see page BC-7)
(b) DATA LIST / ACTIVE TEST (see page BC-11)

NEXT

9 CHECK FOR FLUID LEAKAGE

NEXT

10 REPAIR OR REPLACE

NEXT

11 CONFIRMATION TEST

NEXT

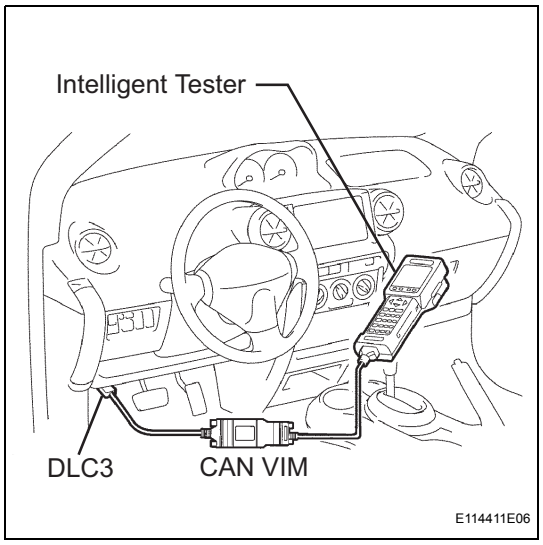
BC

END

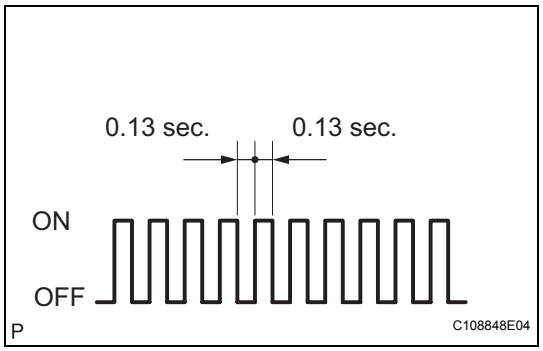
OPERATION CHECK

1. CHECK SENSOR SIGNAL BY TEST MODE (WHEN USING INTELLIGENT TESTER)

HINT:
If the ignition switch is turned from ON to ACC or OFF during test mode, the DTCs will be erased.



(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Check that the shift lever is on P.
(3) Connect the intelligent tester (with CAN VIM) to the DLC3.
(4) Turn the ignition switch ON.
(5) Select the test mode using the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.



(6) Check that the ABS warning light blinks.
HINT:
If the ABS warning light does not blink, check the ABS warning light circuit.

Trouble area	See procedure
ABS warning light circuit	BC-43

(b) Check the speed sensor.
(1) Drive the vehicle straight forward at the following speeds. Then check that the ABS warning light is as follows.

Vehicle Speed	Check	ABS Warning Light
45 km/h (28 mph) or higher	Deviations of sensor signal	Turns off

HINT:
The sensor signal check may not be completed if the vehicle's wheels slip or the steering wheel is turned during this check.
(2) Stop the vehicle.

(c) Read the DTC by following the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

BC

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the skid control ECU with actuator or sensor, turn the ignition switch OFF.

Anti-lock brake system

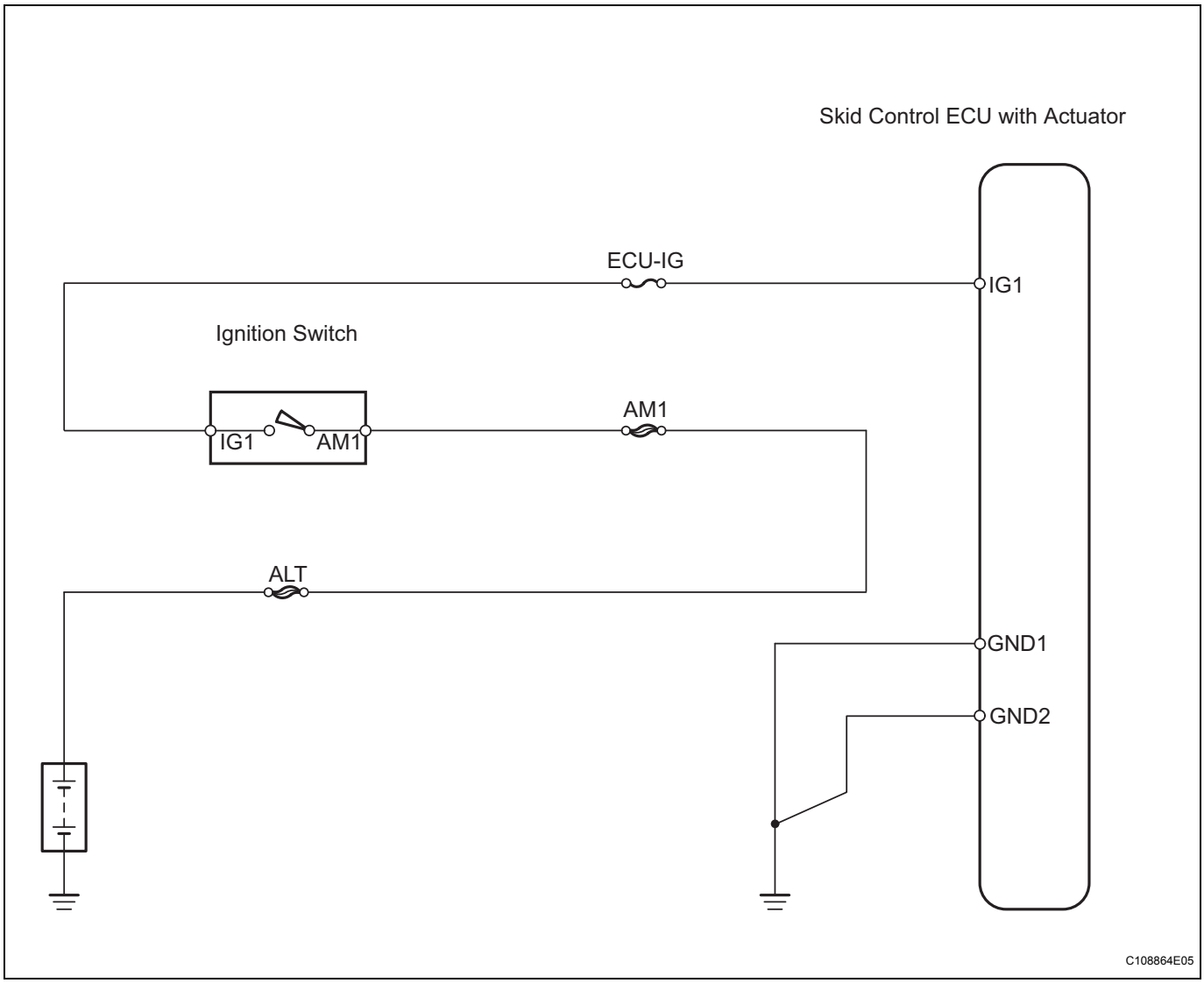
Symptom	Suspected area	See page
ABS does not operate	1. Check DTC and confirm that normal code is output	BC-8
	2. IG power source circuit	BC-34
	3. Front speed sensor circuit	BC-16
	4. Rear speed sensor circuit	BC-22
	5. Check skid control ECU with actuator with intelligent tester. If abnormal, check hydraulic circuit for leakage.	-
ABS does not operate efficiently	1. Check DTC and confirm that normal code is output	BC-8
	2. Front speed sensor circuit	BC-16
	3. Rear speed sensor circuit	BC-22
	4. Stop light switch circuit	BC-37
	5. Check skid control ECU with actuator with intelligent tester. If abnormal, check hydraulic circuit for leakage.	-
ABS warning light abnormality	1.ABS warning light circuit	BC-43
	2. Skid control ECU with actuator	-
DTC check cannot be done	1.ABS warning light circuit	BC-43
	2. TC and CG terminal circuit	BC-57
Speed sensor signal check cannot be done	1. Skid control ECU with actuator	-

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When either of following is detected: 1. Both conditions continue for at least 10 seconds • Vehicle speed is more than 3 km/h (2 mph) • IG1 terminal voltage is less than 9.5 V 2. All conditions continue for at least 0.2 seconds • Solenoid relay remains ON • Relay contact is open • IG1 terminal voltage is less than 9.5 V	• Battery • Charging system • Power source circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

1	INSPECT FUSE (ECU-IG)

(a) Remove the ECU-IG fuse from the instrument panel junction block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω
Result

Result	Proceed to
OK (when using intelligent tester)	A
OK (when not using intelligent tester)	B
NG	C

B → **Go to step 3**

C → **REPLACE FUSE**

A

2	READ INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG power voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 10 to 14 V TOO LOW: Below 10 V	-

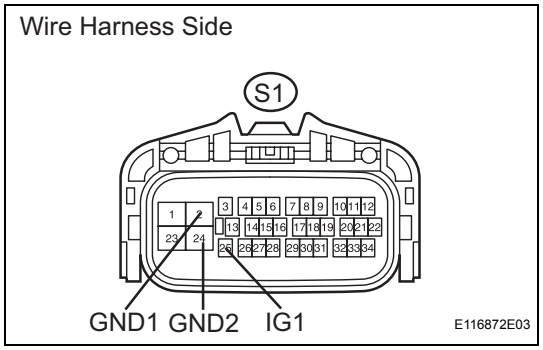
Result

Result	Proceed to
Display is not NORMAL	A
Display is NORMAL	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-25 (IG1) - Body ground	Ignition switch ON	10 to 14 V

Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

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

B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

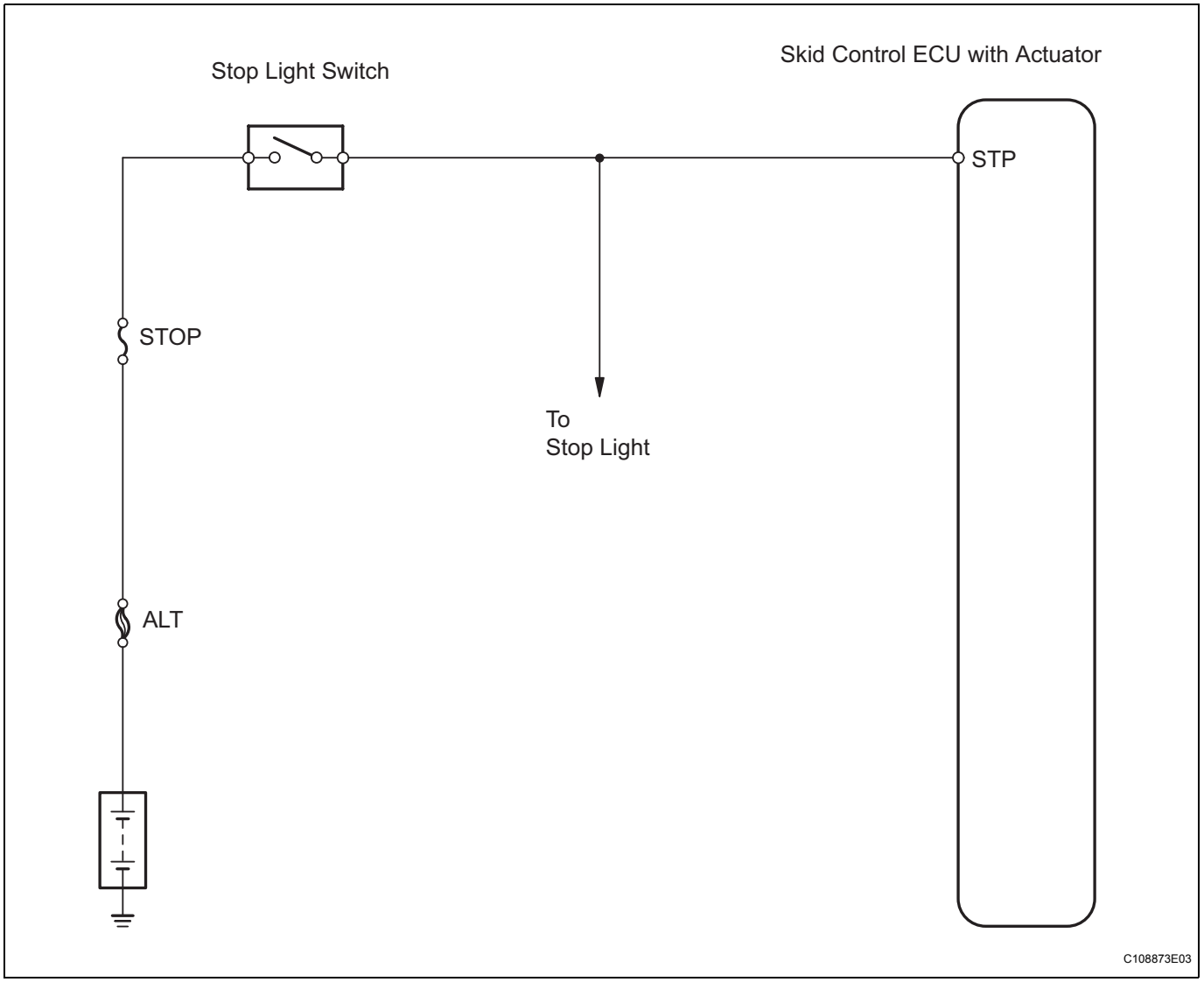
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.

DTC No.1	DTC Detection Condition	Trouble Area
C1249/49	Both conditions continue for at least 1.0 seconds: • IG1 terminal voltage is between 10 and 16 V • Open in stop light switch circuit	• Stop light switch assembly • Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK STOP LIGHT SWITCH (OPERATION)

(a) Check that the stop light illuminates when the brake pedal is depressed, and turns off when the brake pedal is released.

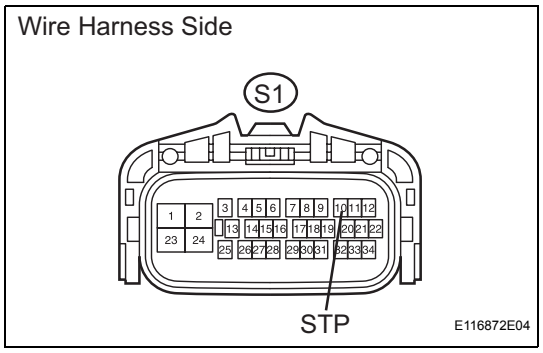
OK

Condition	Stop Light Condition
Brake pedal depressed	Illuminates
Brake pedal released	Turns off

NG → **Go to step 4**

OK ↓

2	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connectors.

Standard voltage

Tester Connection	Switch Condition	Specified Condition
S1-10 (STP) - Body ground	Brake pedal depressed	10 to 14 V
	Brae pedal released	Below 1 V

NG → **Go to step 5**

OK ↓

3	CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see pae BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).

Result

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

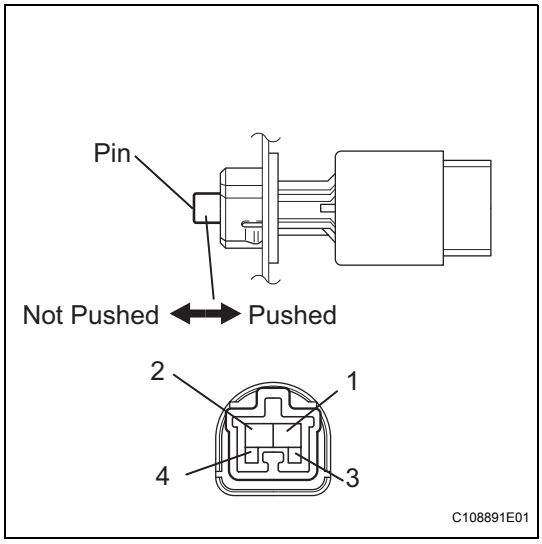
B → **END**

A ↓

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

4 INSPECT STOP LIGHT SWITCH ASSEMBLY



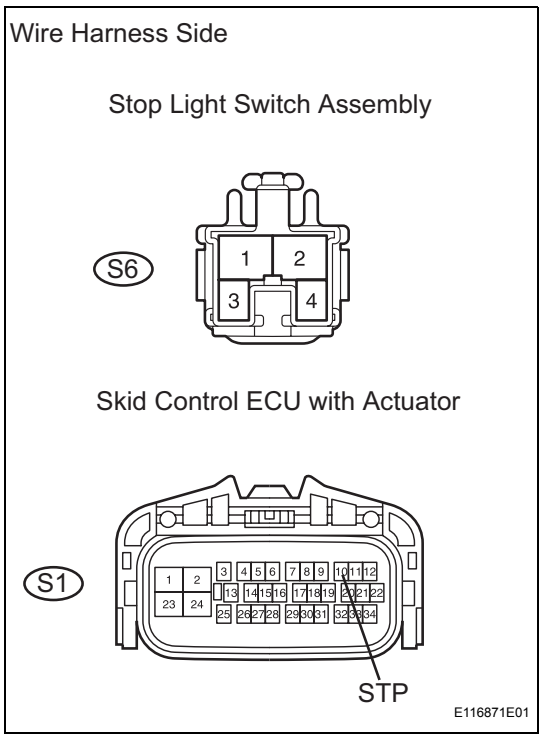
(a) Disconnect the S6 switch connector.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin not pushed	Below 1 Ω
	Pin pushed	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

5 CHECK WIRE HARNESS (STOP LIGHT SWITCH - SKID CONTROL ECU AND BATTERY)



(a) Disconnect the S6 switch connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S6-2 - Body ground	10 to 14 V

(d) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S6-1 - S1-27 (STP)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.

BC

(c) Check for DTCs (see page BC-11).
Result

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

B → END

A

REPLACE BRAKE ACTUATOR ASSEMBLY

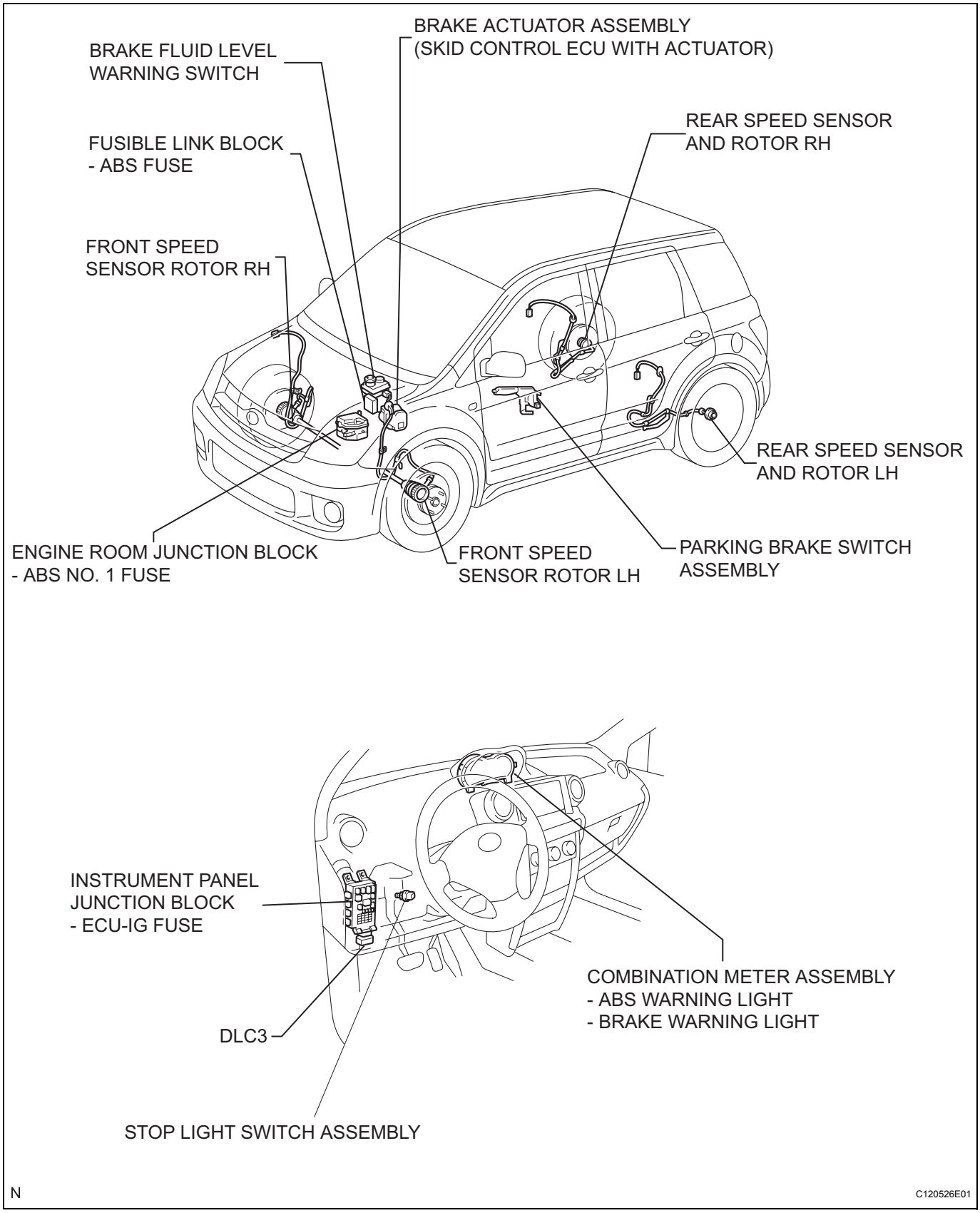
ANTI-LOCK BRAKE SYSTEM

PRECAUTION

NOTICE:

- **When there is a malfunction in the contact point of the terminals or installation problems with parts, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.**
- **In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.**
- **Since the anti-lock brake system may be influenced by a malfunction in other systems, be sure to check for DTCs in other systems.**
- **Be sure to remove and install the skid control ECU with actuator (brake actuator assembly) and each sensor with the ignition switch OFF unless specified in the inspection procedure.**
- **When removing and installing the skid control ECU with actuator and each sensor, be sure to check that the normal display is output in the test mode inspection and in the DTC output inspection after installing all the parts.**

PARTS LOCATION



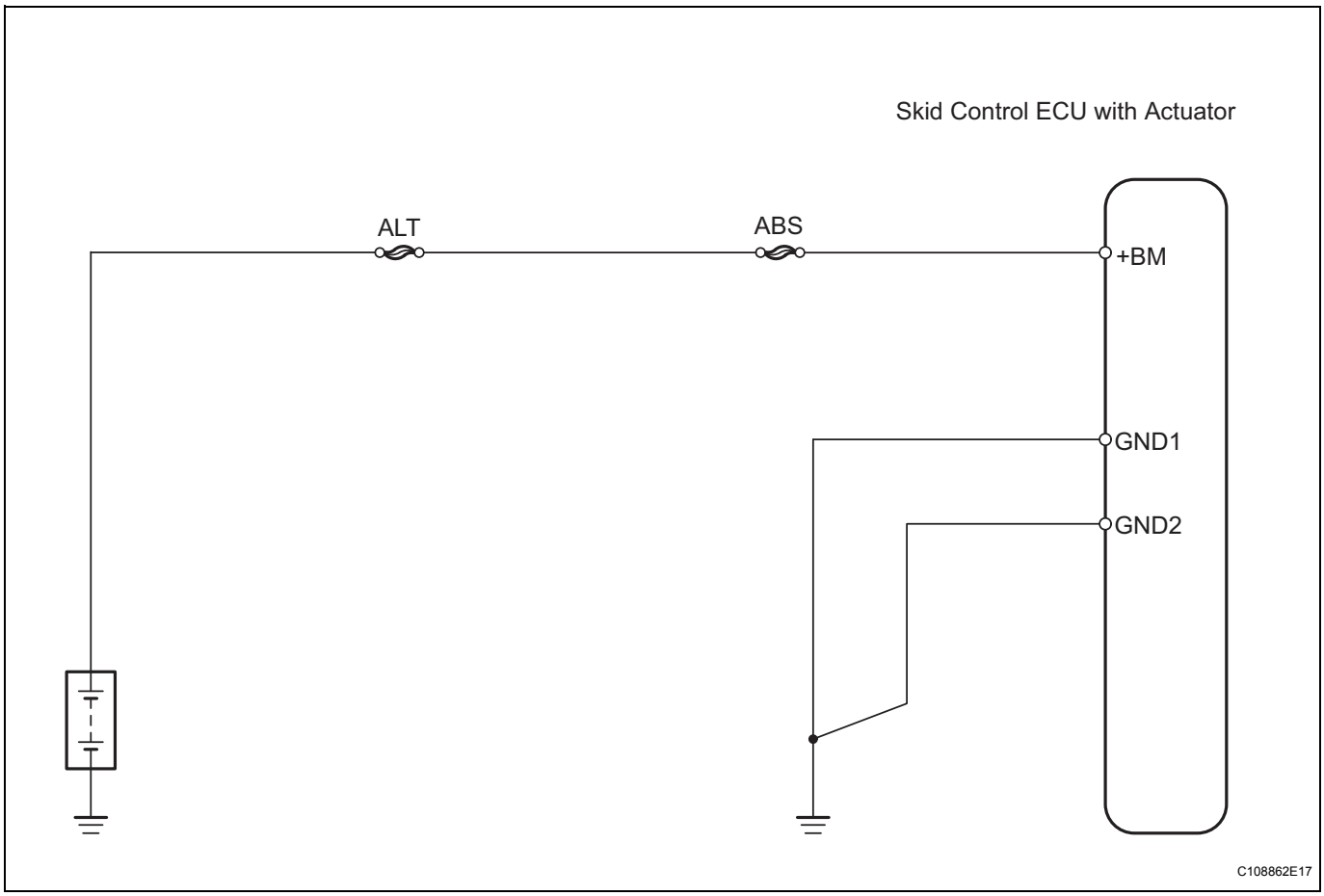
BC

DTC	C1251/51	Open in Pump Motor Circuit

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1251/51	ABS actuator pump motor is not operating normally during initial check	ABS pump motor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

BC

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS motor relay operates.

Skid control ECU with actuator

Item	Vehicle Condition/Test Details	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON/OFF	Operation sound of motor can be heard

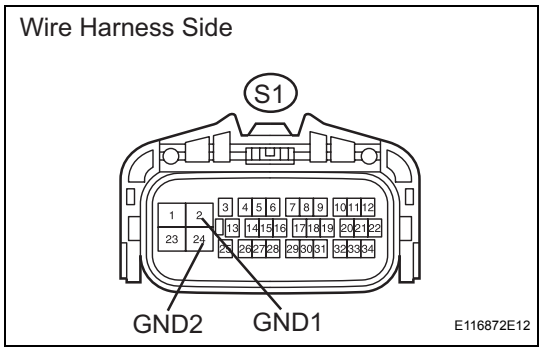
OK:

The operation sound of the ABS motor should be heard.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

3	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connector	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

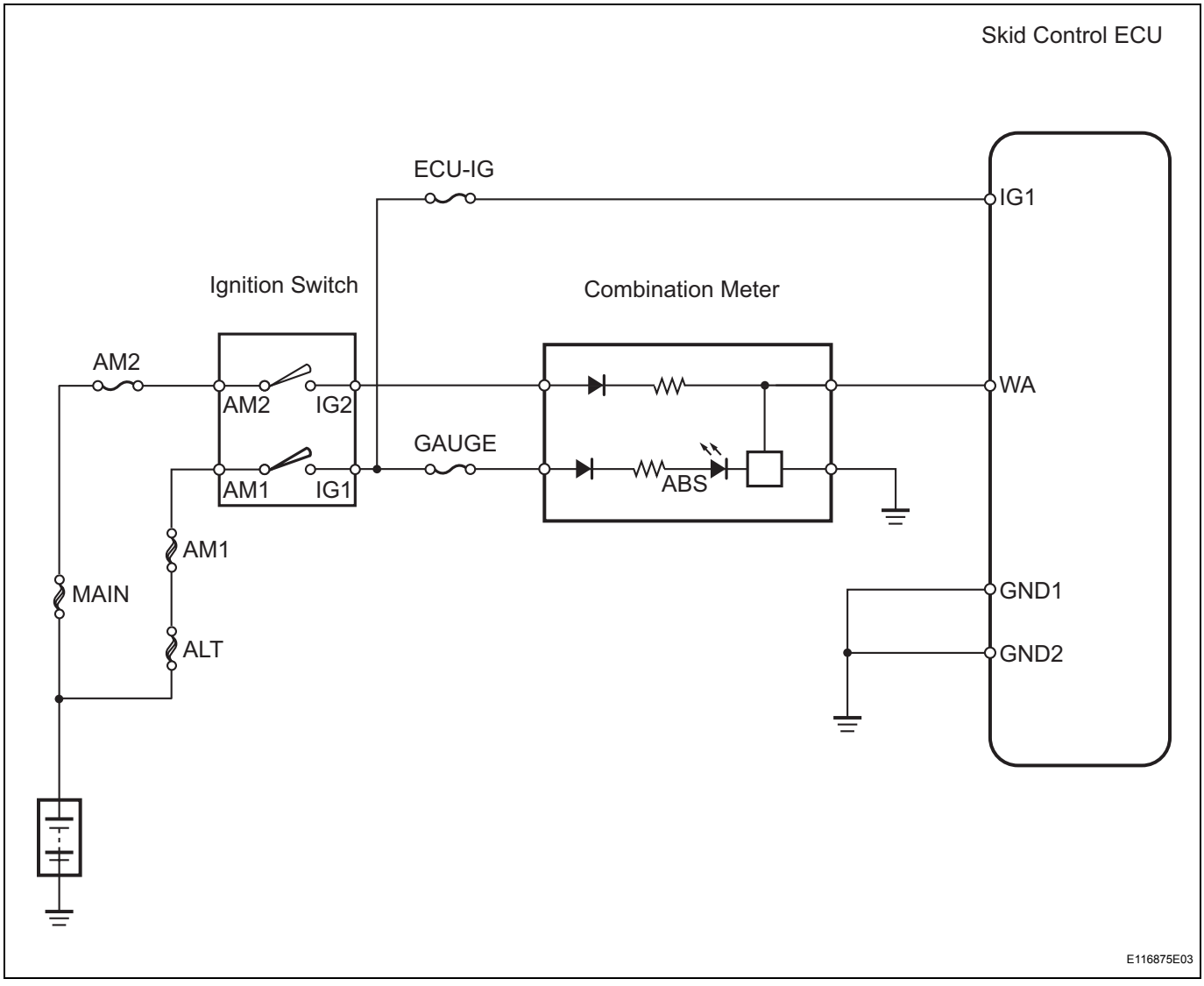
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

ABS Warning Light Remains ON

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
Always ON	When either condition below is met: 1. Voltage of ECU terminal IG1 remains at more than 17 V 2. There is a malfunction in ECU internal circuit	• Power source circuit • ABS warning light circuit • Skid control ECU with actuator • Charging system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTC

(a) Turn the ignition switch ON.
(b) Check that the ABS warning light illuminates.
(c) Check for DTCs (see page BC-8).

BC

Result

Result	Proceed to
DTC is not output (when using intelligent tester)	A
DTC is not output (when not using intelligent tester)	B
DTC is output	C

B → Go to step 7

C → REPAIR CIRCUIT INDICATED BY OUTPUT DTC

A

2 INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.
OK:
Each ECU connector is properly installed.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3 READ VALUE OF INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG power voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 10 to 14 V TOO LOW: Below 10 V	-

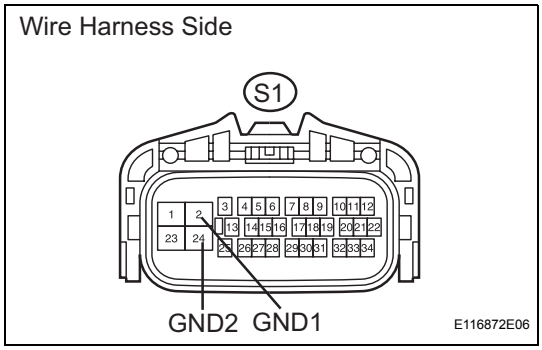
Result

Result	Proceed to
Display is NORMAL	A
Display is not NORMAL	B

B → Go to step 11

A

4	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

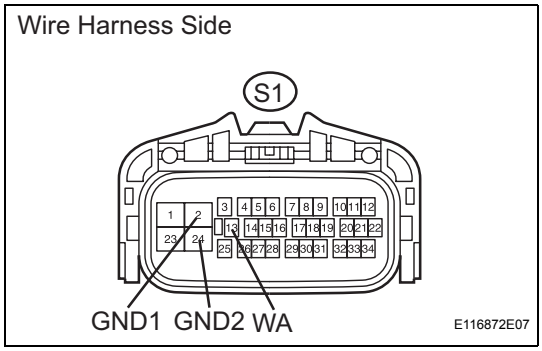
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK ABS WARNING LIGHT



(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-13) to GND1 (S1-2) or GND2 (S1-24) of the connector. Check the ABS warning light.

OK:

ABS warning light turns off.

(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.

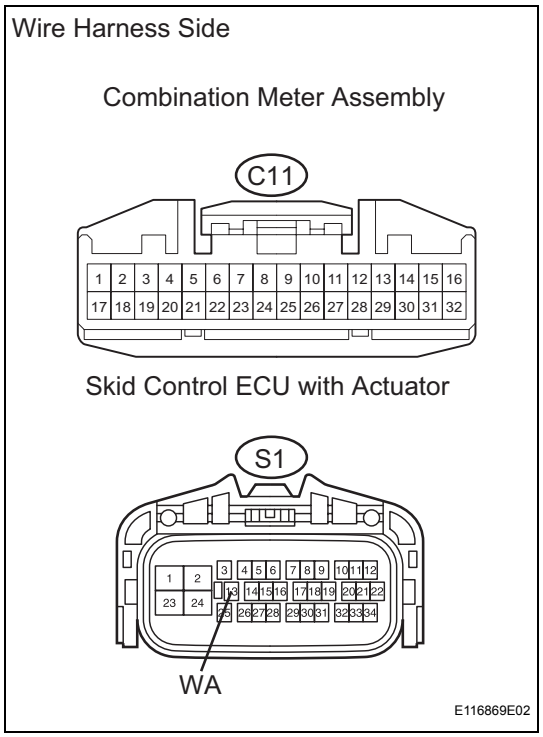
OK:

ABS warning light illuminates.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

6	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C11-11 - S1-13 (WA)	Below 1 Ω
C11-11 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

7	INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.

OK:

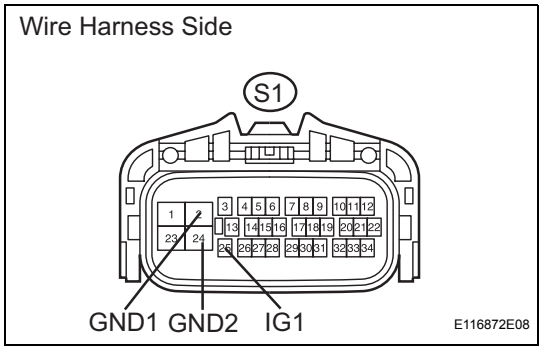
Each ECU connector is properly installed.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

BC

8 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-25 (IG1) - Body ground	Ignition switch ON	10 to 14 V

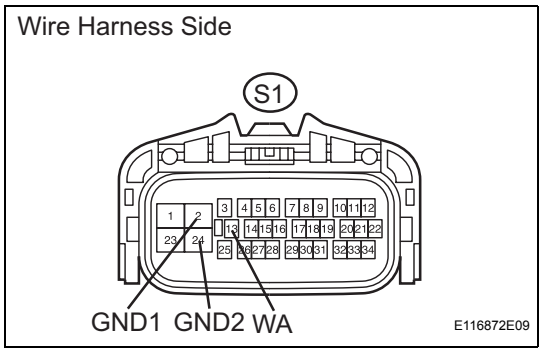
(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

9 CHECK ABS WARNING LIGHT

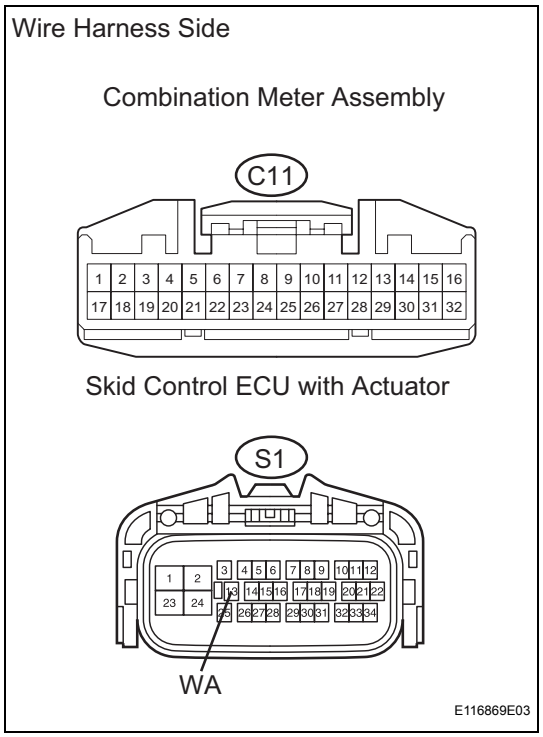


(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-13) to GND1 (S1-2) or GND2 (S1-24) of the S1 ECU connector. Check the ABS warning light.
OK:
ABS warning light turns off.
(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.
OK:
ABS warning light illuminates.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

10	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

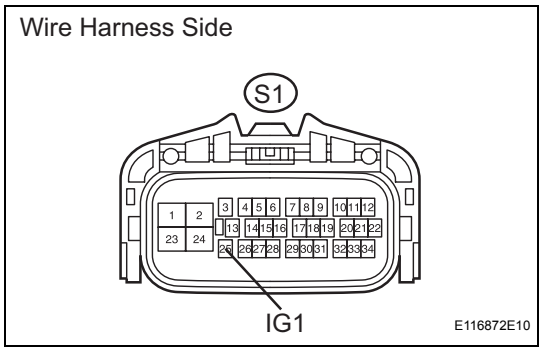
Tester Connection	Specified Condition
C11-11 - S1-13 (WA)	Below 1 Ω
C11-11 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

11	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Condition	Specified Condition
S1-25 (IG1) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

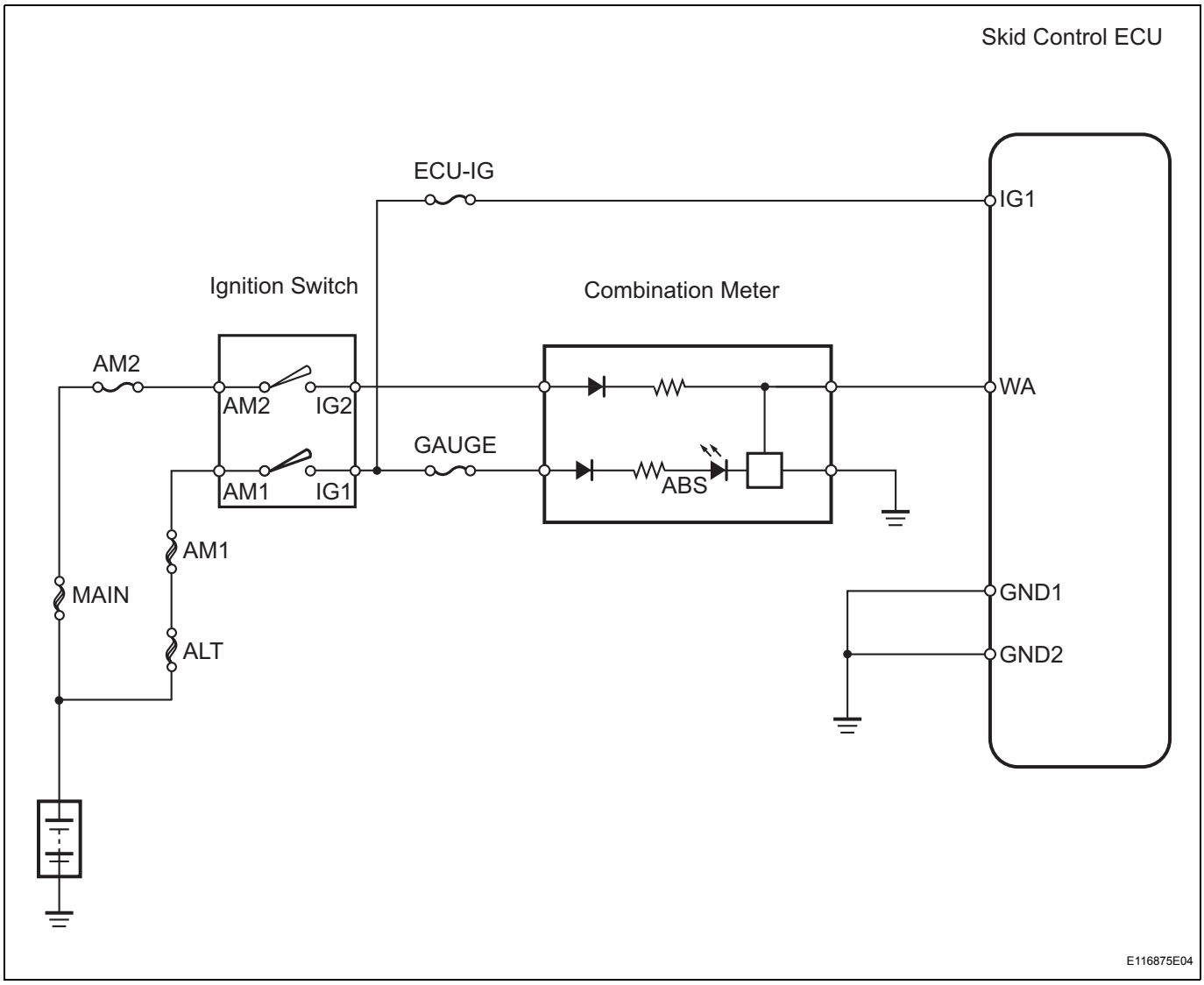
BC

ABS Warning Light does not Come ON

DESCRIPTION

If the ECU detects trouble, it will prohibit ABS control, turn on the ABS warning light, and store a DTC. Connect terminals TC and CG of the DLC3 to make the ABS warning light blink and output a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS warning light illuminates.

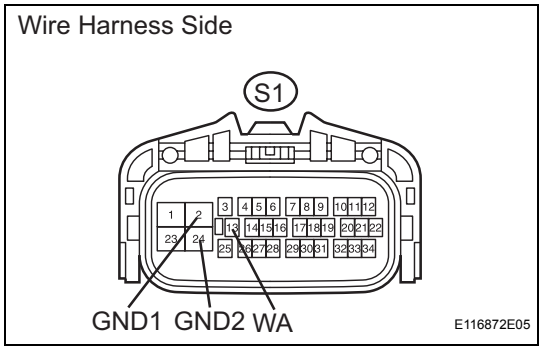
Skid control ECU with actuator

Item	Vehicle Condition/Test Details	Diagnostic Note
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 CHECK ABS WARNING LIGHT



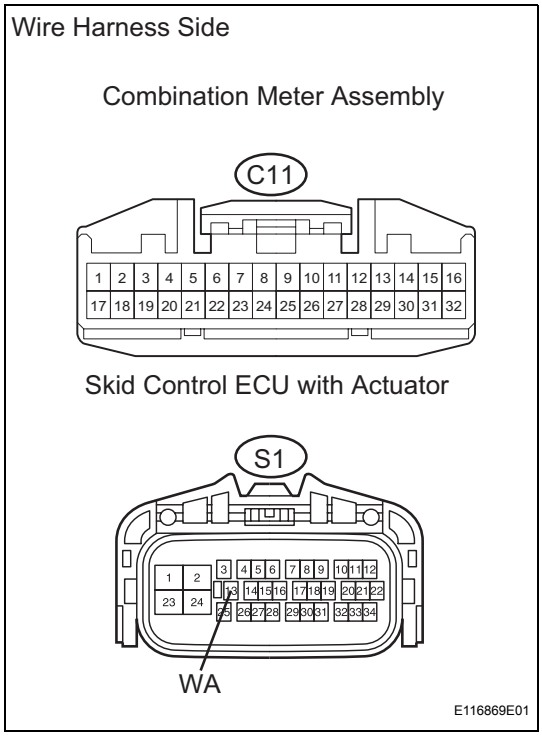
(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-13) to GND1 (S1-2) or GND2 (S1-24) of the S1 ECU connector.
(d) Check the ABS warning light.
OK:
ABS warning light turns off.
(e) Turn the ignition switch OFF.
(f) Remove the service wire.
(g) Turn the ignition switch ON.
(h) Check the ABS warning light.
OK:
ABS warning light illuminates.

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

BC

4	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connector	Specified Condition
C11-11 - S1-13 (WA)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

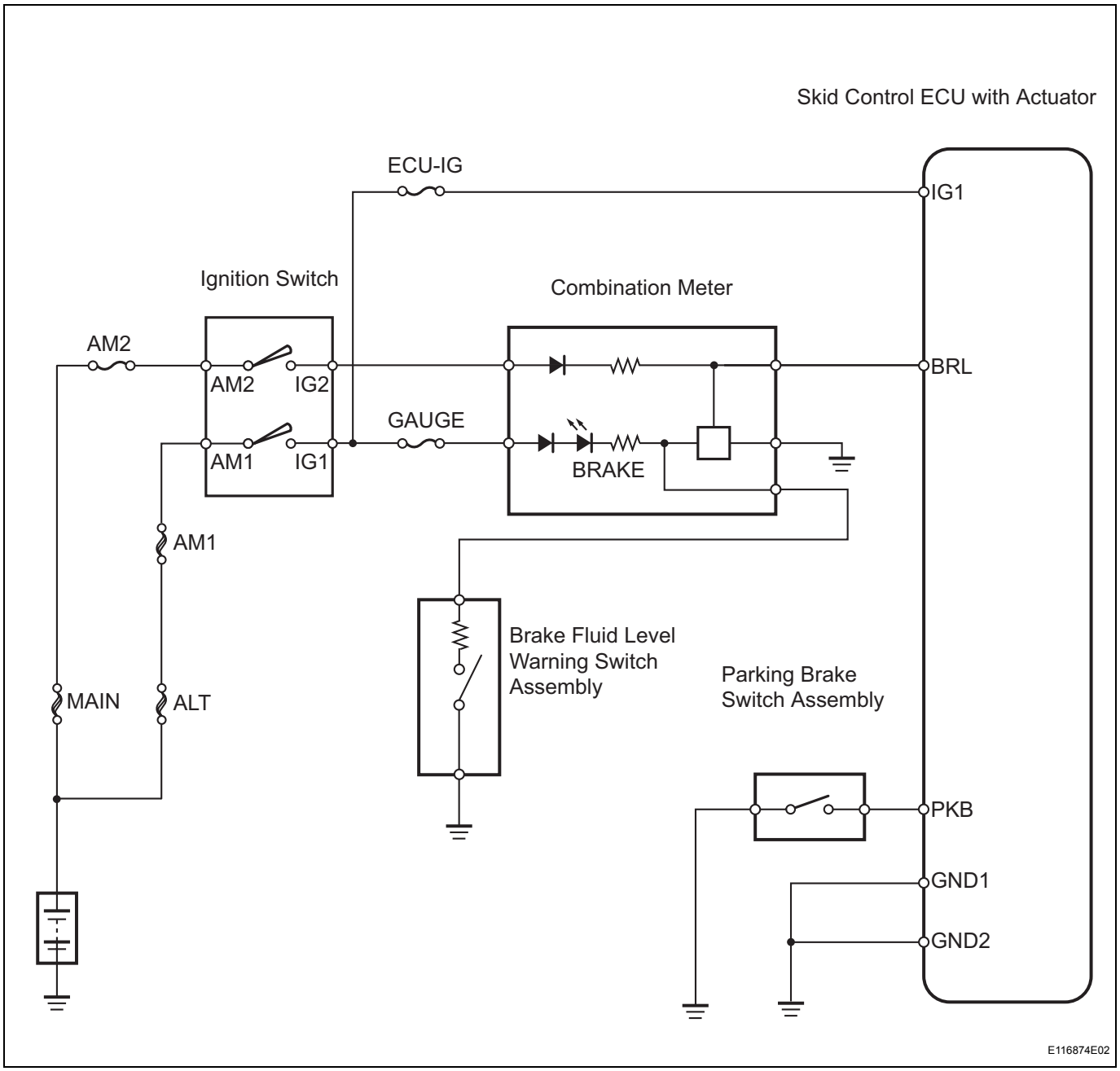
REPLACE COMBINATION METER ASSEMBLY

Brake Warning Light Circuit

DESCRIPTION

The brake warning light turns on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

BC

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (BRAKE WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the brake warning light illuminates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
BRAKE WRN LIGHT	Turns brake warning light ON / OFF	Observe combination meter

OK:
Brake warning light illuminates.

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 CHECK DTC FOR ABS

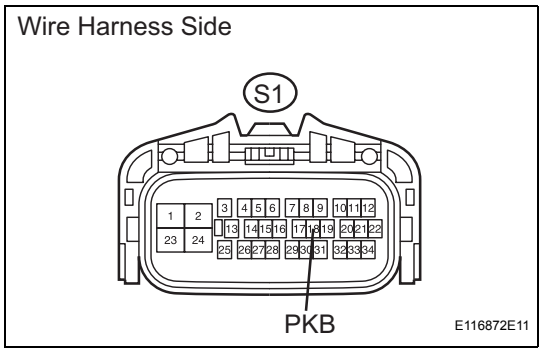
(a) Check for DTCs (see page BC-8).
Result

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

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

A

4 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

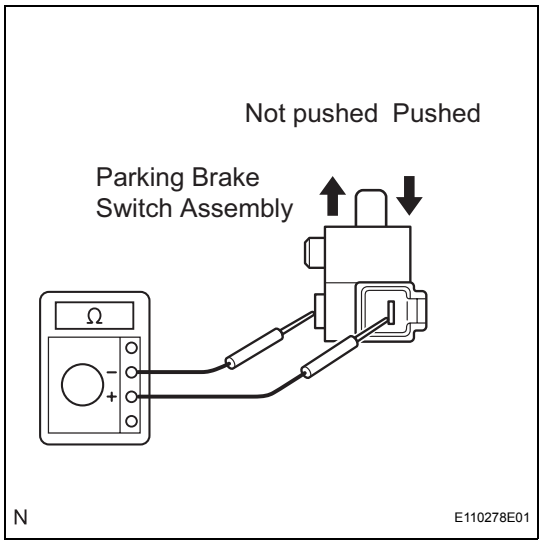
Tester Connection	Switch Condition	Specified Condition
S1-18 (PKB) - Body ground	Parking brake switch ON	Below 1 Ω
	Parking brake switch OFF	10 kΩ or higher

OK → Go to step 7

BC

NG

5 INSPECT PARKING BRAKE SWITCH ASSEMBLY



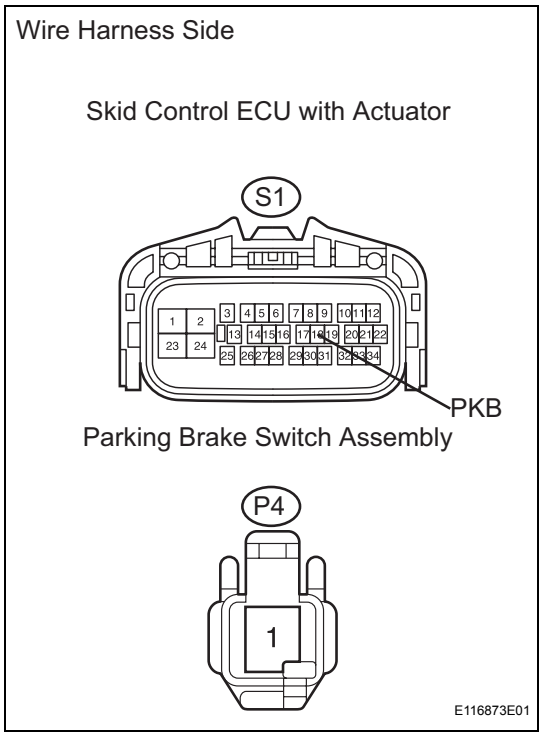
(a) Remove the parking brake switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	Pushed	Below 1 Ω
	Not pushed	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

6 CHECK WIRE HARNESS (SKID CONTROL ECU - PARKING BRAKE SWITCH)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the P4 switch connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S1-18 (PKB) - P4-1	Below 1 Ω

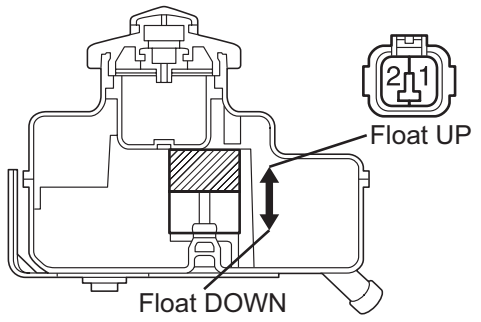
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

BC

7	INSPECT BRAKE FLUID LEVEL WARNING SWITCH ASSEMBLY

Brake Fluid Level Warning Switch Assembly



N E110273E01

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the B2 switch connector.
(c) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Float DOWN	Below 1 Ω
	Float UP	10 kΩ or higher

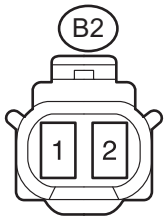
NG → **REPLACE BRAKE MASTER CYLINDER SUB-ASSEMBLY**

OK

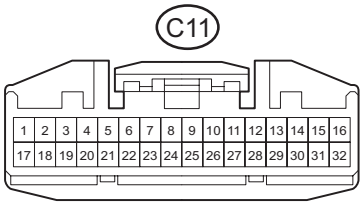
8	CHECK WIRE HARNESS (WARNING SWITCH - COMBINATION METER AND BODY GROUND)

Wire Harness Side

Brake Fluid Level Warning Switch Assembly



Combination Meter Assembly



E116388E01

(a) Disconnect the B2 switch connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

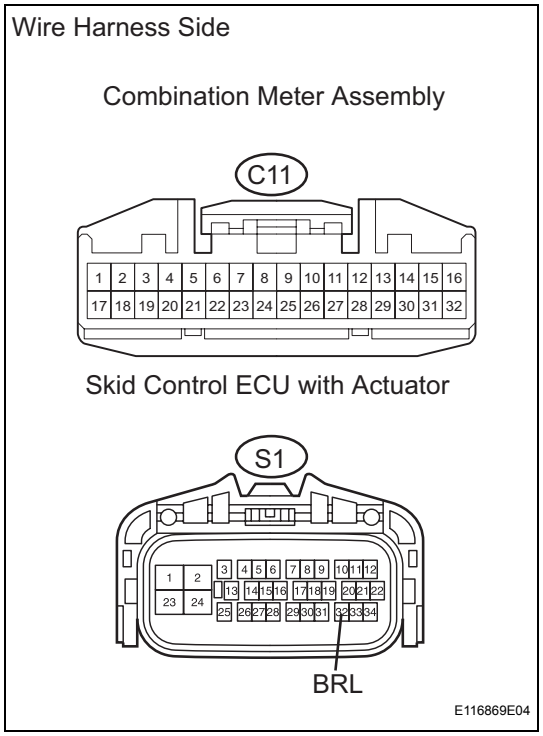
Tester Connection	Specified Condition
B2-1 - C11-15	Below 1 Ω
B2-2 - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

BC

9	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C11-14 - S1-32 (BRL)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

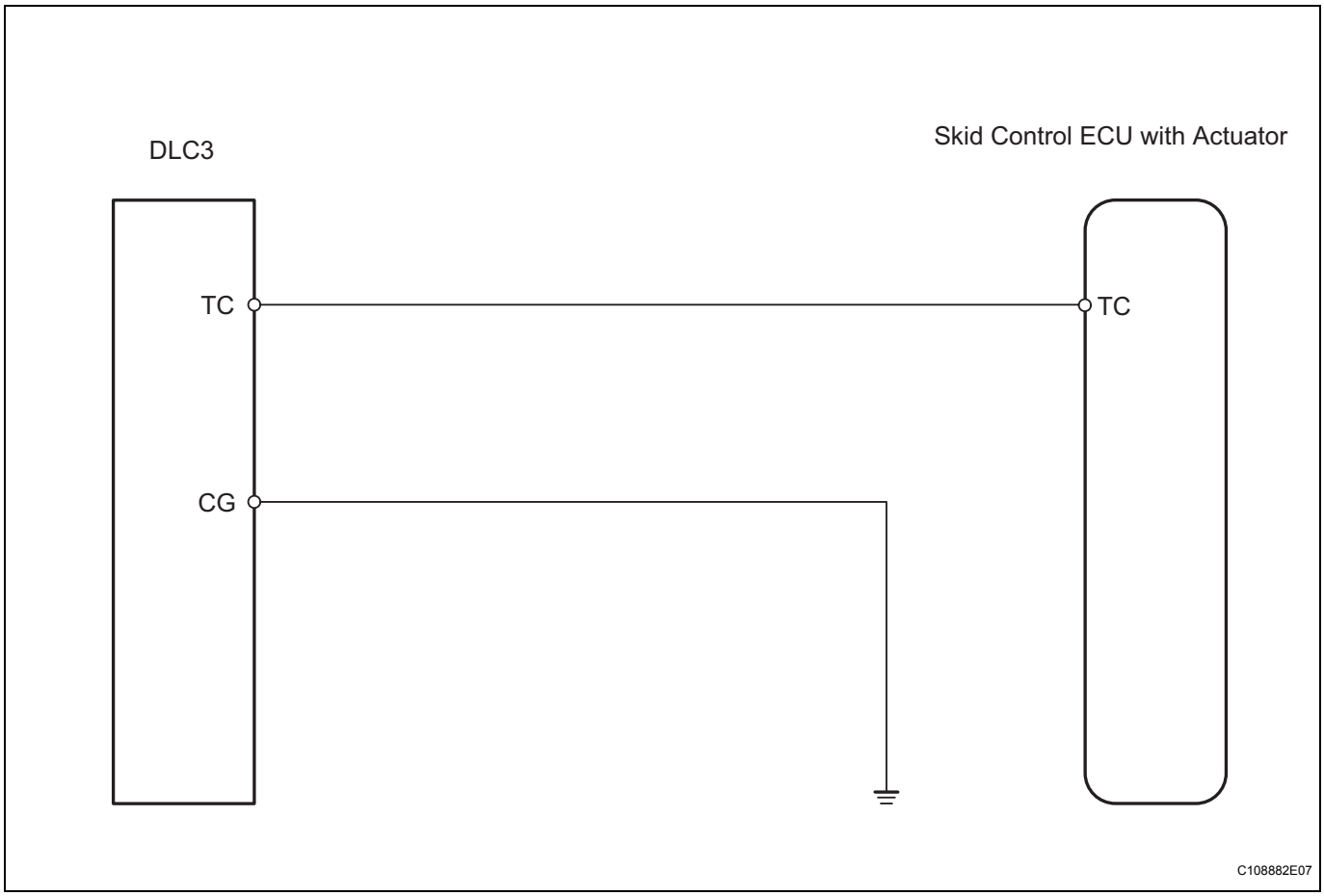
REPLACE BRAKE ACTUATOR ASSEMBLY

TC and CG Terminal Circuit

DESCRIPTION

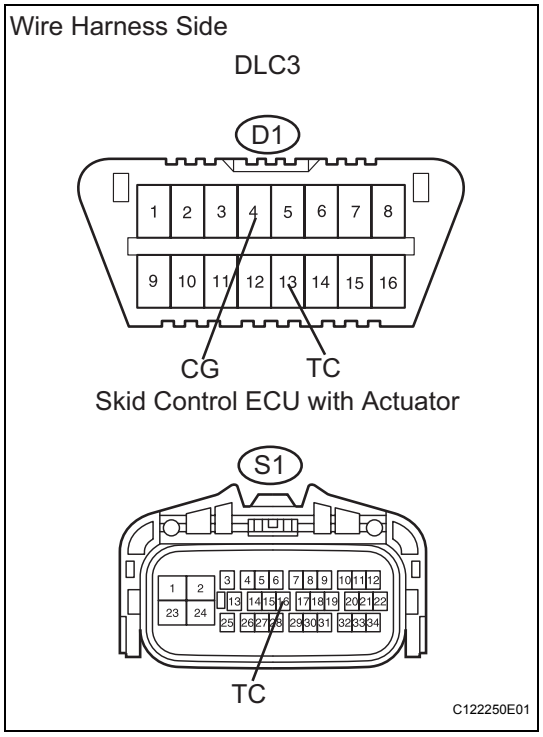
Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (DLC3 - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the D1 DLC3 connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

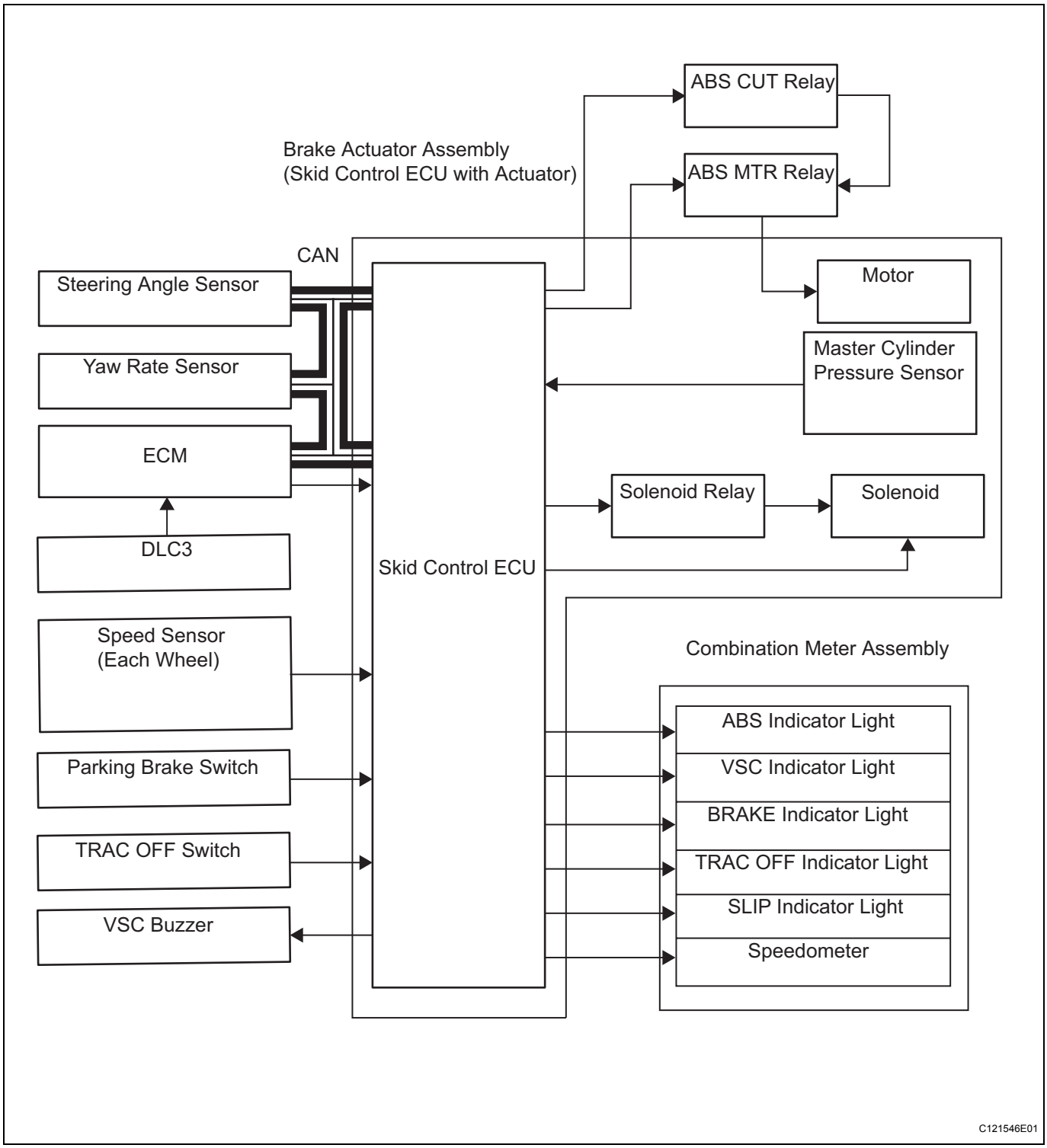
Tester Connector	Specified Condition
D1-13 (TC) - S1-16 (TC)	Below 1 Ω
D1-4 (CG) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

SYSTEM DIAGRAM



BC

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

The yaw rate sensor and deceleration sensor are combined in a single unit. This unit communicates with the skid control ECU through the CAN communication system.

(a) ABS (Anti-lock brake system)
The ABS helps prevent the wheel from locking when the brakes are applied firmly or when braking on a slippery surface.
Wheels in accordance with driving conditions. In addition, when braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.

(b) EBD (Electronic brake force distribution)
The EBD control utilizes the ABS, realizing proper brake force distribution between the front and rear.

(c) BA (Brake assist)
The primary purpose of the brake assist system is to provide an auxiliary brake force to assist the driver who cannot generate a large enough brake force during emergency braking, thus helping to maximize vehicle's brake performance.

(d) TRC (Traction control)
The TRC system helps prevent the drive wheels from slipping if the driver presses down on the accelerator pedal excessively when starting off or accelerating on a slippery surface.

(e) VSC (Vehicle stability control)
The VSC system helps prevent the vehicle from slipping sideways as a result of strong front wheel skid or strong rear wheel skid when cornering.

CAN communication (☐: Receiving signal from skid control ECU with actuator)

Related ECU / Parts	Signal
Steering Angle Sensor	☐: Steering angle signal
Yaw rate (deceleration) sensor	☐: Yaw rate signal ☐: Deceleration sensor signal

2. ABS with EBD & BA & TRC & VSC OPERATION

(a) The skid control ECU calculates vehicle stability tendency based on signals of the master cylinder pressure sensor, speed sensors, yaw rate (deceleration) sensor and steering angle sensor. The skid control ECU judges whether the control of engine output torque by the electronic control throttle and control of wheel brake pressure by the skid control ECU with actuator will start or not by the calculation results.

(b) The SLIP indicator blinks and the VSC warning buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when the TRC system is operating, and the operation being performed is displayed.

3. FAIL-SAFE FUNCTION

(a) When a failure occurs in the ABS & BA & TRC & VSC systems, the ABS warning light and the VSC warning light turn on and ABS & BA & TRC & VSC operations are prohibited. In addition to this, when there is a failure that disables EBD operation, the brake warning light also turns on and EBD operation is prohibited.

(b) If some control is prohibited due to a malfunction during its operation, that control will be cut off gradually so that vehicle stability will not change.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
- Use these procedures to troubleshoot the vehicle stability control system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	CHECK AND CLEAR DTC*

NEXT

4	PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → Go to step 6

A

5	SYMPTOM SIMULATION

BC

NEXT

6	CHECK FOR DTC*

Result

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

B → Go to step 9

A

7 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 9

A

8 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (see page BC-72)
(b) DATA LIST / ACTIVE TEST (see page BC-77)

NEXT

9 CHECK FOR FLUID LEAKAGE

NEXT

10 REPAIR OR REPLACE

NEXT

11 CONFIRMATION TEST

NEXT

END

OPERATION CHECK

1. CHECK SENSOR SIGNAL BY TEST MODE (When Using Intelligent Tester)

NOTICE:

After replacing the yaw rate sensor and/or skid control ECU with actuator (brake actuator assembly), perform zero point calibration of the yaw rate sensor (see page BC-69).

HINT:

If the ignition switch is turned from ON to ACC or OFF during test mode, the DTCs will be erased.

(a) Procedures for test mode:

(1) Turn the ignition switch OFF.

(2) Check that the shift lever is on P.

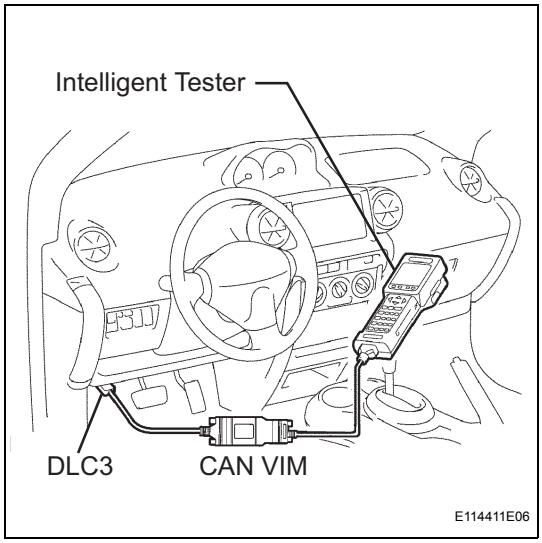
(3) Connect the intelligent tester (with CAN VIM) to the DLC3.

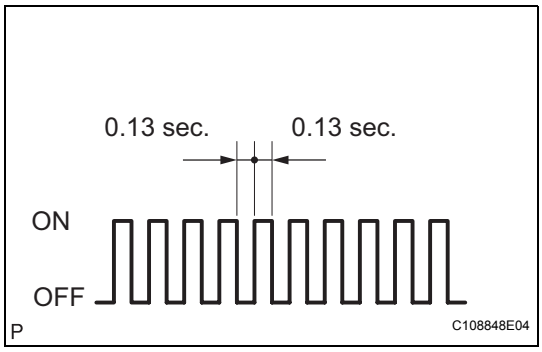
(4) Turn the ignition switch ON.

(5) Select the Test Mode using the intelligent tester.

HINT:

Refer to the intelligent tester operator's manual for further details.





(6) Check that the ABS warning light and VSC warning light blink.

HINT:

If the ABS warning light and VSC warning light do not blink, check the ABS warning light and VSC warning light circuits.

Trouble area	See procedure
ABS warning light circuit	BC-132
VSC warning light circuit	BC-139

(b) Check the master cylinder pressure sensor.

(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more. Then, quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

HINT:

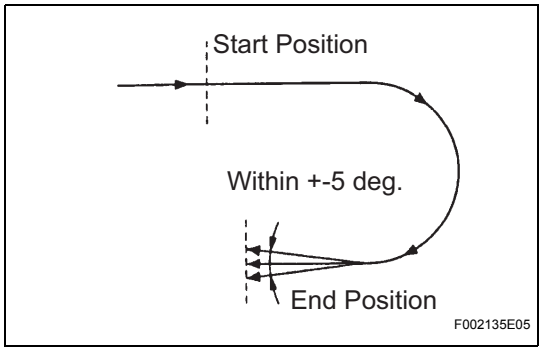
At this time, the ABS warning light and VSC warning light illuminate for 3 seconds.

BC

(c) Check the speed sensor.
(1) Drive the vehicle straightforward at the following speeds. Then check that the ABS warning light is as follows.

Vehicle Speed	Check	ABS Warning Light
45 km/h (28 mph) or higher	Deviations of sensor signal	Turns off

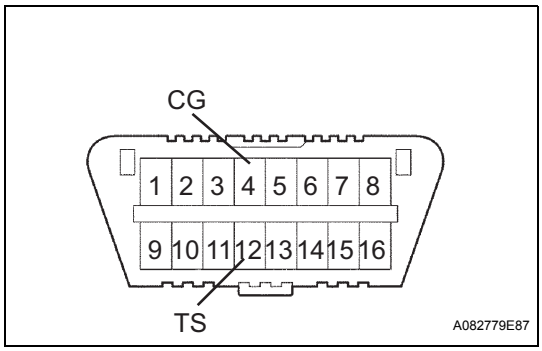
HINT:
The sensor signal check may not be completed if the vehicle's wheels slip or the steering wheel is turned during this check.
(2) Stop the vehicle.

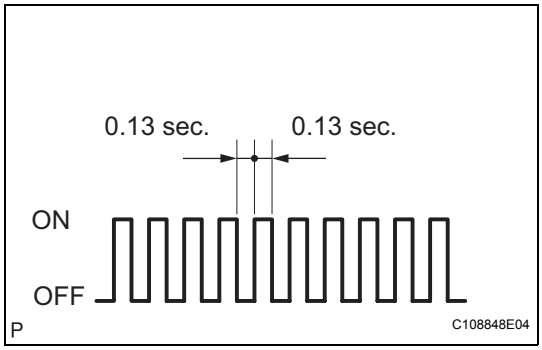


(d) Check the yaw rate sensor.
(1) Move the shift lever to the D position and drive the vehicle at 5 km/h (3 mph). Turn the steering wheel either to the left or right 90°or more, and drive the vehicle in a half-circle pattern.
(2) Stop the vehicle and move the shift lever to the P position. Check that the skid control buzzer sounds for 3 seconds.
If the skid control buzzer sounds, the sensor check is completed normally.
If the skid control buzzer does not sound, check the skid control buzzer circuit (see page BC-155), and then perform the sensor check again.
If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor. Check the DTC.
HINT:
- Drive the vehicle in a half-circle. At the end of the turn, the direction of the vehicle should be within 180°+-5° of its start position.
- Do not spin the wheels.

(e) Read the DTC by following the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CHECK SENSOR SIGNAL BY TEST MODE (When not Using Intelligent Tester)
NOTICE:
After replacing the yaw rate sensor and/or skid control ECU with actuator (brake actuator assembly), perform zero point calibration of the yaw rate sensor (see page BC-69).
HINT:
If the ignition switch is turned from ON to ACC or OFF during test mode, the DTCs will be erased.
During test mode, the ECU records all DTCs of the sensor check function.
By performing the sensor signal check, the codes are erased. If proper function is confirmed the codes left over are the codes when problems were found.





(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Using SSt, connect terminal 12 (TS) and 4 (CG) of the DLC3.
SST 09843-18040
(3) Check that the steering wheel is in the center position and move the shift lever to a P position.
(4) Turn the ignition switch ON.

(5) Check that the ABS warning light and VSC warning light blink as shown in the illustration.
HINT:
If the ABS warning light or VSC warning light does not blink, check the ABS warning light circuit, VSC warning light circuit or TC and CG terminal circuit.

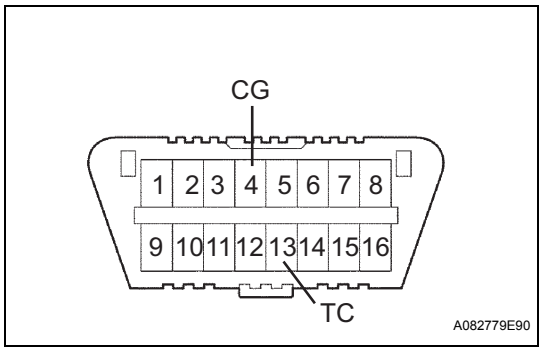
Trouble area	See procedure
ABS warning light circuit	BC-132
VSC warning light circuit	BC-139
TS and CG terminal circuit	BC-159

(b) Check the master cylinder pressure sensor.
(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more. Then, quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.
HINT:
At this time, the ABS warning light illuminates for 3 seconds.

(c) Check the speed sensor.
(1) Drive the vehicle straight forward at the following speeds. Then check that the ABS warning light is as follows.

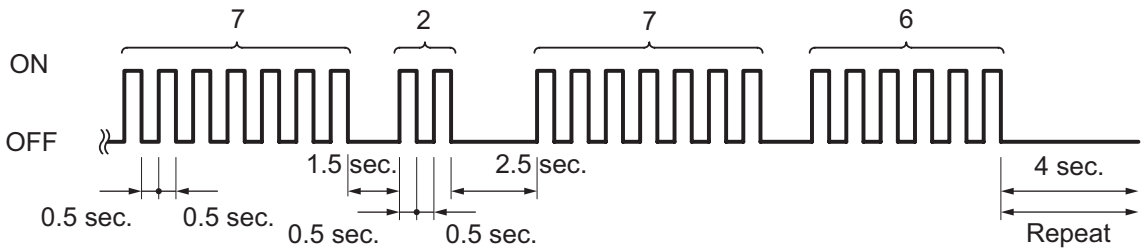
Vehicle Speed	Check	ABS Warning Light
45 km/h (28 mph) or higher	Deviations of sensor signal	Turns off

HINT:
The sensor signal check may not be completed if the vehicle's wheels slip or the steering wheel is turned during this check.
(2) Stop the vehicle.



(d) Read the DTCs.
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
(2) Read the number of blinks of the ABS warning light.
HINT:
- As an example, the blinking patterns for DTCs 72 and 76 are shown below.
- The conditions are explained in the Diagnostic Trouble Code Chart.
- For the normal code, the light cycles between ON and OFF at intervals of 0.25 seconds.
- If more than 1 DTC is detected at the same time, the codes will be displayed in numerical order.

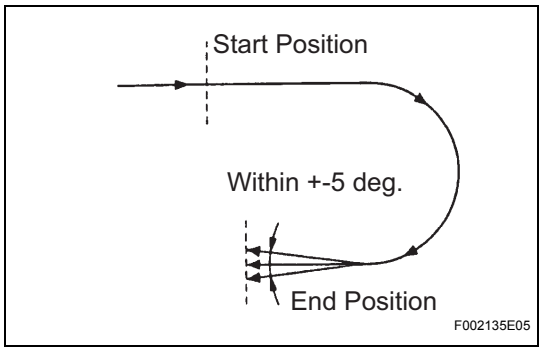
DTC (Example: DTCs 72 and 76)



DTC 72 DTC 76

C108851E01

(e) After the check, disconnect SST from terminals 13 (TC) and 4 (CG) of the DLC3.



(f) Check the yaw rate sensor.
(1) Move the shift lever to the D position and drive the vehicle at 5 km/h (3 mph). Turn the steering wheel either to the left or right 90°or move, and drive the vehicle in a half-circle pattern.
(2) Stop the vehicle and move the shift lever to the P position. Check that the skid control buzzer sounds for 3 seconds.
If the skid control buzzer sounds, the sensor check is completed normally.
If the skid control buzzer does not sound, check the skid control buzzer circuit (see page BC-155), and then perform the sensor check again.
If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor. Check the DTC.
HINT:
- Drive the vehicle in a half-circle. At the end of the turn, the direction of the vehicle should be within 180°+-5° of its start position.

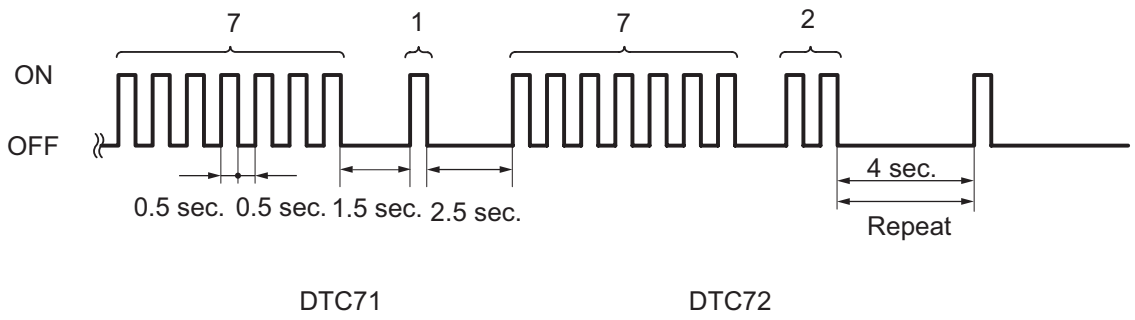
BC

- Do not spin the wheels.

(3) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040

(4) Read the number of blinks of the VSC warning light.
HINT:
- As an example, the blinking patterns for DTCs 71 and 72 are shown below.
- The conditions are explained in the Diagnostic Trouble Code Chart.
- For the normal code, the light cycles between ON and OFF at intervals of 0.25 seconds.
- If more than 1 DTC is detected at the same time, the codes will be displayed in numerical order.

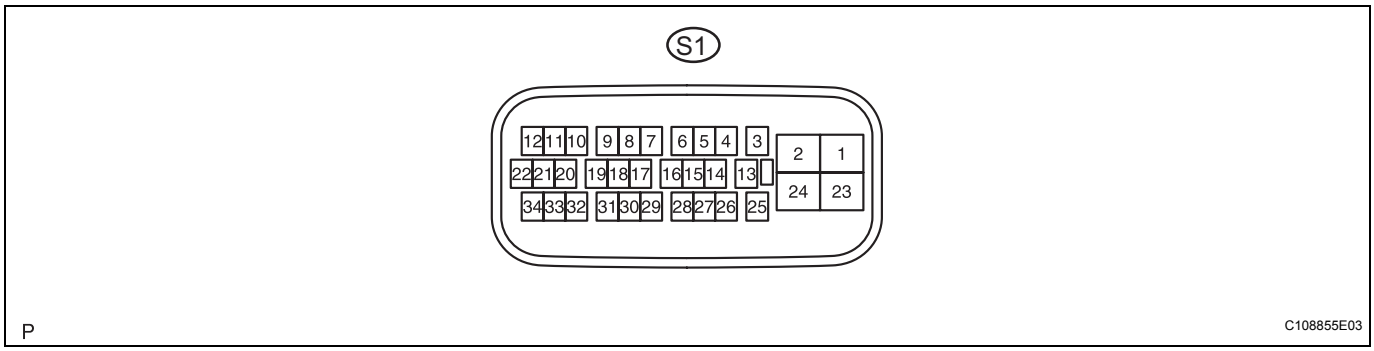
Malfunction Code (Example Code 71 and 72)



(5) After performing the check, disconnect the SST from terminals 13 (TS) and 4 (CG) of the DLC3, and turn the ignition switch OFF.

TERMINALS OF ECU

1. CHECK BRAKE ACTUATOR ASSEMBLY (SKID CONTROL ECU ASSEMBLY WITH ACTUATOR)

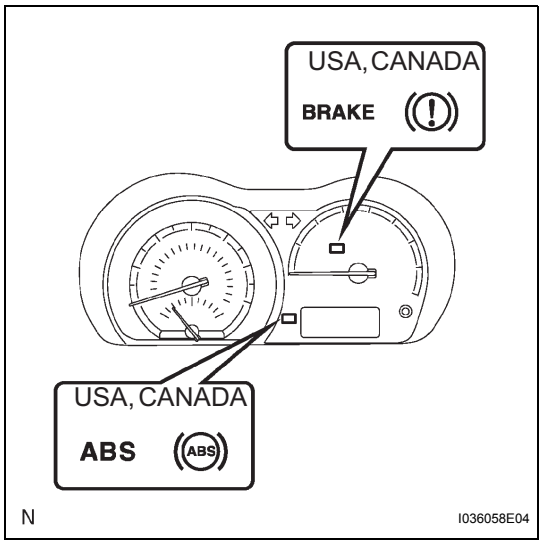


(a) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+BS (S1-1) - GND (S1-2, 24)	B - W-B	Solenoid relay power supply	Always	11 to 14 V
FR+ (S1-31) - FR- (S1-30)	G-W - G-O	Front RH wheel speed signal input	Ignition switch ON, slowly turn right front wheel	AC generation
FL+ (S1-9) - FL- (S1-8)	R - G	Front LH wheel speed signal input	Ignition switch ON, slowly turn left front wheel	AC generation
RR+ (S1-33) - RR- (S1-34)	LG-B - LG-R	Rear RH wheel speed signal input	Ignition switch ON, slowly turn right rear wheel	AC generation
RL+ (S1-11) - RL- (S1-12)	Y-B - P-B	Rear LH wheel speed signal input	Ignition switch ON, slowly turn left rear wheel	AC generation
SP1 (S1-26) - GND (S1-2, 24)	W-R - W-B	Speed signal output	Vehicle driving at about 20 km/h (12 mph)	AC generation
D/G (S1-14) - GND (S1-2, 24)	W - W-B	Diagnostic communication line	Ignition switch ON	11 to 14 V
TC (S1-16) - GND (S1-2, 24)	P-B - W-B	Diagnosis tester communication line	Ignition switch ON	11 to 14 V
+BM (S1-23) - GND (S1-2, 24)	B - W-B	Motor relay test input	Always	11 to 14 V
STP (S1-10) - GND (S1-2, 24)	G-W - W-B	Stop light input signal	Stop light switch ON (Brake pedal depressed)	8 to 14 V
PKB (S1-18) - GND (S1-2, 24)	Y-B - W-B	Parking brake switch input	Ignition switch ON, parking brake switch ON	Below 1.5 V
			Ignition switch ON, parking brake switch OFF	11 to 14 V
WA (S1-13) - GND (S1-2, 24)	P - W-B	ABS warning light output	Ignition switch ON, ABS warning light ON	8 to 14 V
BRL (S1-32) - GND (S1-2, 24)	B-Y - W-B	Brake warning line output	Ignition switch ON, brake warning light ON	8 to 14 V
IG1 (S1-25) - GND (S1-2, 24)	B-L - W-B	IG1 power supply	Ignition switch ON	11 to 14 V

If the result is not as specified, there may be a malfunction in the ECU.

BC



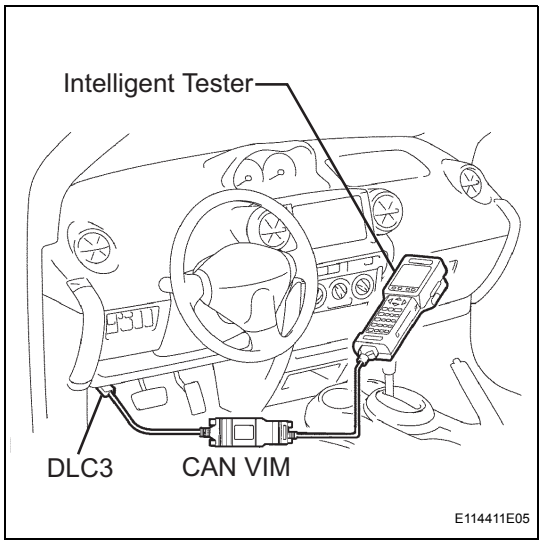
DIAGNOSIS SYSTEM

1. CHECK INDICATOR

(a) Check the warning lights.
  (1) Release the parking brake lever.
  (2) When the ignition switch is ON, check that the ABS warning light and brake warning light illuminate for approximately 3 seconds.
  HINT:
  - When the parking brake is applied or brake fluid level is low, the brake warning light illuminates.
  - If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light and brake warning light circuit. If the indicator remains on, proceed to troubleshooting for the light circuit below.

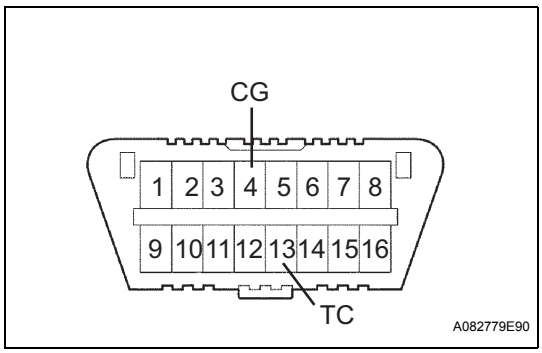
Trouble Area	See procedure
ABS warning light circuit	BC-43
Brake warning light circuit	BC-52

DTC CHECK / CLEAR



1. CHECK DTC (WHEN USING INTELLIGENT TESTER)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Read the DTCs by following the prompts on the tester screen.
  HINT:
  Refer to the intelligent tester operator's manual for further details.



2. CHECK DTC (WHEN NOT USING INTELLIGENT TESTER:)

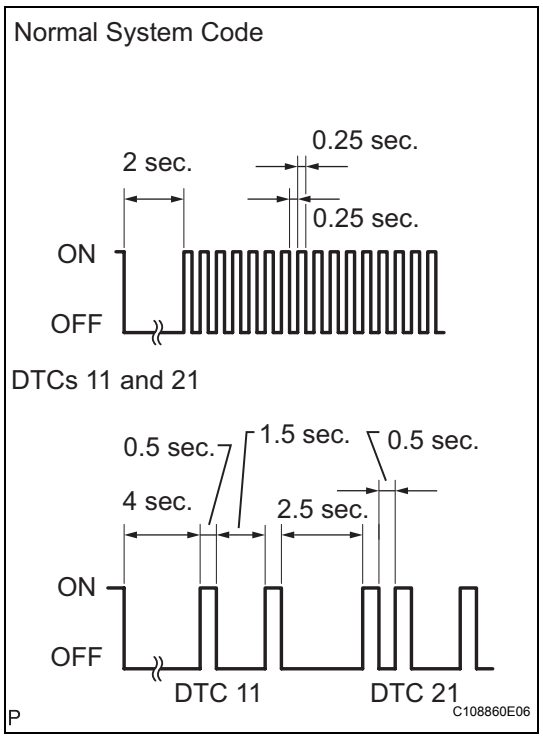
(a) Check the DTCs.
  (1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
  SST 09843-18040
  (2) Turn the ignition switch ON.
  (3) Read the DTC from the ABS warning light on the combination meter.
  HINT:
  - If no code appears, check the TC and CG terminal circuit or ABS warning light circuit.

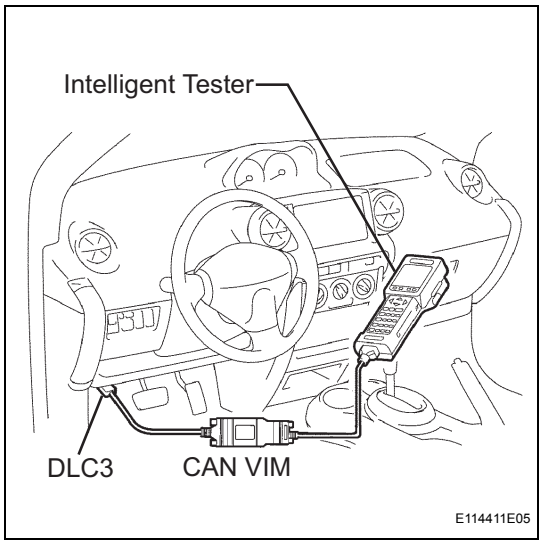
Trouble Area	See procedure
ABS warning light circuit	BC-43
TC and CG terminal circuit	BC-57

BC

- If more than 1 DTC is detected at the same time, the DTCs will be displayed in numerical order.
- As an example, the blinking patterns for a normal system code and DTCs 11 and 21 are shown in the illustration.
- DTCs are explained in the Diagnostic Trouble Code Chart.

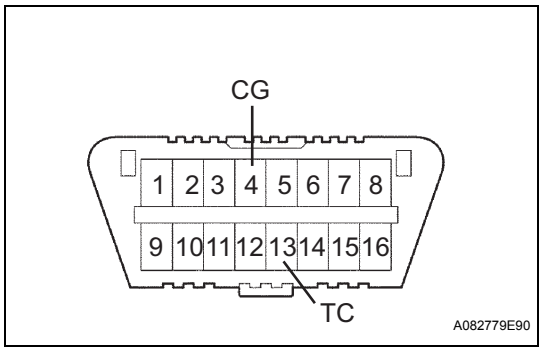
(b) After completing the check, disconnect terminals 13 (TC) and 4 (CG) of the DLC3, and turn off the display.
If 2 or more DTCs are detected at the same time, the DTCs will be displayed first.





3. CLEAR DTC (WHEN USING INTELLIGENT TESTER)

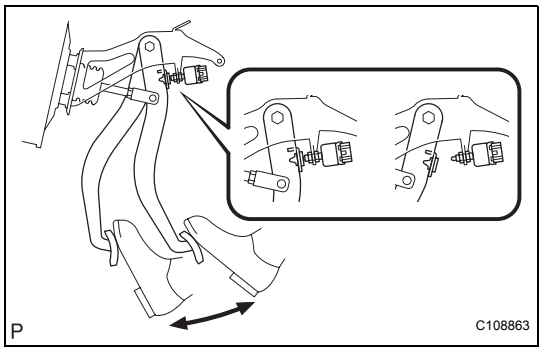
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) Operate the intelligent tester to erase the codes.
HINT:
Refer to the intelligent tester operator's manual for further details.



4. CLEAR DTC (WHEN NOT USING INTELLIGENT TESTER)

(a) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
(b) Turn the ignition switch ON.

BC



(c) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(d) Check that the ABS warning light and brake warning light displays the normal system code.
(e) Remove SST from the terminals of the DLC3.
HINT:
DTCs cannot be cleared by removing the battery cable or ECU-IG fuse.

CALIBRATION

1. PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR (When not Using Intelligent Tester)

HINT:

After replacing the yaw rate sensor and/or the skid control ECU with actuator (brake actuator assembly), make sure to perform the yaw rate sensor and deceleration sensor zero point calibration.

NOTICE:

- **While performing the calibration, do not tilt, move or shake the vehicle. Keep it in a stationary condition. Do not start the engine.**
- **Be sure to perform the calibration on a level surface that has an inclination of less than 1 degree.**

(a) Move the shift lever to P.

(b) Clear the zero point calibration using the SST check wire.

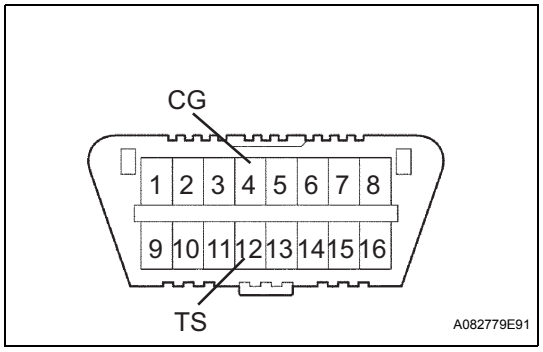
SST 09843-18040

(1) Turn the ignition switch ON.

(2) Using SST, connect and disconnect terminals 12 (TS) and 4 (CG) of the DLC3 4 times or more within 8 seconds.

(3) Check that the warning light indicates the normal code.

(4) Remove the SST from the terminals of the DLC3.



(c) Procedure for test mode:

(1) Turn the ignition switch OFF.

(2) Apply the parking brake (the parking brake switch is turned ON).

(3) Using SST, connect and disconnect terminals 12 (TS) and 4 (CG) of the DLC3.

SST 09843-18040

(4) Check that the steering wheel is in the center position and move the shift lever to P.

(5) Turn the ignition switch ON.

(d) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.

(e) Check that the VSC warning light blinks.

HINT:

If the VSC warning light does not blink, perform the zero point calibration again.

2. PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR (When Using Intelligent Tester)

NOTICE:

- **While performing the calibration, do not tilt, move or shake the vehicle. Keep it in a stationary condition. Do not start the engine.**
- **Be sure to perform the calibration on a level surface (within an inclination of 1 degree).**

BC

(a) Check that the steering wheel is in the center position and move the shift lever to the P position.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON.
(d) Operate the intelligent tester to test mode (SIGNAL CHECK).
(e) Obtain zero point of the yaw rate sensor and deceleration sensor:
    (1) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.
    (2) Check that the VSC warning light blinks.
    HINT:
    If the VSC warning light does not blink, perform the zero point calibration again.
(f) Turn the ignition switch OFF.

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

- **When replacing the skid control ECU, sensors, etc., turn the ignition switch OFF.**
- **When replacing the yaw rate sensor and/or the brake actuator assembly, make sure to perform the yaw rate sensor zero point calibration (see page BC-69)**

Vehicle stability control system

Symptom	Suspected area	See page
ABS, BA and/or EBD does not operate	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. IG power source circuit	BC-120
	3. Front speed sensor circuit	BC-83
	4. Rear speed sensor circuit	BC-89
	5. Check the ABS and TRACTION actuator assembly with the intelligent tester (Check the skid control ECU with actuator operation using the active test function). If abnormal, check the hydraulic circuit for leakage.	BC-74
	6. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU with actuator	-
ABS, BA and/or EBD does not operate efficiently	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. Front speed sensor circuit	BC-83
	3. Rear speed sensor circuit	BC-89
	4. Stop light switch circuit	BC-125
	5. Check the skid control ECU with actuator operation using the active test function. If abnormal, check the hydraulic circuit for leakage	BC-74
	6. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU with actuator	-
ABS warning light abnormal (Remains on)	1. ABS warning light circuit	BC-132
	2. Skid control ECU with actuator (brake actuator assembly)	-
ABS sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. TC and CG terminal circuit	BC-157
	3. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU with actuator	-
Sensor signal check cannot be done	1. Skid control ECU with actuator	-
VSC and/or TRAC does not operate	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2, IG1 power source circuit	BC-120
	3. Check hydraulic circuit for leakage	-
	4. Front speed sensor circuit	BC-83
	5. Rear speed sensor circuit	BC-89
	6. Yaw rate sensor circuit (Deceleration sensor)	BC-117
	7. Steering sensor circuit	BC-115
SLIP indicator light abnormal	1. SLIP indicator light circuit	BC-153
	2. Skid control ECU with actuator	-

Symptom	Suspected area	See page
TRAC OFF indicator abnormal	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. TRAC OFF switch circuit	BC-149
VSC DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. TC and CG terminal circuit	BC-157
VSC warning light abnormal	1. Check the DTC again and make sure that the normal system code is output	BC-74
	2. VSC warning circuit	BC-139

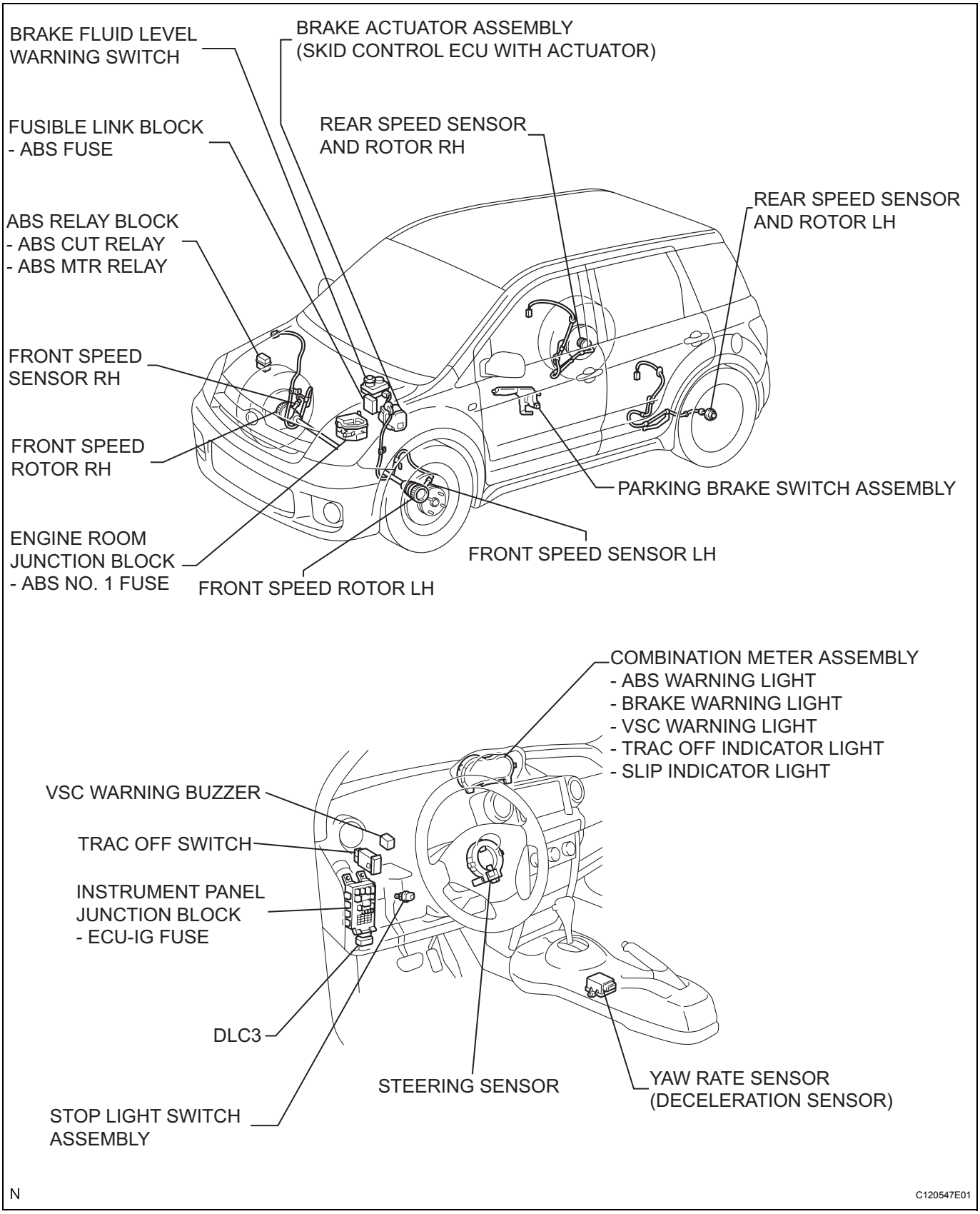
VEHICLE STABILITY CONTROL SYSTEM

PRECAUTION

NOTICE:

- **When there is a malfunction in the contact point of the terminals or installation problems with parts, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.**
- **In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.**
- **Since the vehicle stability control system may be influenced by a malfunction in the other systems, be sure to check for DTCs in the other systems.**
- **Be sure to remove and install the brake actuator assembly and each sensor with the ignition switch OFF unless specified in the inspection procedure.**
- **When removing and installing the brake actuator assembly and each sensor, be sure to check that the normal display is output in test mode inspection and in DTC output inspection after installing all the parts.**
- **After replacing the brake actuator assembly and/or the yaw rate (deceleration) sensor, make sure to perform yaw rate (deceleration) sensor zero point calibration (see page BC-69).**
- **The CAN communication system is used for data communication between the skid control ECU, the steering angle sensor, and the yaw rate (deceleration) sensor. If there is trouble in the CAN communication line, the DTC of the communication line is output.**
- **If a DTC of the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the vehicle stability control system.**
- **Since the CAN communication line has its own length and route, it cannot be repaired temporarily with the bypass wire, etc.**

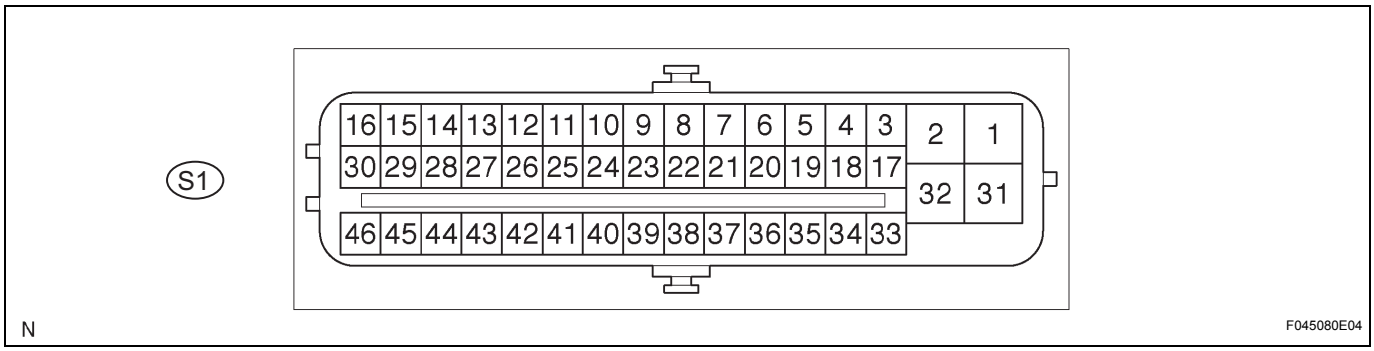
PARTS LOCATION



BC

TERMINALS OF ECU

1. CHECK BRAKE ACTUATOR ASSEMBLY (SKID CONTROL ECU ASSEMBLY WITH ACTUATOR)



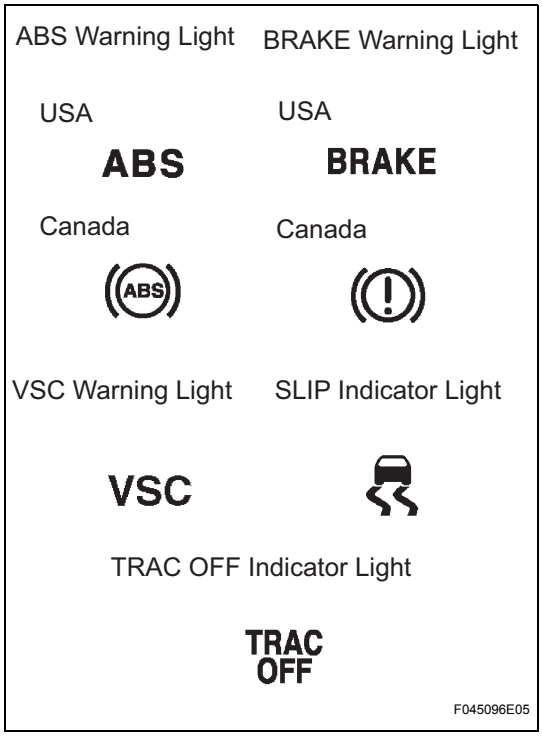
(a) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BM (S1-2) - GND1, 2 (S1-1, 32)	W-L - W-B	Motor relay test input	Ignition switch ON, pump motor running	11 to 14 V
FR+ (S1-3) - FR- (S1-17)	G-W - G-O	Front RH wheel speed signal input	Ignition switch ON, slowly turn right front wheel	AC generation
FL+ (S1-18) - FL- (S1-4)	R - G	Front LH wheel speed signal input	Ignition switch ON, slowly turn left front wheel	AC generation
RR+ (S1-5) - RR- (S1-19)	LG-B - LG-R	Rear RH wheel speed signal input	Ignition switch ON, slowly turn right rear wheel	AC generation
RL+ (S1-20) - RL- (S1-6)	Y-B - Y-B	Rear LH wheel speed signal input	Ignition switch ON, slowly turn left rear wheel	AC generation
NEO (S1-10) - GND1, 2 (S1-1, 32)	V - W-B	Engine rpm signal input	Engine idling	Pulse generation
CANH (S1-11) - CANL (S1-25)	B - W	CAN communication line	Ignition switch ON	Pulse generation
D/G (S1-13) - GND1, 2 (S1-1, 32)	W - W-B	Diagnostic communication line	Ignition switch ON	11 to 14 V
MRF (S1-14) - R+ (S1-45)	GR - R-W	Fail-safe motor relay output	Ignition switch ON	11 to 14 V
MR (S1-15) - R+ (S1-45)	P - R-W	Ignition switch ON, pump motor running	Motor relay output	11 to 14 V
+BS (S1-31) - GND1, 2 (S1-1, 32)	B - W-B	Solenoid relay power supply	Always	11 to 14 V
STP (S1-27) - GND1, 2 (S1-1, 32)	G-W - W-B	Stop light input signal	Stop light switch ON (Brake pedal depressed)	8 to 14 V
			Stop light switch OFF (Brake pedal released)	Below 1.5 V
PKB (S1-28) - GND1, 2 (S1-1, 32)	Y-B - W-B	Parking brake switch input	Ignition switch ON, parking brake switch ON	Below 1.5 V
			Ignition switch ON, parking brake switch OFF	9 to 14 V
WA (S1-29) - GND1, 2 (S1-1, 32)	P - W-B	ABS warning light output	Ignition switch ON, ABS warning light ON	4 to 14 V
			Ignition switch ON, ABS warning light OFF	Below 2.0 V
Bz (S1-30) - GND1, 2 (S1-1, 32)	R-W - W-B	Buzzer output	Ignition switch ON, VSC buzzer sounds	Below 1.0 V
			Ignition switch ON, VSC buzzer does not sound	6 to 14 V
IND (S1-34) - GND1, 2 (S1-1, 32)	B-R - W-B	SLIP input	Ignition switch ON	11 to 14 V

BC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
WT (S1-35) - GND1, 2 (S1-1, 32)	R-L - W-B	TRAC OFF input	Ignition switch ON	11 to 14 V
VSCW (S1-36) - GND1, 2 (S1-1, 32)	BR-W - W-B	VSC warning light output	Ignition switch ON, VSC warning light ON	Below 2.0 V
			Ignition switch ON, VSC warning light OFF	11 to 14 V
WFSE (S1-42) - GND1, 2 (S1-1, 32)	R - W-B	WIFSE input	Ignition switch ON	11 to 14 V
CSW (S1-43) - GND1, 2 (S1-1, 32)	W-L - W-B	TRAC OFF switch input	TRAC OFF switch OFF	11 to 14 V
BRL (S1-44) - GND1, 2 (S1-1, 32)	B-Y - W-B	Brake warning line output	Ignition switch ON, brake warning light ON	4 to 14 V
			Ignition switch ON, brake warning light OFF	Below 1.0 V
R+ (S1-45) - GND1, 2 (S1-1, 32)	R-W - W-B	Power supply for motor relay	Ignition switch ON, ABS warning light OFF	11 to 14 V
IG1 (S1-46) - GND1, 2 (S1-1, 32)	B-L - W-B	IG1 power supply	Ignition switch ON	11 to 14 V

If the result is not as specified, there may be a malfunction in the ECU.



DIAGNOSIS SYSTEM

1. CHECK INDICATOR

(a) Check the warning lights.

(1) Release the parking brake lever.

(2) When the ignition switch ON, check that the ABS warning light, VSC warning light, TRAC OFF indicator light, brake warning light and SLIP indicator light illuminate for approximately 3 seconds.

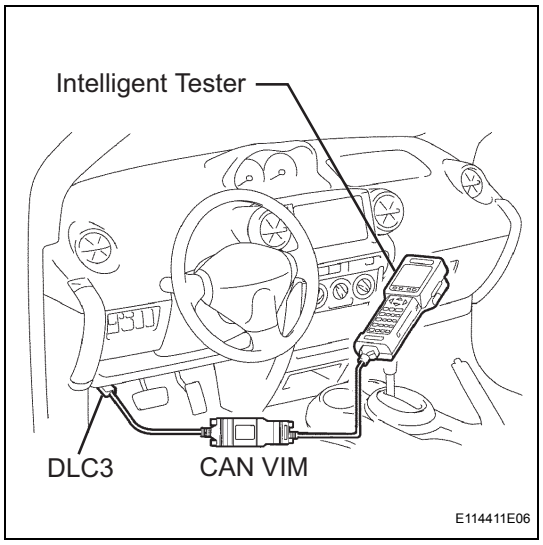
HINT:

- When the parking brake is applied or brake fluid level is low, the brake warning light illuminates.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light, VSC warning light, TRAC OFF indicator light, brake warning light and SLIP indicator light circuit.

If the indicator remains on, proceed to troubleshooting for the light circuit below.

Trouble Area	See procedure
ABS warning light circuit	BC-132
Brake warning light circuit	BC-139
VSC warning light circuit	BC-143
TRAC OFF warning light circuit	BC-149
SLIP indicator light circuit	BC-153

BC



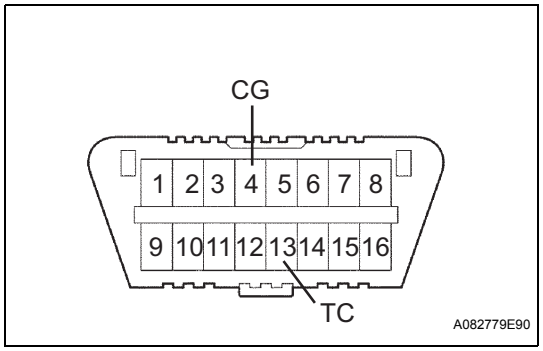
DTC CHECK / CLEAR

1. CHECK DTC (When Using Intelligent Tester)

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.



2. CHECK DTC (When not Using Intelligent Tester)

(a) Check the DTCs.

(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040

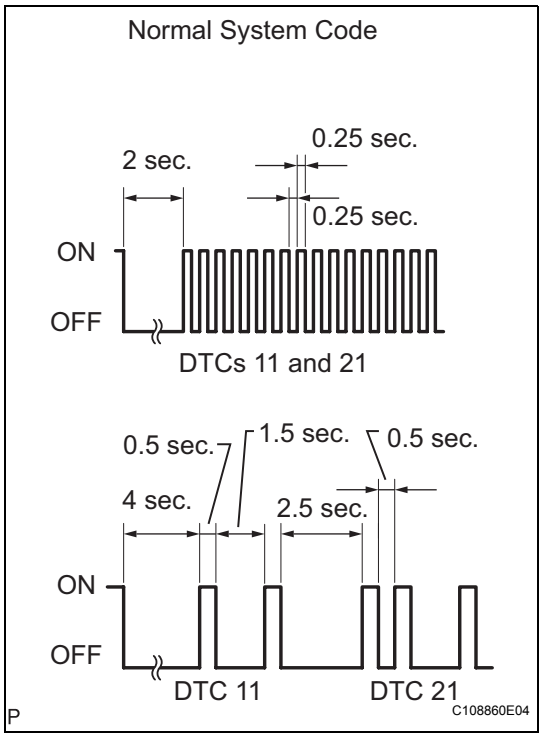
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and VSC warning light on the combination meter.
HINT:

- If no code appears, check the TC and CG circuit or ABS warning light and VSC warning light circuits.

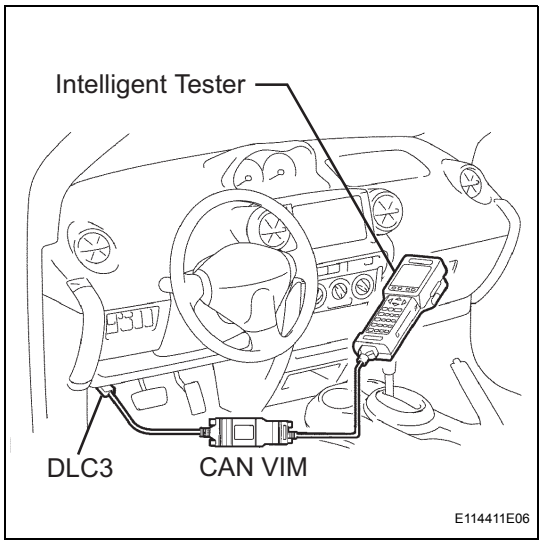
Trouble Area	See procedure
ABS warning light circuit	BC-132
VSC warning light circuit	BC-139
TC and CG terminal circuit	BC-157

- If more than 1 DTC is detected at the same time, the DTCs will be displayed in numerical order.



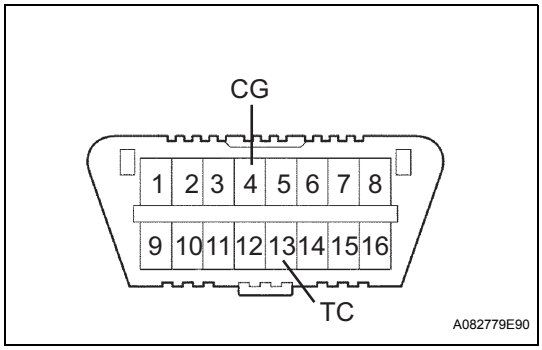
- As an example, the blinking patterns for a normal system code and DTCs 11 and 21 are shown in the illustration.
- DTCs are explained in the Diagnostic Trouble Code Chart.

(b) After completing the check, disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
If 2 or more DTCs are detected at the same time, the DTCs will be displayed first.



3. CLEAR DTC (When Using Intelligent Tester)

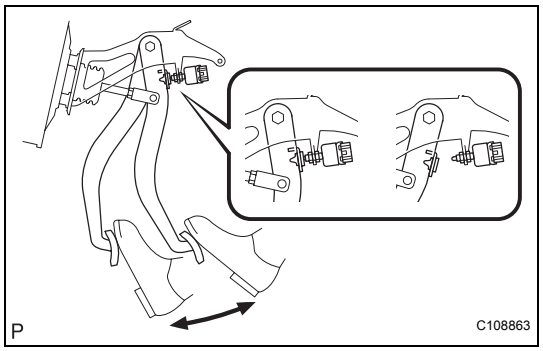
(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Operate the intelligent tester to erase the codes.
HINT:
Refer to the intelligent tester operator's manual for further details.



4. CLEAR DTC (When not Using Intelligent Tester)

(a) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
(b) Turn the ignition switch ON.

BC



(c) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(d) Check that the ABS warning light and VSC warning light indicate the normal system code.
(e) Remove SST from the terminals of the DLC3.
HINT:
DTCs cannot be cleared by removing the battery cable or ECU-IG fuse.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

- When a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from OFF to ON since the last time the ABS was activated. However, if the vehicle is stopped, the vehicle is driven at 7 km/h (4.3 mph) or less, or a DTC is detected, the ECU will not count the next time the ignition switch is turned from OFF to ON.
- Freeze frame data at the time the ABS operates: The skid control ECU stores data or updates stored data when the ABS operates. This data is erased when the ECU stores data at the time a DTC is detected.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, the data will not be updated until the data is cleared.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) From the display on the tester, select FREEZE FRAME DATA.

Intelligent tester display	Measurement item	Reference value
VEHICLE SPD	Vehicle speed	Speed indication on meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON Stop light switch OFF: OFF
# IG ON	Number of ignition switch OFF to ON operations after memorizing freeze frame data	0 to 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.9 V Brake pedal depressed: 0.8 to 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	Min.: -30 MPa/s Max.: 200 MPa/s
SYSTEM	Information about system / mode status	No system activated: NO SYS ABS operating: ABS Fail-safe mode activated: FAIL SF
YAW RATE	Yaw rate sensor reading	-100 to 100
STEERING ANG	Steering angle sensor reading	Left turn: Increase Right turn: Drop
THROTTLE	Throttle position sensor reading	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.
G (RIGHT & LEFT)	Forward and rearward gravitational force (G)	Min.: -1.869 Max.: 1.869
G (BACK & FORTH)	Forward and rearward gravitational force (G)	Min.: -1.869 Max.: 1.869
VSC (TRAC) OFF SW	VSC OFF switch signal	Traction OFF switch ON: OFF, OFF: ON
SHIFT POSITION	Shift lever position	FAIL P*, N* R D 2 L

HINT:
*: The A/C switch is OFF and all accessory switches are OFF.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DATA LIST according to the display on the tester.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PKB SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake not applied	-
STOP LIGHT SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal not depressed	-
VSC/TRAC OFF SW	VSC/TRAC OFF switch/ON or OFF	ON: TRAC OFF switch ON	-
IDLE SW	Main idle switch/ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
ABS MOT RELAY	ABS MTR relay / ON or OFF	ON: MTR relay ON OFF: MTR relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: Test mode	-
SRRR (SRR)	ABS solenoid (SRRR (SRR)) / ON or OFF	ON: Operates OFF: Does not operate	-
SRRH (SRH)	ABS solenoid (SRRH (SRH)) / ON or OFF	ON: Operates OFF: Does not operate	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates OFF: Does not operate	-
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
IG VOLTAGE	ECU power supply voltage / TOO LOW / NORMAL	NORMAL: 10 to 14.0 V TOO LOW: Below 10 V	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
DECELERATION SENSOR	Deceleration sensor 1 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 +-0.13 G when vehicle is not moving	Reading changes when vehicle is shaken
DECELERATION SENSOR 2	Deceleration sensor 2 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 +-0.13 G when vehicle is not moving	Reading changes when vehicle is shaken
ABS OPERT FR	ABS operation (FR) / Before or Operate	Before: No ABS operation (FR) Operate: During ABS operation (FR)	-
ABS OPERT FL	ABS operation (FL) / Before or Operate	Before: No ABS operation (FL) Operate: During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / Before or Operate	Before: No ABS operation (RR) Operate: During ABS operation (RR)	-
ABS OPERT RL	ABS operation (RL) / Before or Operate	Before: No ABS operation (RL) Operate: During ABS operation (RL)	-
SRLR	ABS solenoid (SRLR)/ON or OFF	ON: Operated OFF: Not operated	-
SRLH	ABS solenoid (SRLH)/ON or OFF	ON: Operated OFF: Not operated	-
SM1 (BA-SOL)	TRAC solenoid (SMF)/ON or OFF	ON: Operated OFF: Not operated	-
SM2	TRAC solenoid (SMR)/ON or OFF	ON: Operated OFF: Not operated	-
THROTTLE	Throttle position sensor/ Min.: 0 deg, Max.: 125 deg	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.	-
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 6000 rpm	Actual engine speed	-
VEHICLE SPD	Maximum wheel speed sensor reading/ Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual engine speed	Speed indicated on speedometer
YAW RATE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
YAW ZERO VALUE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
STEERING ANG	Steering sensor/ Min.: -1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / Min.: 0 V, Max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
AIR BLD SUPPORT	Air bleed support/ NOT SUP or SUPPORT	Not supported	-
SPD SEN FR	FR speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
SPD SEN FL	FL speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
SPD SEN RR	RR speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
SPD SEN RL	RL speed sensor open detection/ OPN DET/NORMAL	NORMAL	-
EFI COM	EFI communication open detection/ OPN DET/NORMAL	NORMAL	-
YAWRATE SEN	Yaw rate sensor open detection/ OPN DET/NORMAL	NORMAL	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
DECELE SEN	Deceleration sensor open detection/ OPN DET/NORMAL	NORMAL	-
STEERING SEN	Steering sensor open detection/ OPN DET/NORMAL	NORMAL	-
TEST MODE	Test mode/NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of DTC recorded/ Min.: 0, Max.: 255	Min.: 0, Max.: 39	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Perform the ACTIVE TEST according to the display on the tester.

Skid control ECU with actuator

Item	Vehicle Condition / Test Details	Diagnostic Note
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMF (BA-SOL)	Turns TRAC solenoid SMF (BA-SOL) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMR	Turns TRAC solenoid (SMR) ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard
SOL RELAY	Turns ABS solenoid relay ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS WARNING LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator ON / OFF	Observe combination meter
BRAKE WRN LIGHT	BRAKE warning light ON / OFF	Observe combination meter
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a malfunction code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, turn to the page for the respective "DTC No." in the DTC chart.

DTC chart of VSC

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor - Front speed sensor circuit - Speed sensor rotor	BC-83
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor - Front speed sensor circuit - Speed sensor rotor	BC-83
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor - Rear speed sensor circuit - Speed sensor rotor	BC-89
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor - Rear speed sensor circuit - Speed sensor rotor	BC-89
C0226/21	SFR Solenoid Circuit	- SFRR or SFRH circuit - Skid control ECU with actuator	BC-94
C0236/22	SFL Solenoid Circuit	- SRRR or SRRH circuit - Skid control ECU with actuator	BC-94
C0246/23	SRR Solenoid Circuit	- SRLR or SRLH circuit - Skid control ECU with actuator	BC-94
C0256/24	SRL Solenoid Circuit	- SFRR or SFRH circuit - Skid control ECU with actuator	BC-94
C0273/13	Open in ABS Motor Relay Circuit	- ABS MTR relay - ABS MTR relay circuit - Skid control relay - ABS NO. 1 H-fuse - ABS MTR relay power source circuit	BC-97
C0274/14	Short to B+ in ABS Motor Relay Circuit	- ABS MET relay - ABS MET relay circuit - Skid control relay - ABS NO. 1 H-fuse	BC-97
C0278/11	Open in ABS Solenoid Relay Circuit	- Skid control ECU with actuator - ABS solenoid relay circuit	BC-102
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	- Skid control ECU with actuator - ABS solenoid relay circuit	BC-102
C1201/51	Engine Control System Malfunction	Engine control system	BC-105
C1203/53	ECM Communication Circuit Malfunction	- CAN communication system - ECM	BC-106
C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone	- Yaw rate sensor - Yaw rate sensor circuit - Zero point calibration not done	BC-108
C1223/43	ABS Control System Malfunction	Anti-lock brake system	BC-111
C1224/44	NE Signal Circuit	- NEO circuit - ECM - Skid control ECU with actuator	BC-112
C1225/25	SMC Solenoid Circuit	- SM1 or SM2 circuit - Skid control ECU with actuator	BC-94
C1231/31	Steering Angle Sensor Circuit Malfunction	- Steering angle sensor - Steering angle sensor circuit - Power source circuit	BC-115

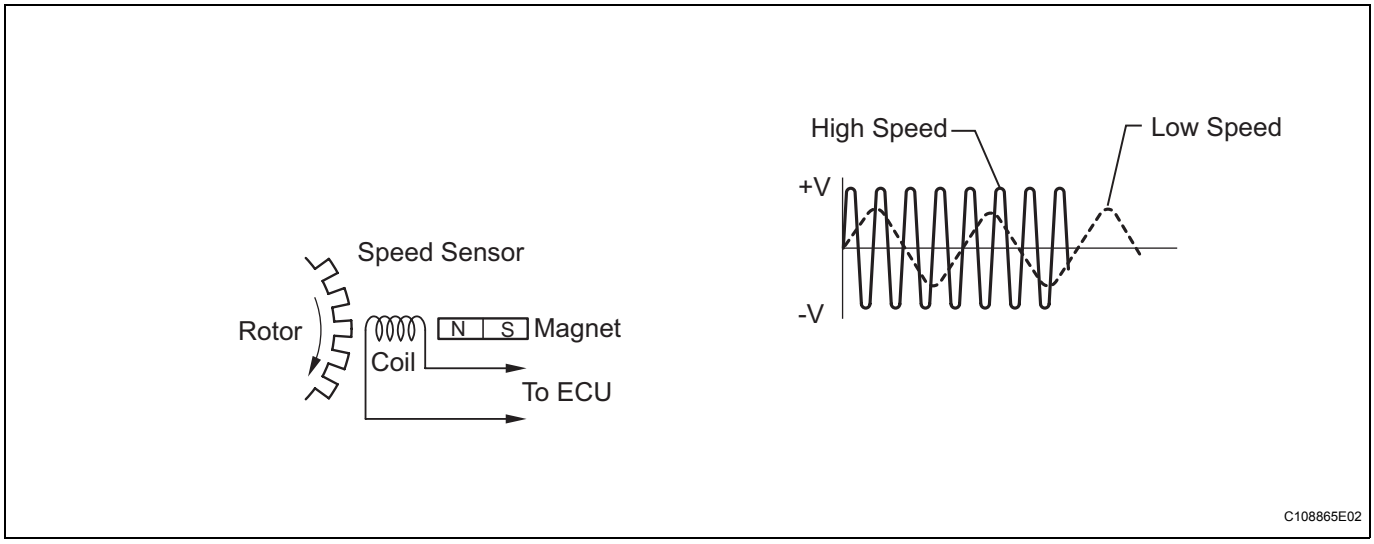
DTC No.	Detection Item	Trouble Area	See page
C1232/32	Stuck in Deceleration Sensor	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1234/34	Yaw Rate Sensor Malfunction	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	- Front speed sensor - Front speed sensor circuit	BC-83
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	- Front speed sensor - Front speed sensor circuit	BC-83
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	- Rear speed sensor - Rear speed sensor circuit	BC-89
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	- Rear speed sensor - Rear speed sensor circuit	BC-89
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	- Battery - Charging system - Power source circuit	BC-120
C1246/46	Master Cylinder Pressure Sensor Malfunction	- Master cylinder pressure sensor - Master cylinder pressure sensor circuit	BC-123
C1249/49	Open in Stop Light Switch Circuit	- Stop light switch assembly - Stop light switch circuit	BC-125
C1251/51	Open in Pump Motor Circuit	- Skid control ECU with actuator - Skid control ECU with actuator circuit	BC-129
C1243/43	Acceleration Sensor Stuck Malfunction	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1244/44	Open or Short in Deceleration Sensor Circuit	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1245/45	Acceleration Sensor Output Malfunction	- Yaw rate sensor - Yaw rate sensor circuit - Wire harness	BC-117
C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit	- ABS MET relay - ABS MET relay circuit - Skid control relay - ABS NO. 1 H-fuse	BC-97
C1336/39	Zero Point Calibration of Acceleration Sensor Undone	- Yaw rate sensor (Deceleration sensor) - Yaw rate sensor circuit (Deceleration sensor) - Zero point calibration not done	BC-108
C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction	- Battery - Power source circuit - Charging system	BC-117
U0100/65	Lost Communication with ECM / PCM	CAN communication system	BC-131
U0121/94	CAN Communication Function Fault	CAN communication system	BC-131
U0123/62	Lost Communication with Yaw Rate Sensor Module	CAN communication system	BC-131
U0124/95	Lost Communication with Lateral Acceleration Sensor Module	CAN communication system	BC-131
U0126/63	Lost Communication with Steering Angle Sensor Module	CAN communication system	BC-131

DTC chart of sensor check function

DTC No.	Detection Item	Trouble Area	See page
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor RH - Sensor installation - Sensor rotor	BC-83
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor LH - Sensor installation - Sensor rotor	BC-83
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor RH - Sensor installation - Sensor rotor	BC-89
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor LH - Sensor installation - Sensor rotor	BC-89
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor rotor RH	BC-83
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor rotor LH	BC-83
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor rotor RH	BC-89
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor rotor LH	BC-89
C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)	- Deceleration sensor - Sensor installation	BC-117
C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)	- Master cylinder pressure sensor	BC-123

DTC	C0200/31	Right Front Wheel Speed Sensor Signal Malfunction
DTC	C0205/32	Left Front Wheel Speed Sensor Signal Malfunction
DTC	C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH
DTC	C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH
DTC	C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)
DTC	C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)

DESCRIPTION



The speed sensor detects wheel speed and transmits the appropriate signals to the ECU. These signals are used for control of the ABS.

BC

Each of the front and rear rotors have 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor produces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71, C1272/72, C1275/75 and C1276/76 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1271/71, C1272/72, C1275/75 and C1276/76 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 1 second or more • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.5 seconds or more	• Front speed sensor • Front speed sensor circuit • Speed sensor rotor
C1235/35 C1236/36	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more.	• Front speed sensor • Front speed sensor circuit
C1271/71	Detected only during test mode	• Front speed sensor RH • Sensor installation • Sensor rotor
C1272/72	Detected only during test mode	• Front speed sensor LH • Sensor installation • Sensor rotor
C1275/75	Detected only during test mode	Front speed sensor rotor RH
C1276/76	Detected only during test mode	Front speed sensor rotor LH

HINT:
- DTCs C0200/31 and C1235/35 are for the front speed sensor RH.
- DTCs C0205/32 and C1236/36 are for the front speed sensor LH.

WIRING DIAGRAM

BC

INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 4

A

2 READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Check the DATA LIST for proper functioning of the front speed sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → Go to step 4

OK

3 CHECK DTC IF OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

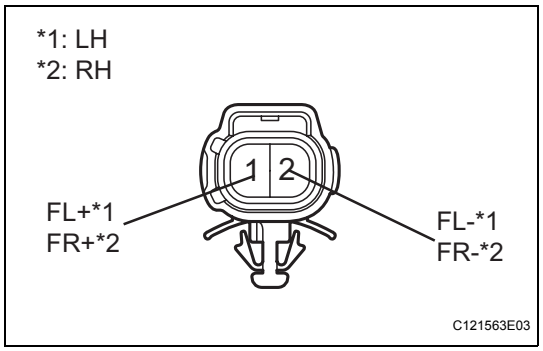
B → CHECK FOR INTERMITTENT PROBLEMS

BC

A

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT FRONT SPEED SENSOR



(a) Disconnect the A3 and A4 sensor connectors.
(b) Measure the resistance of the speed sensors.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (FL+) - 2 (FL-)	0.6 to 2.5 kΩ at 40 to 120°C
1 (FL+) - Body ground	10 kΩ or higher
2 (FL-) - Body ground	

RH

Tester Connection	Specified Condition
1 (FR+) - 2 (FR-)	0.6 to 2.5 kΩ at 40 to 120°C
1 (FR+) - Body ground	10 kΩ or higher
2 (FR-) - Body ground	

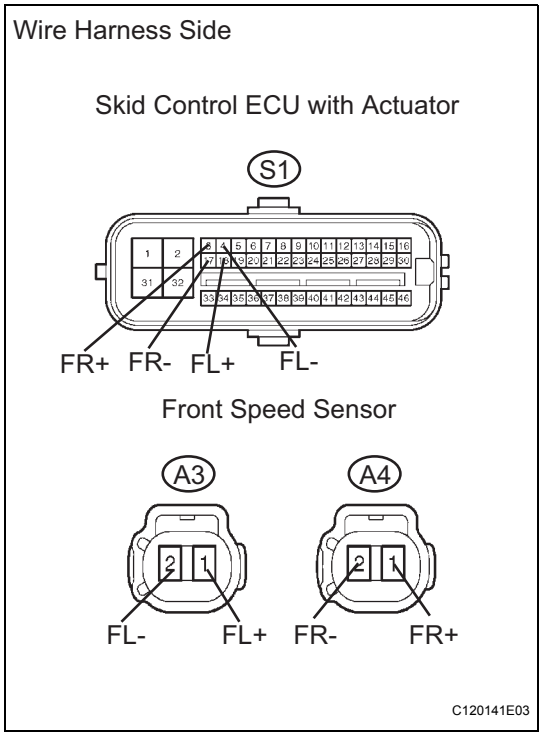
HINT:
- Check the speed sensor signal after the speed sensor replacement (see page BC-65).
- When replacing the speed sensor, clean the installation hole of the sensor.

NG → **REPLACE FRONT SPEED SENSOR**

OK

BC

5 CHECK WIRE HARNESS (SKID CONTROL ECU - FRONT SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A3 and A4 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance:

LH

Tester Connection	Specified Condition
S1-18 (FL+) - A3-1 (FL+)	Below 1 Ω
S1-4 (FL-) - A3-2 (FL-)	
A3-1 (FL+) - Body ground	10 kΩ or higher
A3-2 (FL-) - Body ground	

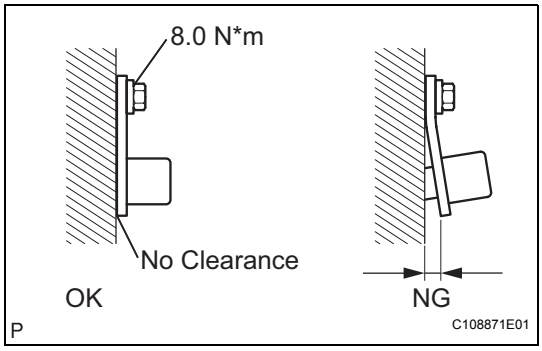
RH

Tester Connection	Specified Condition
S1-3 (FR+) - A4-1 (FR+)	Below 1 Ω
S1-17 (FR-) - A4-2 (FR-)	
A4-1 (FR+) - Body ground	10 kΩ or higher
A4-2 (FR-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 INSPECT FRONT SPEED SENSOR (INSTALLATION)



(a) Check the speed sensor installation.

OK:

Installation bolt is tightened properly.
There is no clearance between sensor and front steering knuckle.
Torque:
8.0 N*m (82 kgf*cm, 71 in.*lbf)

HINT:

- Check the speed sensor signal after the speed sensor replacement (see page BC-65).
- When replacing the speed sensor, clean the installation hole of the sensor.

NG → **SECURELY REINSTALL FRONT SPEED SENSOR**

OK

7 INSPECT SPEED SENSOR (TIP)

(a) Remove the front speed sensor.
(b) Check the sensor tip.

BC

OK:

No scratches or foreign matter on sensor tip.

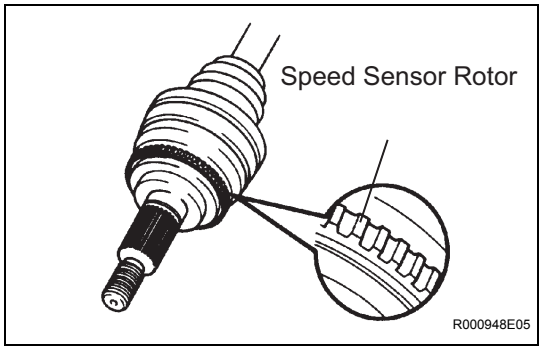
HINT:

Check the speed sensor signal after cleaning or replacing the speed sensor (see page BC-65).

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

8 INSPECT SPEED SENSOR ROTOR



(a) Remove the front axle hub.

(b) Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter on sensor rotor.

HINT:

- If foreign matter is attached, remove it and check the output waveform after reassembly.
- Check the speed sensor signal after cleaning or replacing the speed sensor rotor (see page BC-65).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

9 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).

(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.

(c) Check for DTCs (see page BC-74).

Result

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

HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

DTC	C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction
DTC	C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction
DTC	C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH
DTC	C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH
DTC	C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)
DTC	C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)
DTC	C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)
DTC	C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DESCRIPTION

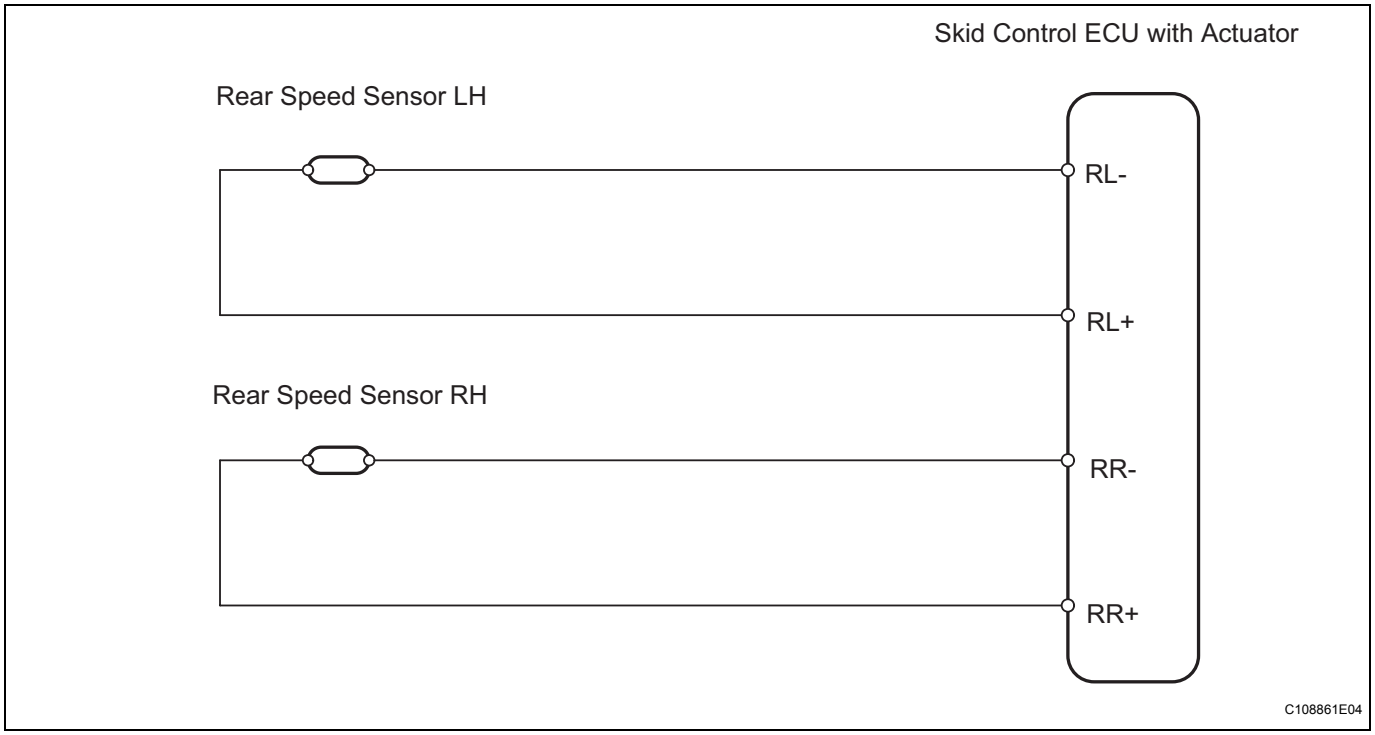
Refer to DTCs C0200/31, C0205/32, C1235/35 and C1236/36.
DTCs C1273/73, C1274/74, C1277/77 and C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1273/73, C1274/74, C1277/77 and C1278/78 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 1 second or more • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.5 seconds or more	• Rear speed sensor • Rear speed sensor circuit • Speed sensor rotor
C1238/38 C1239/39	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more	• Rear speed sensor • Rear speed sensor circuit
C1273/73	Detected only during test mode	• Rear speed sensor RH • Sensor installation • Sensor rotor
C1274/74	Detected only during test mode	• Rear speed sensor LH • Sensor installation • Sensor rotor

DTC No.	DTC Detection Condition	Trouble Area
C1277/77	Detected only during test mode	Rear speed sensor RH
C1278/78	Detected only during test mode	Rear speed sensor LH

HINT:
- DTCs C0210/33 and C1233/38 are for the rear speed sensor RH.
- DTCs C0215/34 and C1239/39 are for the rear speed sensor LH.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 4**

A

2 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Check the DATA LIST for proper functioning of the rear speed sensor.

BC

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → **Go to step 4**

OK ↓

3 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

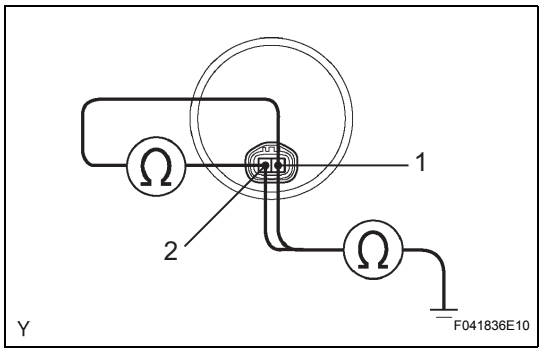
B → **END**

A ↓

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT REAR SPEED SENSOR

BC



(a) Disconnect the A15 and A16 sensor connectors.
(b) Measure the resistance of the speed sensors.
Standard resistance:
LH

Tester Connection	Specified Condition
1 (RL-) - 2 (FL+)	1.0 to 1.4 kΩ at 20°C
1 (RL-) - Body ground	10 kΩ or higher
2 (RL+) - Body ground	

RH

Tester Connection	Specified Condition
1 (RR-) - 2 (RR+)	1.0 to 1.4 kΩ at 20°C

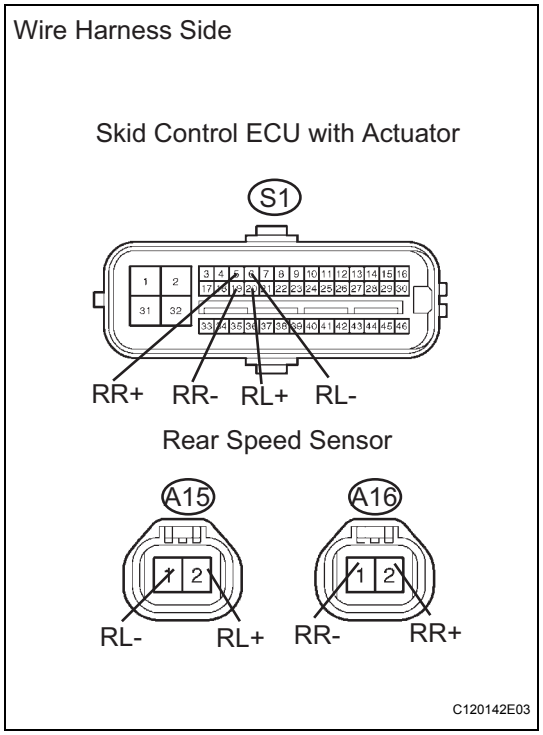
Tester Connection	Specified Condition
1 (RR-) - Body ground	10 kΩ or higher
2 (RR+) - Body ground	

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-65).

NG → REPLACE REAR SPEED SENSOR

OK

5 CHECK WIRE HARNESS (SKID CONTROL ECU - REAR SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A15 and A16 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance:
LH

Tester Connection	Specified Condition
S1-20 (RL+) - A15-2	Below 1 Ω
S1-6 (RL-) - A15-1	
A15-2 - Body ground	10 kΩ or higher
A15-1 - Body ground	

RH

Tester Connection	Specified Condition
S1-5 (RR+) - A16-2	Below 1 Ω
S1-19 (RR-) - A16-1	
A16-2 - Body ground	10 kΩ or higher
A16-1 - Body ground	

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

BC

B → END

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

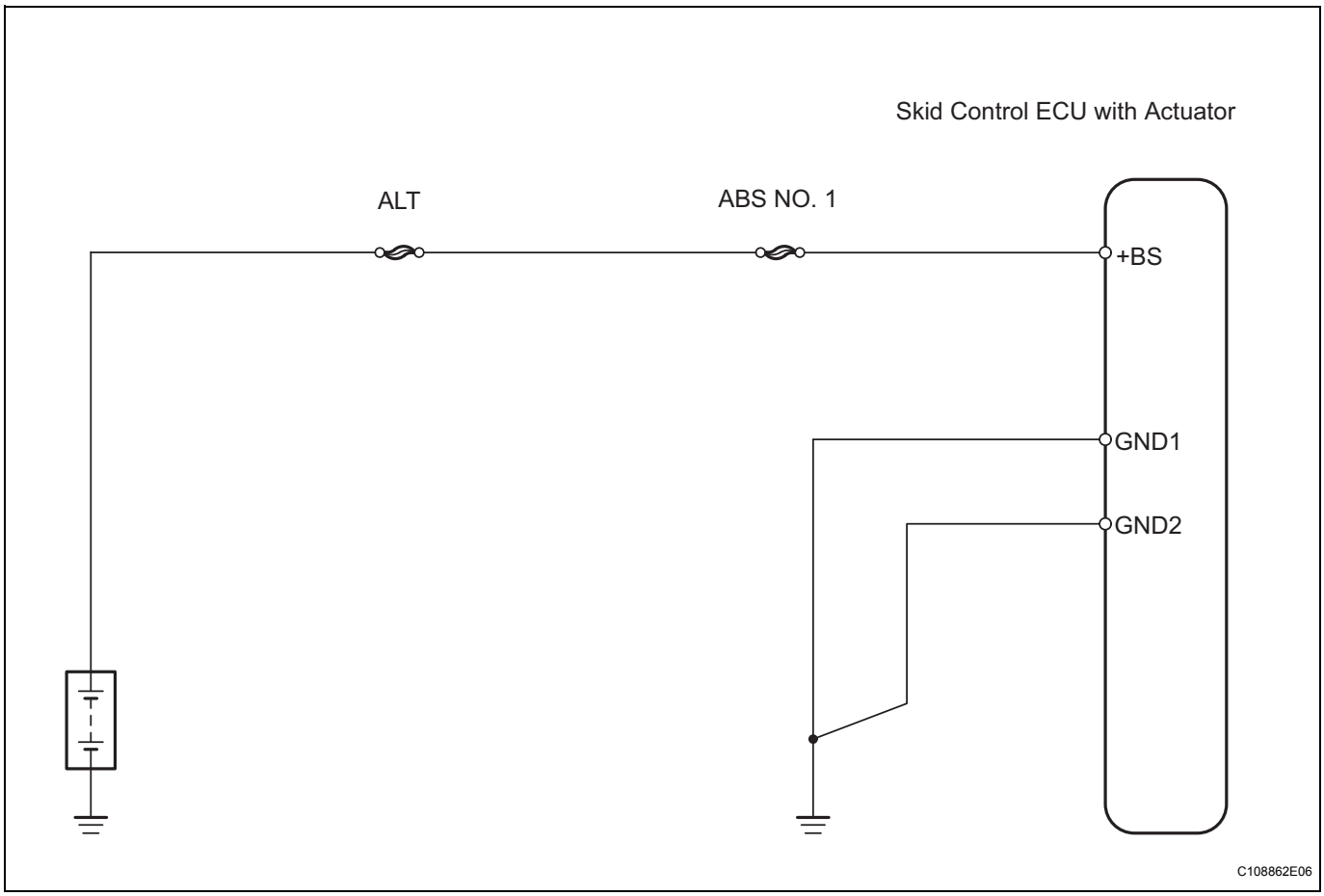
DTC	C1225/25	SMC Solenoid Circuit

DESCRIPTION

ABS solenoids turn on when receiving signals from the ECU. They control braking force by adjusting the pressure applied to the wheel cylinders.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21	Open or short circuit in front right solenoid circuit (SFRR or SFRH) continues for 0.05 seconds or more	• SFRR or SFRH circuit • Skid control ECU with actuator
C0236/22	Open or short circuit in front left solenoid circuit (SFLR or SFLH) continues for 0.05 seconds or more	• SFLR or SFLH circuit • Skid control ECU with actuator
C0246/23	Open or short circuit in rear right solenoid circuit (SRRR or SRRH) continues for 0.05 seconds or more	• SRRR or SRRH circuit • Skid control ECU with actuator
0256/24	Open or short in rear left solenoid circuit (SRLR or SRLH) continues for 0.05 seconds or more	• SRLR or SRLH circuit • Skid control ECU with actuator
C1255/25	Detection of any of conditions 1. to 5.: 1. When SM1 or SM2 is ON, excessive electric current on SM1 or SM2 continues for 0.05 seconds or more 2. When SM1 or SM2 is OFF, open circuit in SM1 or SM2 continues for 0.05 seconds or more 3. When SM1 or SM2 is ON and electric current is 0.348 A or more, duty ratio between SM1 and SM2 is 2.08 or more, or below 0.48 for 0.2 seconds or more 4. When SM1 or SM2 is OFF, electric current is 0.15 A or more for 0.05 seconds or more 5. All of following conditions continue • When switch solenoid (SM1 or SM2) outputs ON signal • Output current is more than 0.348 A • Ratio of monitored current to target current is more than 2 A for 0.1 second, or less than 0.15 A for 0.5 seconds.	• SM1 or SM2 circuit • Skid control ECU with actuator

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the solenoid circuit is built into the brake actuator assembly, solenoid circuit inspection and solenoid unit inspection cannot be performed.
Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTCs (see page BC-74).
(b) Turn the ignition switch ON and check that the ABS warning light illuminates for approximately 3 seconds.
(c) Check for DTCs (see page BC-74).

Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

BC

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

- When a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times the ignition switch has been turned from OFF to ON (maximum: 31) since the last time the ABS was activated. However, if the vehicle is stopped, the vehicle is driven at 7 km/h (4.3 mph) or less, or a DTC is detected, the ECU will not count the next time the ignition switch is turned from OFF to ON.
- Freeze frame data at the time the ABS operates: The skid control ECU stores data or updates stored data when the ABS operates. This data is erased when the ECU stores data at the time a DTC is detected.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, the data will not be updated until the data is cleared.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) From the display on the tester, select FREEZE FRAME DATA.

Intelligent tester display	Measurement item	Reference value*
VEHICLE SPD	Vehicle speed	Speed indication on meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON Stop light switch OFF: OFF
# IG ON	Number of ignition switch OFF to ON operations after memorizing freeze frame data	0 to 31
SYSTEM	Information about system / mode status	No system activated: NO SYS ABS operating: ABS Fail-safe mode activated: FAIL SF

HINT:

*: The A/C switch is OFF and all accessory switches are OFF.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DATA LIST according to the display on the tester.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PKB SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake not applied	-
STOP LIGHT SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal not depressed	-
ABS MOT RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: Test mode	-
SRRR	ABS solenoid (SRRR) / ON or OFF	ON: Operates OFF: Does not operate	-
SRRH	ABS solenoid (SRRH) / ON or OFF	ON: FOperates OF: Does not operate	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates OFF: Does not operate	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates OFF: Does not operate	-
SRLR	ABS solenoid (SRLR) ON or OFF	ON: Operates OFF: Does not operate	-
SRLH	ABS solenoid (SRLH) ON or OFF	ON: Operates OFF: Does not operate	-
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOWT	NORMAL: 10 to 14.0 V TOO LOW: Below 10 V	-
ABS OPERT FR	ABS operation (FR) / Before or Operate	Before: No ABS operation (FR) Operate: During ABS operation (FR)	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS OPERT FL	ABS operation (FL) / Before or Operate	Before: No ABS operation (FL) Operate: During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / Before or Operate	Before: No ABS operation (RR) Operate: During ABS operation (RR)	-
ABS OPERT RL	ABS operation (RL) / Before or Operate	Before: No ABS operation (RL) Operate: During ABS operation (RL)	-
AIR BLD SUPPORT	Air bleed support / SUPPORT or NOT SUP	Supported	-
#CODES	Number of DTC recorded / Min.: 0, Max.: 255	Min.: 0, Max.: 19	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Perform the ACTIVE TEST according to the display on the tester.

Skid control ECU with actuator

Item	Vehicle Condition / Test Details	Diagnostic Note
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR & SFRH	Turns ABS solenoid SFRR & SFRH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR & SFLH	Turns ABS solenoid SFLR & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH & SRRR	Turns ABS solenoid SRRH & SRRR ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR & SRLH	Turns ABS solenoid SRLR & SRLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH & SFLH	Turns ABS solenoid SFRH & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard

Item	Vehicle Condition / Test Details	Diagnostic Note
SOL RELAY	Turns ABS solenoid relay ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS WARNING LIGHT	Turns warning light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Brake warning light ON / OFF	Operation of solenoid (clicking sound) can be heard

DTC	C0273/13	Open in ABS Motor Relay Circuit

DTC	C0274/14	Short to B+ in ABS Motor Relay Circuit

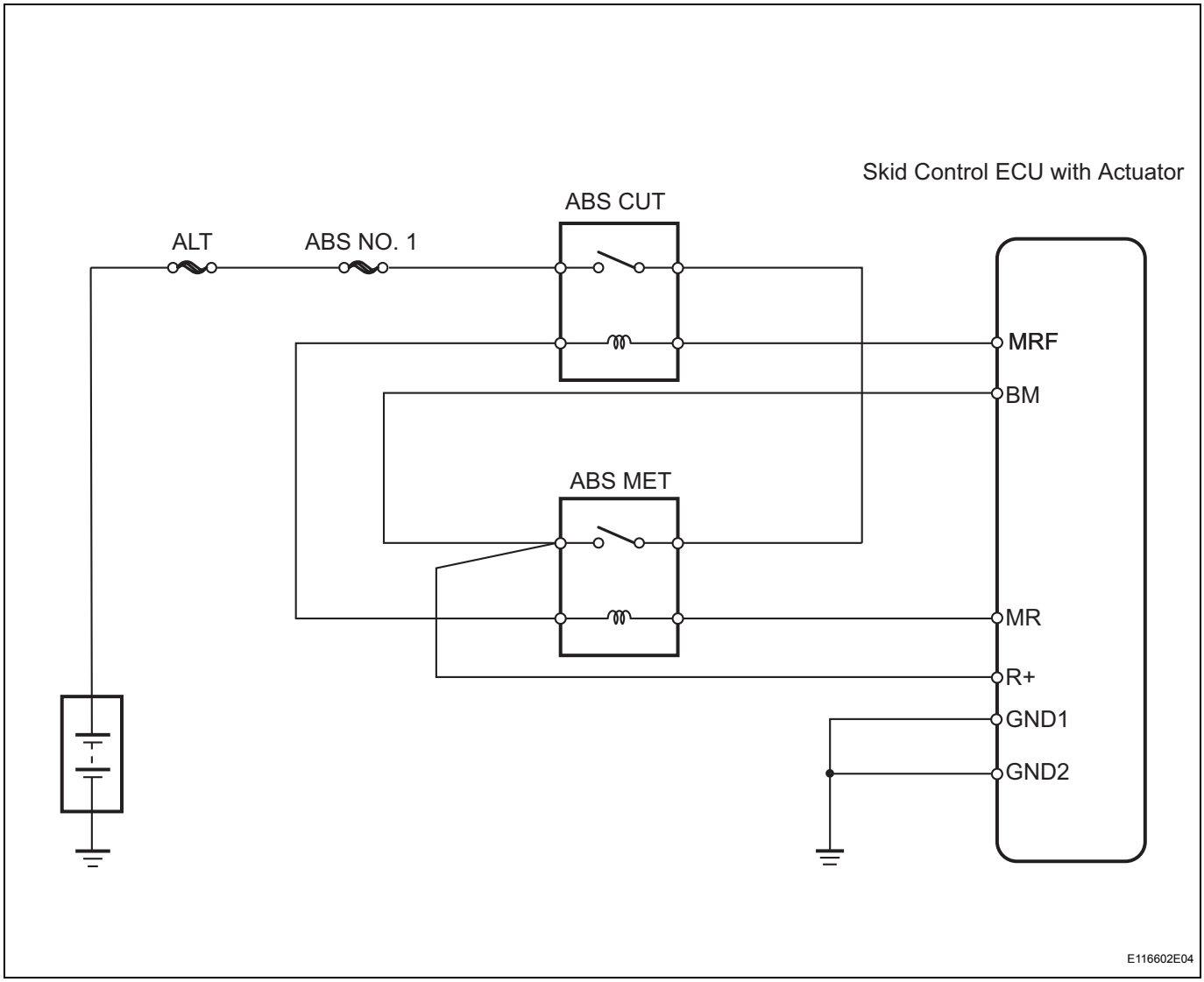
DTC	C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit

DESCRIPTION

The ABS MTR relay supplies power to the ABS pump motor. While the ABS is activated, the ECU turns the ABS MTR relay ON and operates the ABS pump motor.

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	When any of following (1 or 2) is detected: 1. All of following conditions continue for 0.12 seconds or more – IG1 terminal voltage is between 9.5 to 17.2 V – During initial check or ABS, BA, TRAC, and VSC are in operation – Relay contact is open when relay is ON 2. Both of following conditions continue for 0.12 seconds or more – IG1 terminal voltage is 9.5 V or less – Relay contact remains open when relay is ON	• ABS MTR relay • ABS MTR relay circuit • Skid control relay • ABS NO. 1 H-fuse • ABS MTR relay power source circuit
C0274/14	When motor relay is OFF, motor relay remains closed for 4 seconds or more	• ABS MTR relay • ABS MTR relay circuit • Skid control relay • ABS NO. 1 H-fuse
C1361/91	All of following conditions continue for at least 4 seconds: • Immediately after turning ignition switch ON • Relay contact is closed when fail-safe relay is OFF	• ABS MTR relay • ABS MTR relay circuit • Skid control relay • ABS NO. 1 H-fuse

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

BC

B → **Go to step 3**

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS motor relay operates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard

OK:
Operation sound of motor can be heard.
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

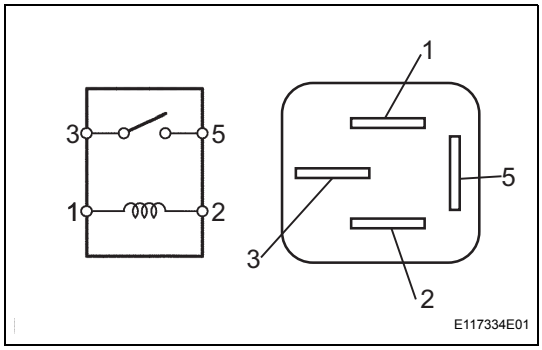
3	INSPECT FUSE (ABS)

(a) Remove the ABS H-fuse from the engine room relay block.
(b) Measure the resistance of the H-fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

4	INSPECT RELAY (Marking: ABS MTR)



(a) Remove the ABS MTR relay from the ABS relay block.
(b) Measure the resistance of the relay.
Standard resistance

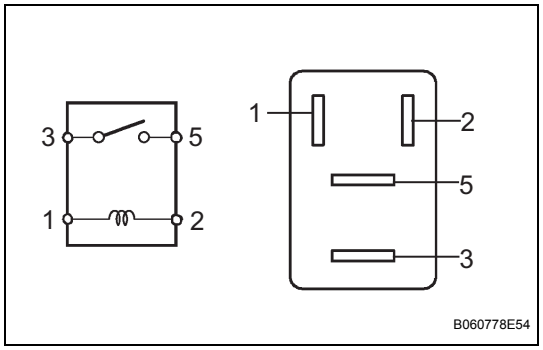
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

BC

5 INSPECT RELAY (Marking: ABS CUT)



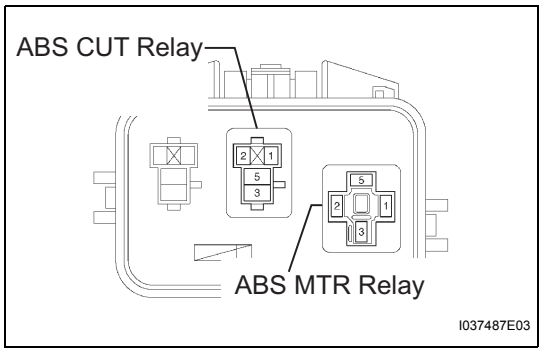
(a) Remove the ABS CUT relay from the ABS relay block.
(b) Measure the resistance of the relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

6 CHECK WIRE HARNESS (ABS CUT RELAY - ABS MTR RELAY AND BATTERY)



(a) Remove the ABS CUT relay and ABS MTR relay from the ABS relay block.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
ABS CUT relay terminal 5 - Body ground	10 to 14 V

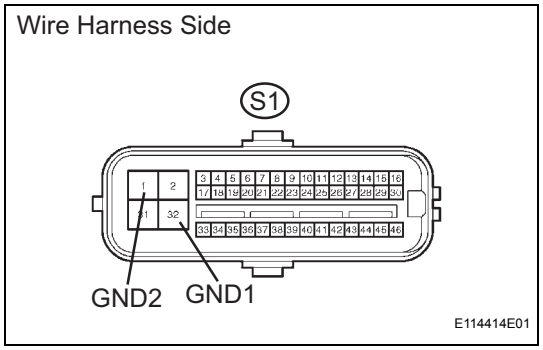
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
ABS CUT relay terminal 3 - ABS MTR relay terminal 5	Below 1 Ω
ABS CUT relay terminal 1 - ABS MTR relay terminal 1	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

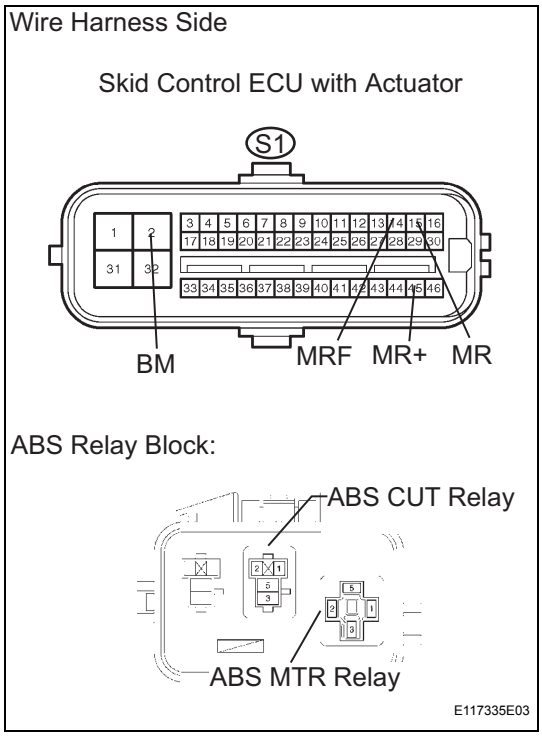
Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

BC

OK

8	CHECK WIRE HARNESS (SKID CONTROL ECU - ABS CUT RELAY AND ABS MTR RELAY)



(a) Disconnect the S1 ECU connector.
(b) Remove the ABS CUT relay and ABS MTR relay from the ABS relay block.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
S1-14 (MRF) - ABS CUT relay terminal 2	Below 1 Ω
S1-2 (BM) - ABS MTR relay terminal 3	
S1-15 (MR) - ABS MTR relay terminal 2	
S1-45 (R+) - ABS MTR relay terminal 3	

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0278/11	Open in ABS Solenoid Relay Circuit

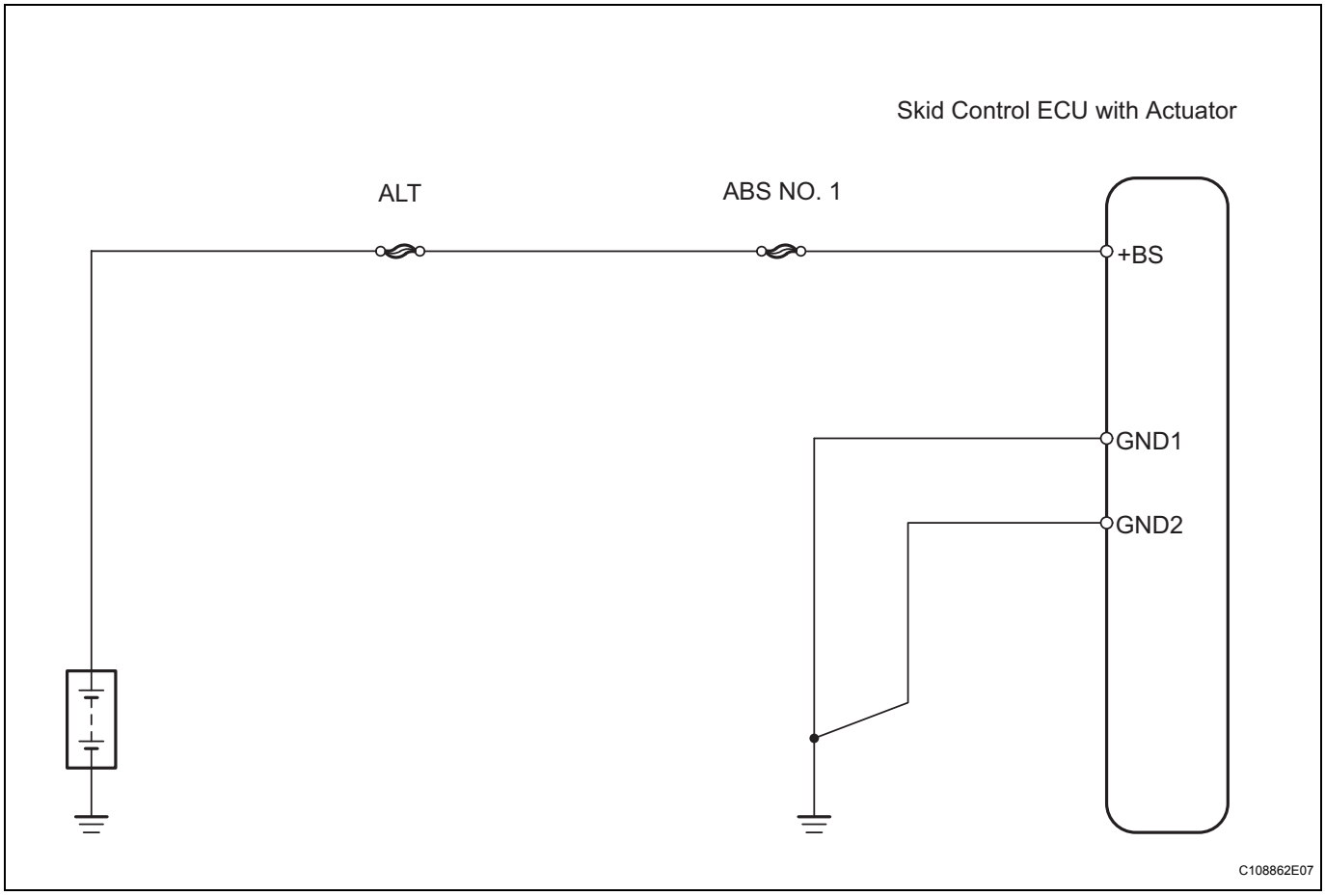
DTC	C0279/12	Short to B+ in ABS Solenoid Relay Circuit

DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the ABS initial check completes, the skid control ECU turns the ABS solenoid relay on.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When either of following is detected: 1. Both conditions continue for at least 0.2 seconds • IG voltage is between 9.5 and 17.2 V • Relay contact is open when relay is ON 2. Both conditions continue for at least 0.2 seconds • IG voltage is less than 9.5 V • Relay contact remains open when relay is ON	• Skid control ECU with actuator • ABS solenoid relay circuit
C0279/12	When relay is OFF, turning ignition switch ON closes relay contact immediately and continues for at least 0.2 seconds	• Skid control ECU with actuator • ABS solenoid relay circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

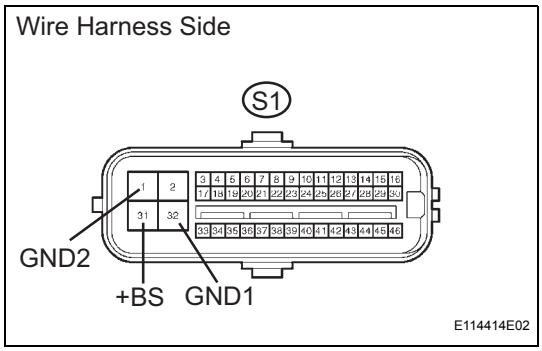
1	INSPECT FUSE (ALT, ABS NO. 1)

(a) Remove the ALT and ABS NO. 1 H-fuses from the engine room junction block.
(b) Measure the resistance of the H-fuses.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S1-31 (+BS) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the ABS motor relay is built into the brake actuator assembly, ABS motor relay and solenoid unit inspection cannot be performed.
Be sure to check if the DTC is output before replacing the brake actuator assembly.
(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at 6 km/h (4 mph) or more.
(c) Check for DTCs (see page BC-74).
Result

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

BC

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → END

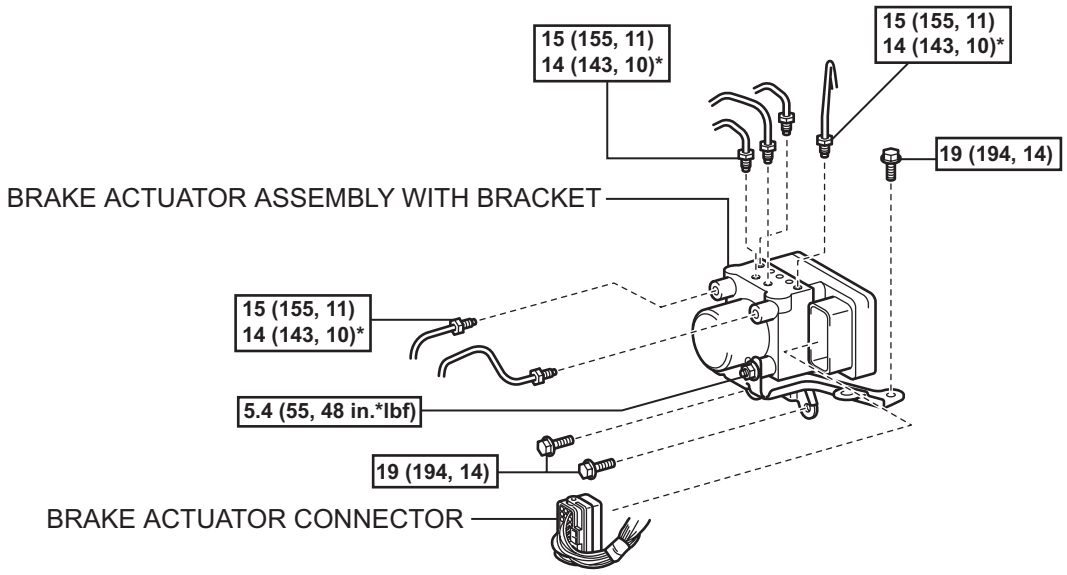
A

REPLACE BRAKE ACTUATOR ASSEMBLY

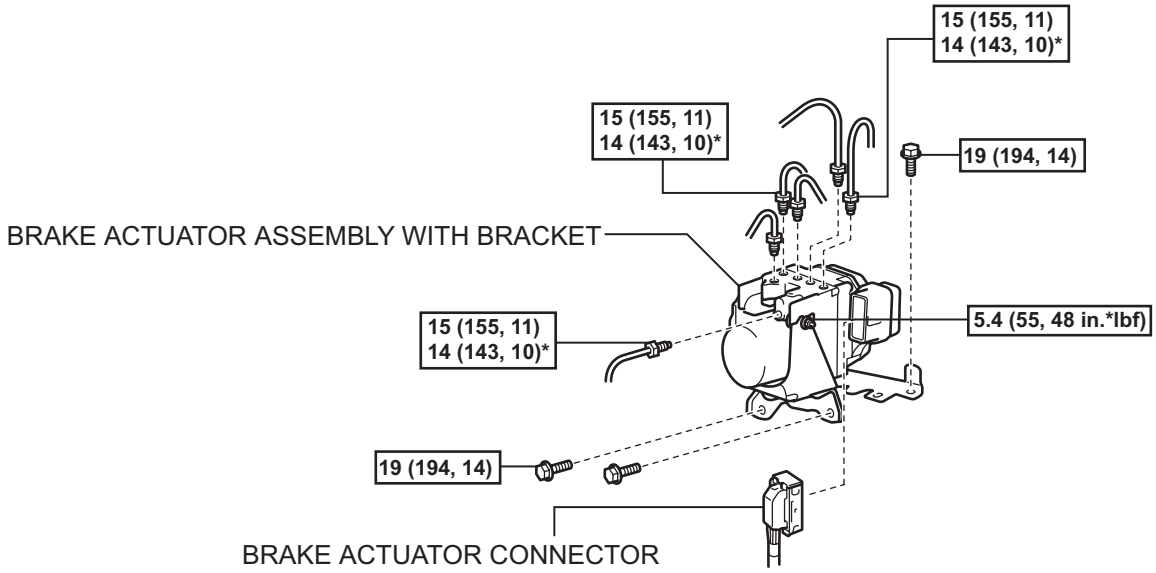
BRAKE ACTUATOR

COMPONENTS

w/o VSC



w/ VSC



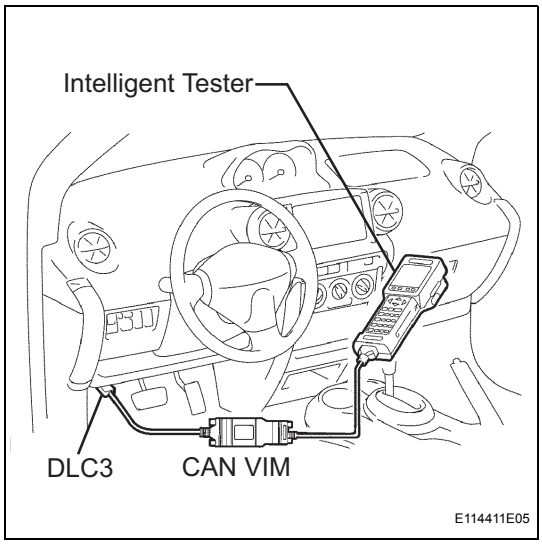
N*m (kgf*cm, ft.*lbf) : Specified torque

* For use with SST

H

C117784E01

BC



ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and idle it.
(c) Select the Active Test mode on the intelligent tester.
HINT:
Please refer to the intelligent tester operator's manual for further details.

2. CHECK ACTUATOR MOTOR OPERATION

NOTICE:
Do not keep a motor relay ON for more than 5 seconds. When operating it consecutively, wait 20 seconds between each operation.

(a) Turn the motor relay ON and check the actuator motor operation noise.
(b) Turn the motor relay OFF.
(c) Fully depress the brake pedal and hold it for approximately 15 seconds. Check that the pedal's initial depth is maintained for the entire 15 seconds.
(d) Turn the motor relay ON and check that the pedal does not pulsate.
(e) Turn the motor relay OFF and release the pedal.

3. CHECK RIGHT FRONT WHEEL OPERATION

NOTICE:
- **Be sure to follow the procedures below when turning ON a solenoid.**
- **Do not keep a solenoid ON for more than 10 seconds. When operating it consecutively, wait 20 seconds between each operation.**

(a) With the pedal depressed as much as possible, perform the following operations.
(b) Turn the SFRH and SFRR solenoids ON simultaneously, and check that the pedal cannot be depressed further.
(c) Turn the SFRH and SFRR solenoids OFF simultaneously, and check that the pedal can be depressed further.
(d) Turn the motor relay ON. Check that the pedal returns to the "depressed as much as possible" position.
(e) Turn the motor relay OFF and release the pedal.

4. CHECK OTHER WHEEL OPERATION

(a) Using the same procedures, check the solenoids of the other wheels.
NOTICE:
The pedal must be depressed if only the reduction solenoid SFLR, SRRR or SRLR is turned on.
HINT:
Left front wheel: SFLH, SFLR
Right rear wheel: SRRH, SRRR
Left rear wheel: SRLH, SRLR

DTC C1201/51 Engine Control System Malfunction

DESCRIPTION

If trouble occurs in the engine control system, the skid control ECU prohibits TRAC and VSC control.

DTC No.	DTC Detection Condition	Trouble Area
C1201/51	At engine speed of 500 rpm or more, a trouble signal in engine control system continues for 5 seconds or more	Engine control system

INSPECTION PROCEDURE

1	CHECK DTC FOR ENGINE

Result

Result	Proceed to
Normal Code	A
Malfunction Code	B

B → REPAIR ENGINE CONTROL SYSTEM ACCORDING TO CODE OUTPUT

A

REPLACE ECM

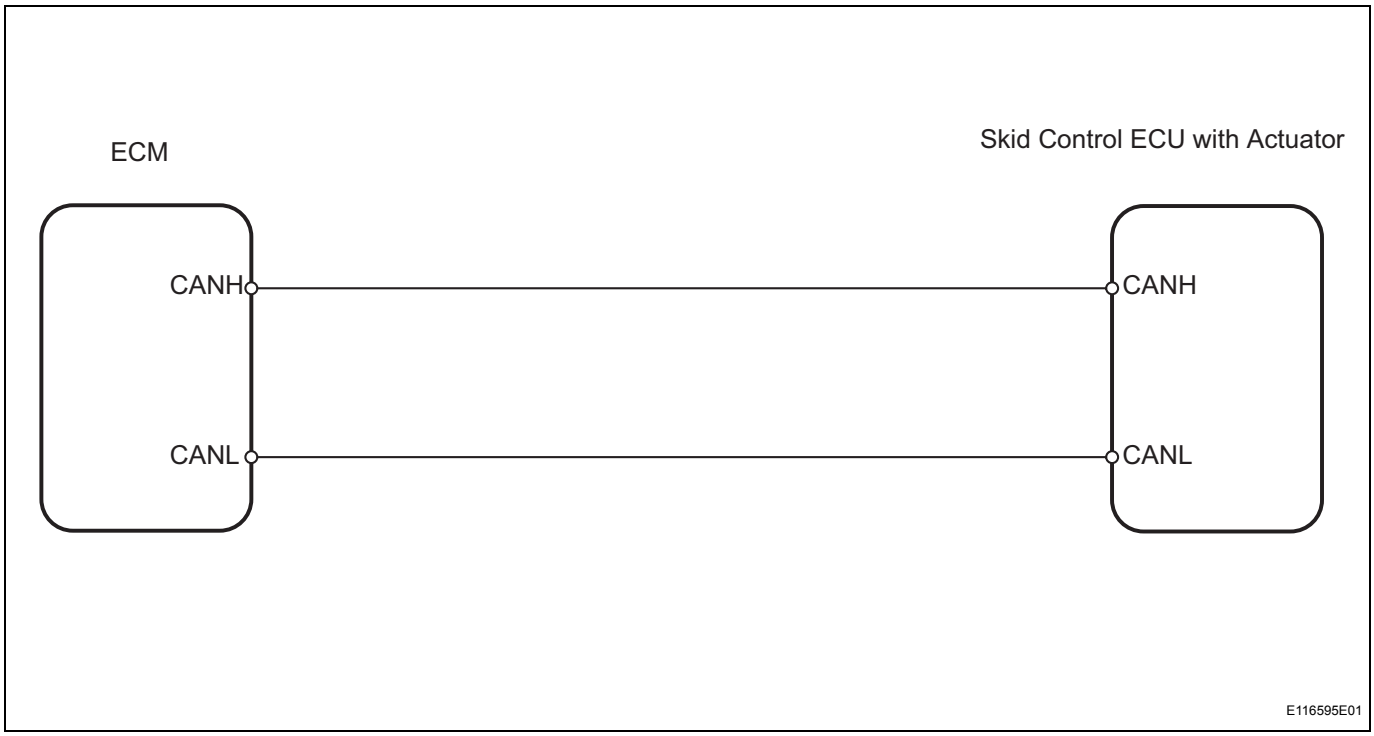
DTC	C1203/53	ECM Communication Circuit Malfunction

DESCRIPTION

This circuit is used to send TRAC & VSC control information from the skid control ECU to the ECM and engine control information from the ECM to the skid control ECU.

DTC No.	DTC Detection Condition	Trouble Area
C1203/53	Data about engine, drive system, and user country from ECM are not same as skid control ECU	• CAN Communication System • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

(a) Clear the DTC (see page BC-74).
(b) Turn the ignition switch ON.
(c) Drive the vehicle at a speed of 15 km/h (9 mph) and turn the steering wheel to the right and left.
(d) Check for DTC (see page BC-74). If a DTC of the ABS and VSC is output, make a note of them.

BC

Result

Result	Proceed to
DTC is output for CAN communication system CA-6	A
DTC is output (ABS and VSC DTCs are output)	B
DTC is not output	C

B	**REPAIR CIRCUIT INDICATED BY OUTPUT CODE**
C	**END**

A

GO TO CAN COMMUNICATION SYSTEM

DTC	C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone

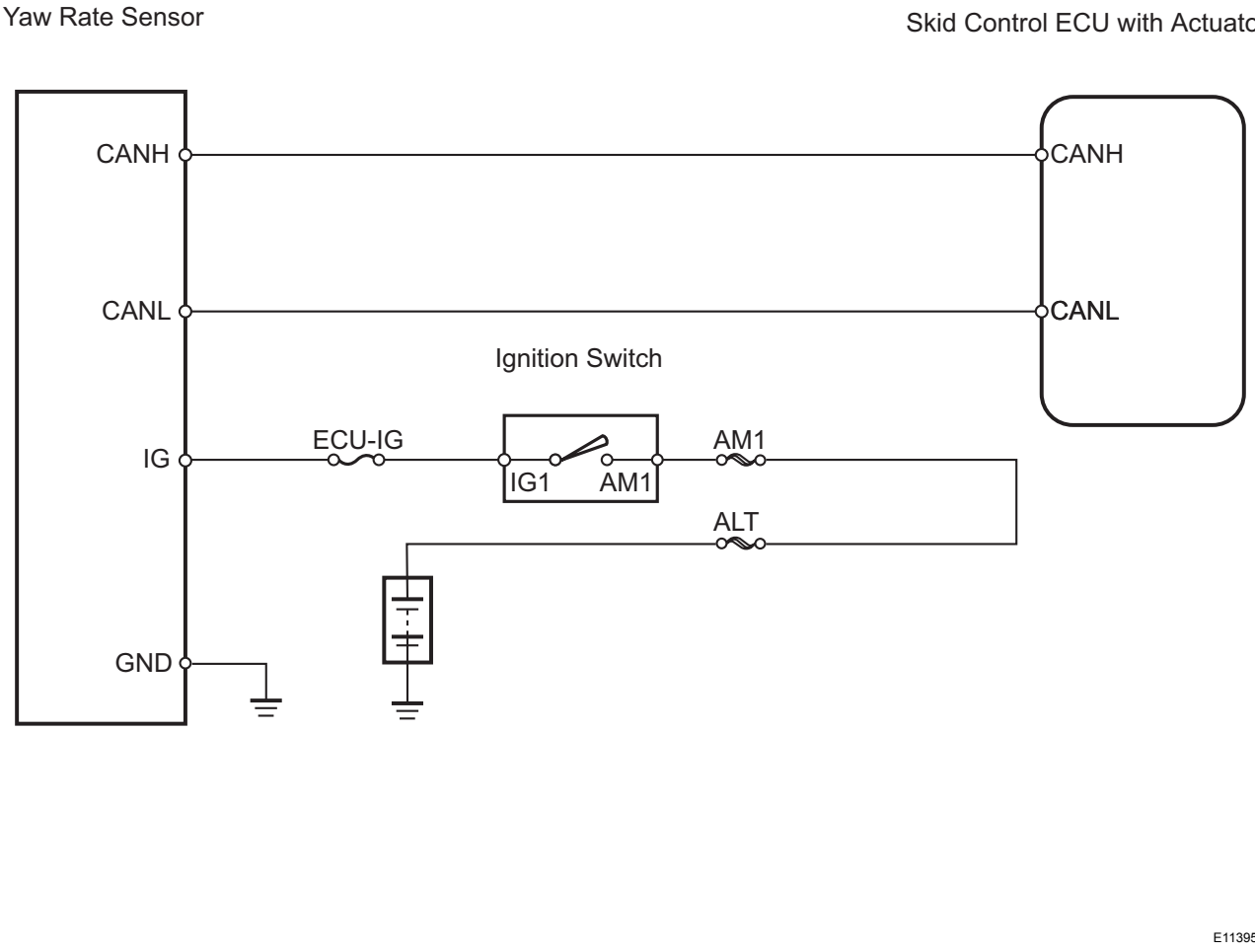
DTC	C1336/39	Zero Point Calibration of Acceleration Sensor Undone

DESCRIPTION

The deceleration sensor is built into the yaw rate sensor.

DTC No.	DTC Detection Condition	Trouble Area
C1210/36	When either condition below is met: • After ECU was replaced, shift lever was moved to position other than P within 15 seconds immediately after ECU terminal IG1 turns ON for first time. • Yaw rate sensor zero point recorded in ECU is deleted	• Yaw rate sensor • Yaw rate sensor circuit • Zero point calibration not done
C1336/39	After initial time after replacing ECU, or after erasing deceleration sensor memory by connecting terminals TS and CG of DLC3, ignition switch is turned ON and vehicle is driven in any mode except for test mode	• Yaw rate sensor • Yaw rate sensor circuit (Deceleration sensor) • Zero point calibration not done

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
When U0121/94, U0123/62, U0124/95 or U0126/63 is output along with C1210/36 or C1336/98, inspect and repair the trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.

1	**PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR (DECELERATION SENSOR)**

(a) Perform the zero point calibration of the yaw rate sensor (see page BC-69).

NEXT

2	**CHECK YAW RATE SENSOR (INSTALLATION)**

(a) Check that the yaw rate sensor has been installed properly.

BC

NG → **INSTALL YAW RATE SENSOR CORRECTLY**

OK

3	**RECONFIRM DTC**

(a) Clear the DTCs (see page BC-74).
(b) Turn the ignition switch ON.
(c) Check for DTCs (see page BC-74).
OK:
Same DTCs are output.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **END**

OK

REPLACE YAW RATE SENSOR

DTC	C1223/43	ABS Control System Malfunction

DESCRIPTION

This DTC is displayed when the VSC system receives the malfunction signal from the ABS.

DTC No.	DTC Detection Condition	Trouble Code
C1223/43	Malfunction in anti-lock brake system	Anti-lock brake system

INSPECTION PROCEDURE

1	CHECK DTC

(a) Check that the DTCs for the ABS other than C1223/43 are recorded (see page BC-74).

NEXT

REPAIR CIRCUIT INDICATED BY OUTPUT CODE

DTC	C1224/44	NE Signal Circuit

DESCRIPTION

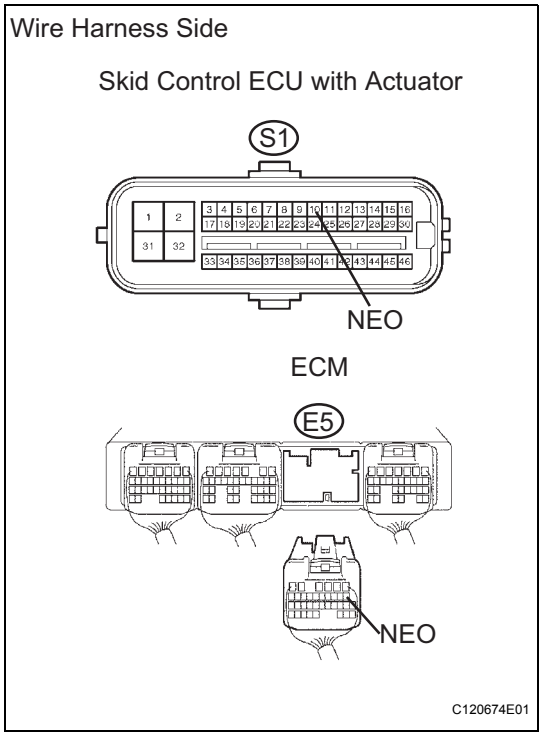
The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detection Condition	Trouble Area
C1224/44	Detection of either condition 1. or 2.: 1. When vehicle speed is 30 km/h (19 mph) or more and data reception from ECM is in normal condition, open or short circuit of engine revolution signal continues for 10 seconds or more 2. When TRAC is in operation, open or short circuit of engine revolution signal continues for 0.24 seconds or more	• NEO circuit • ECM • Skid control ECU with actuator

WIRING DIAGRAM

INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (SKID CONTROL ECU - ECM)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

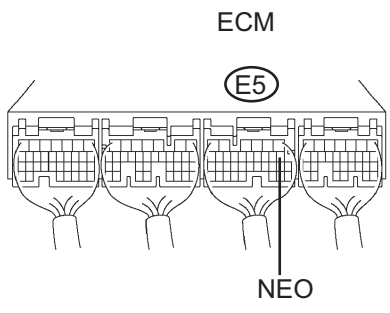
Standard resistance

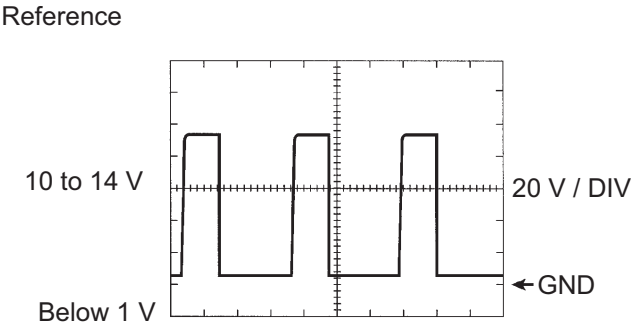
Tester Connection	Specified Condition
S1-10 (NEO) - E5-7 (NEO)	Below 1 Ω
S1-10 (NEO) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2 CHECK ECM (NEO TERMINAL)





(a) Measure the voltage of the ECM.

Standard voltage

Tester Connection	Engine Condition	Specified Condition
E5-7 (NEO) - Body ground	OFF (Ignition switch ON)	Alternating between 10 to 14 V and below 1 V
	ON (Idling)	

BC

	NG	**REPLACE ECM**
OK		

IF SAME CODE IS STILL OUTPUT AFTER DTC IS DELETED, CHECK CONTACT CONDITION OF EACH CONNECTION

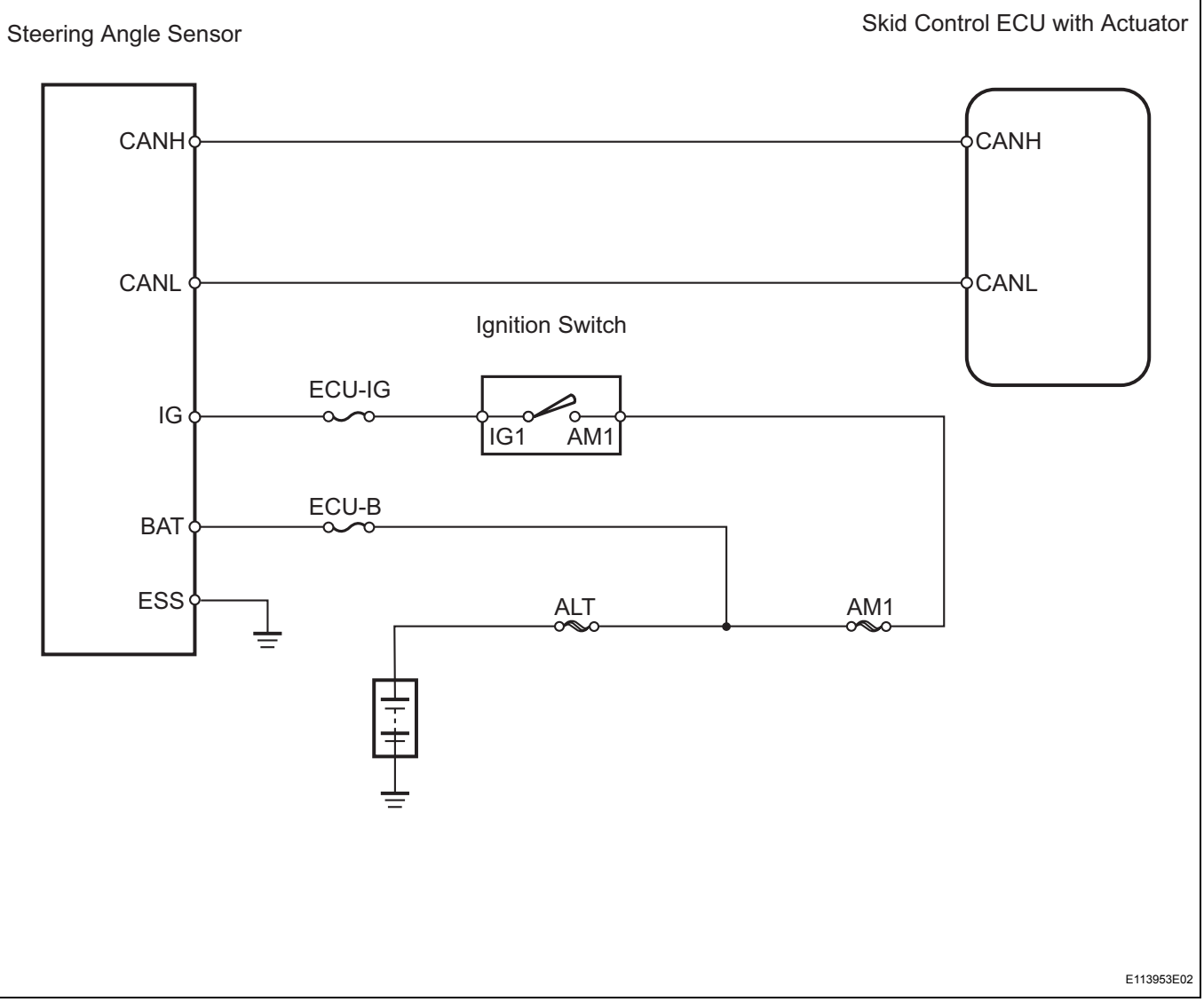
DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU through the CAN communication system. When there is a malfunction in the communication system, the DTC will be detected by the diagnosis function.

DTC No.	DTC Detection Condition	Trouble Area
C1231/31	When ECU IG1 terminal voltage is 9.5 V or more, steering angle sensor malfunction signal is received	• Steering angle sensor • Steering angle sensor circuit • Power source circuit

WIRING DIAGRAM

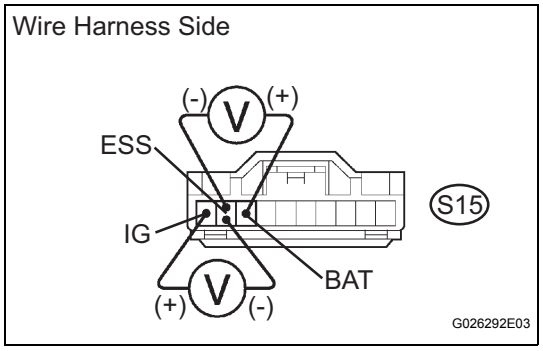


INSPECTION PROCEDURE

HINT:

- When U0121/94, U0123/62, U0124/95 or U0126/63 is output along with C1210/36 or C1336/98, inspect and repair the trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.
- When the speed sensor or the yaw rate sensor has a problem, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate sensor are output with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate sensor first. Then inspect and repair the steering angle sensor.

1 CHECK WIRE HARNESS (STEERING ANGLE SENSOR - BATTERY)



(a) Disconnect the S15 sensor connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
S15-1 (IG) - S15-2 (ESS)	Ignition switch ON	10 to 14 V
S15-3 (BAT) - S15-2 (ESS)	Always	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE STEERING ANGLE SENSOR

DTC	C1232/32	Stuck in Deceleration Sensor

DTC	C1234/34	Yaw Rate Sensor Malfunction

DTC	C1243/43	Acceleration Sensor Stuck Malfunction

DTC	C1244/44	Open or Short in Deceleration Sensor Circuit

DTC	C1245/45	Acceleration Sensor Output Malfunction

DTC	C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)

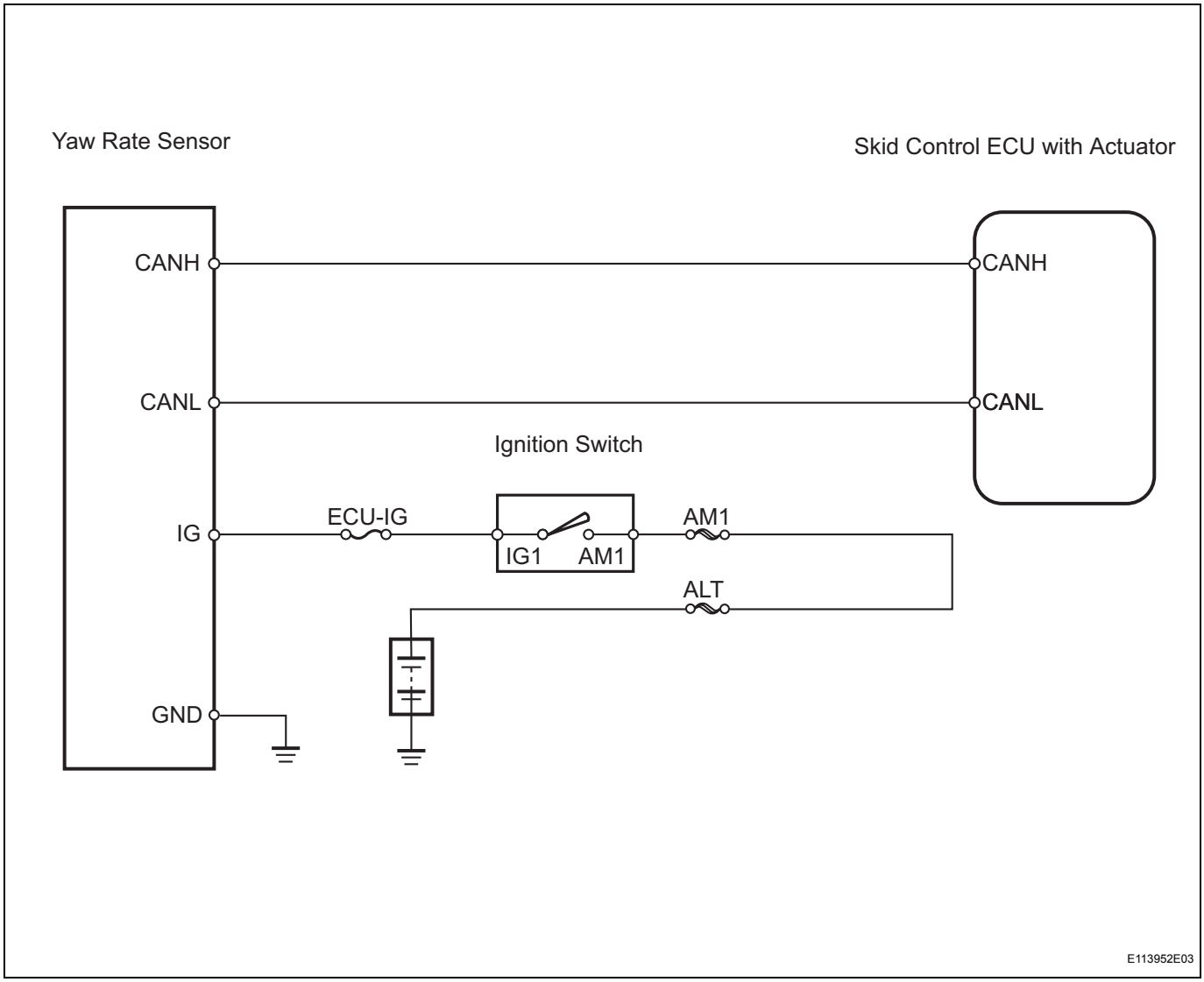
DTC	C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction

DESCRIPTION

The deceleration sensor is built into the yaw rate sensor.
The yaw rate sensor signal is sent to the skid control ECU through the CAN communication system. When there is a malfunction in communication, it will be detected by the diagnosis function.

DTC No.	DTC Detection Condition	Trouble Area
C1232/32	While vehicle speed becomes 0 km/h (0 mph) from 30 km/h (18 mph), the condition that GL1 and GL2 signals of ECU terminals do not change to 0.04 V or less occurs 16 times in a row	• Yaw rate sensor (Deceleration sensor) • Yaw rate sensor (Deceleration sensor) circuit • Wire harness
C1234/34	Yaw rate sensor malfunction signal is received	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness
C1243/43	While the vehicle speed changes from 30 km/h (19 mph) to 0 km/h (0 mph), the condition that either GL1 or GL2 does not change occurs 16 times in a row	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness for deceleration sensor system
C1244/44	Either condition (1 or 2) is detected 1. While the vehicle is not running, the condition that the difference between GL1 and GL2 once became 0.6 G or more but has not become below 0.4 G since then continues for 60 seconds or more 2. Data malfunction signal is received from G sensor	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness
C1245/45	With vehicle speed at 30 km/h (19 mph) or more, the condition that the difference between acceleration and deceleration values of computation from deceleration sensor and vehicle speed becomes more than 0.35 G continues for 60 seconds or more	• Yaw rate sensor • Yaw rate sensor circuit • Wire harness for deceleration sensor system
C1381/97	With vehicle speed at 3 km/h (2 mph) or more, malfunction signal of deceleration sensor battery has been received constantly for 10 seconds or more	• Battery • Power source circuit • Charging system
C1279/79	Detected only during test mode	• Deceleration sensor • Sensor installation

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
When U0121/94, U0123/62, U0124/95 or U0126/63 are output along with C1210/36 or C1336/39, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

1	CHECK YAW RATE SENSOR (INSTALLATION)

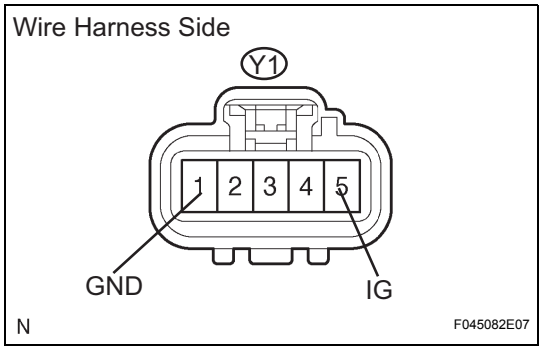
(a) Check that the yaw rate sensor has been installed properly.

NG → INSTALL YAW RATE SENSOR CORRECTLY

OK

BC

2	CHECK WIRE HARNESS (YAW RATE SENSOR - BATTERY AND BODY GROUND)



(a) Disconnect the Y1 sensor connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
Y1-5 (IG) - Body ground	Ignition switch ON	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
Y1-1 (GND) - Body ground	Below 1 Ω

HINT:
When replacing the yaw rate sensor, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

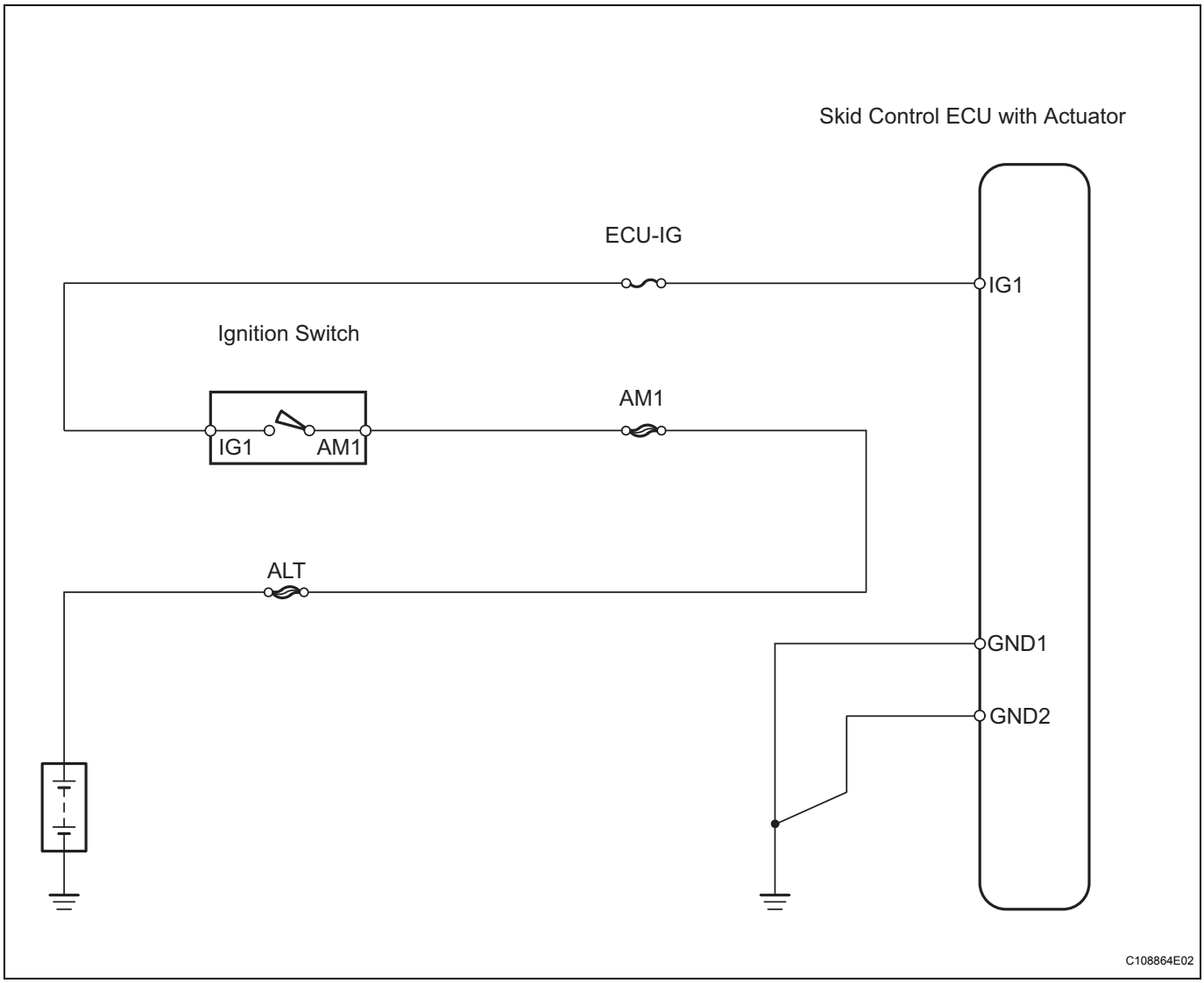
REPLACE YAW RATE SENSOR

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When either of following is detected: 1. Both conditions continue for at least 10 seconds • Vehicle speed is more than 3 km/h (2 mph) • IG1 terminal voltage is less than 9.5 V 2. All conditions continue for at least 0.2 seconds • Solenoid relay remains ON • Relay contact is open • IG1 terminal voltage is less than 9.5 V	• Battery • Charging system • Power source circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

1	INSPECT FUSE (ECU-IG)

(a) Remove the ECU-IG fuse from the instrument panel junction block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω
Result

Result	Proceed to
OK (when using intelligent tester)	A
OK (when not using intelligent tester)	B
NG	C

B → **Go to step 3**

C → **REPLACE FUSE**

A

2	READ DATA LIST (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 9.5 to 14 V TOO LOW: Below 9.5 V	-

Result

Result	Proceed to
Display is not NORMAL	A
Display is NORMAL	B

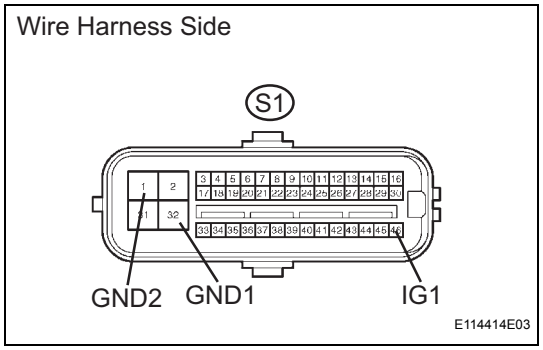
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

BC

3 CHECK WIRE HARNESS (SKID CONTROL ECU- BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DTC	C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)

DESCRIPTION

The master cylinder pressure sensor is connected to the skid control ECU with actuator.
DTC C128181 can be deleted when the master cylinder pressure sensor sends a master cylinder pressure signal or the test mode ends. DTC C1281/81 is output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C1246/46	• When vehicle speed is 7 km/h (4 mph) or more and PMC terminal voltage of skid control ECU exceeds 0.86 V, condition that voltage does not change by 0.005 V or more continues for 30 seconds • Noise in terminal PMC of skid control ECU occurs 7 times or more within 5 seconds • When stop light switch is OFF, condition that PMC terminal voltage of skid control ECU is 0.86 V or more, or less than 0.3 V continues for 5 seconds or more • When IG1 terminal voltage is 9.5 to 17.2 V, condition that VCM terminal voltage of skid control ECU is out of range from 4.4 to 5.6 V continues for 1.2 seconds or more • When VCM terminal voltage of skid control ECU is 4.4 to 5.6 V, condition that PMC terminal voltage of skid control ECU is out of range from 0.14 to 4.85 V continues for 1.2 seconds or more	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C121/81	Detected only during test mode	Master cylinder pressure sensor

INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

BC

B → Go to step 3

A

2	READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

(a) Check the DATA LIST for proper functioning of the master cylinder pressure sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / Min.: 0 V, Max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed

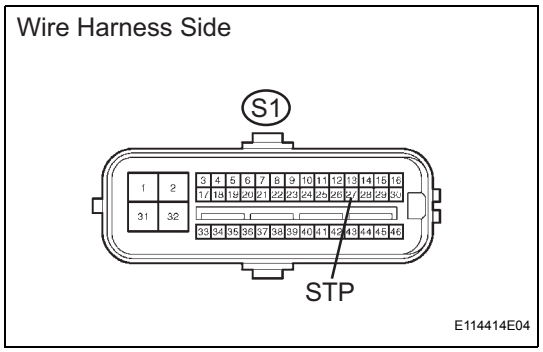
OK:
Brake fluid pressure value (voltage) changes from 0.3 to 0.9 V.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-27 (STP) - Body ground	Brake pedal is depressed	8 to 14 V
	Brake pedal is released	Below 1 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

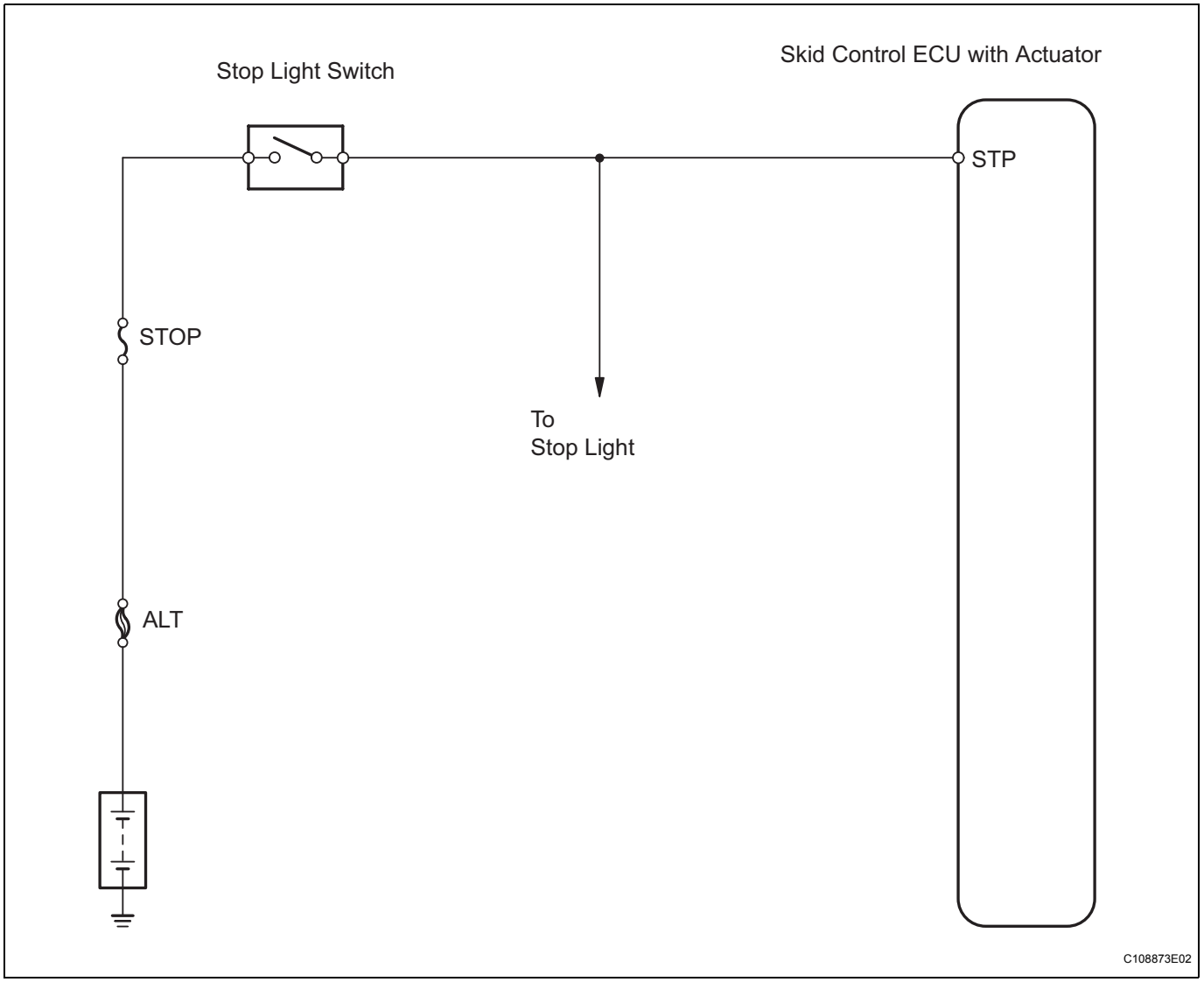
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.

DTC No.1	DTC Detection Condition	Trouble Area
C1249/49	Both conditions continue for at least 0.3 seconds: • IG1 terminal voltage is between 9.5 and 17.2 V • Open in stop light switch circuit	• Stop light switch assembly • Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK STOP LIGHT SWITCH ASSEMBLY (OPERATION)

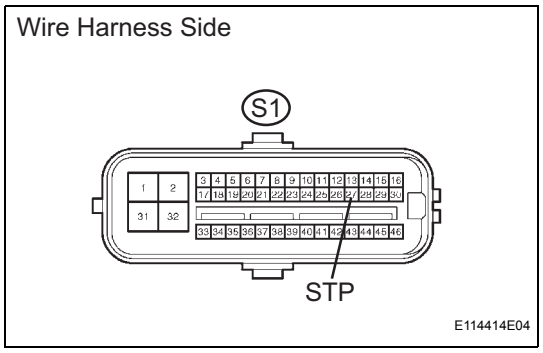
(a) Check that the stop light illuminates when the brake pedal is depressed, and turns off when the brake pedal is released.
OK

Condition	Stop Light Condition
Brake pedal depressed	Illuminates
Brake pedal released	Turns off

NG → **Go to step 4**

OK

2 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
S1-27 (STP) - Body ground	Brake pedal depressed	10 to 14 V
	Brake pedal released	Below 1 V

NG → **Go to step 5**

OK

3 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-69).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-74).

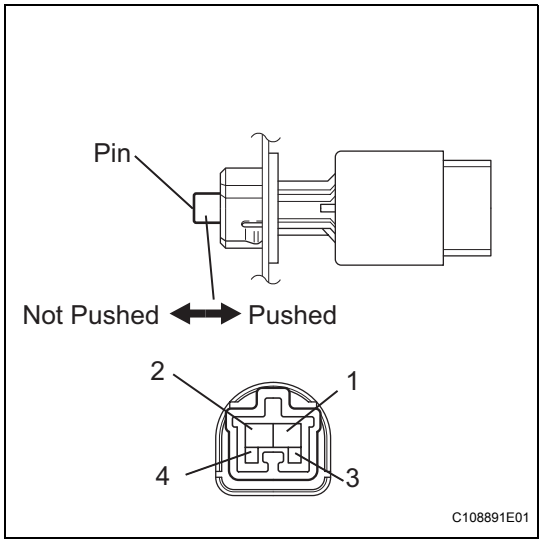
B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

4 INSPECT STOP LIGHT SWITCH ASSEMBLY



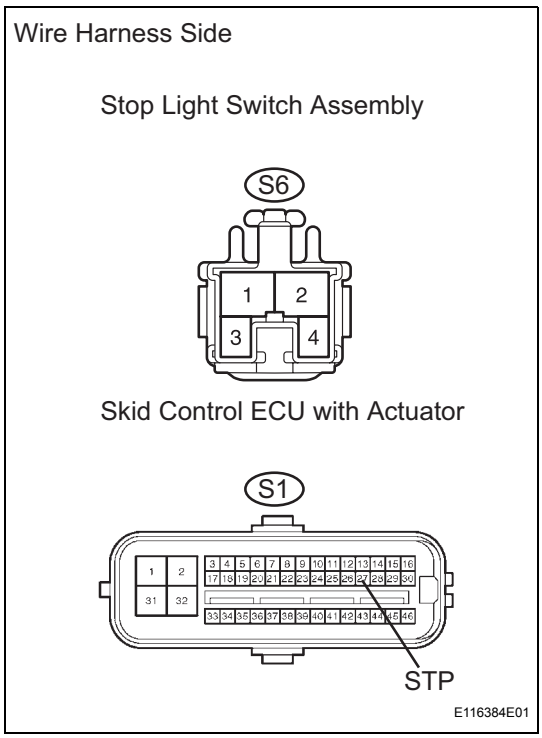
(a) Disconnect the S6 switch connector.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Pin not pushed	Below 1 Ω
	Pin pushed	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

5 CHECK WIRE HARNESS (STOP LIGHT SWITCH - SKID CONTROL ECU AND BATTERY)



(a) Disconnect the S6 switch connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S6-2 - Body ground	10 to 14 V

(d) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S6-1 - S1-27 (STP)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-74).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.

BC

(c) Check for DTCs (see page BC-74).
Result

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

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

B → END

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:
When removing parts, turn the ignition switch OFF.
HINT:

- Using SST 09843-18040, connect terminals TC and CG of the DLC3.
- If any abnormality is not found when inspecting parts, inspect the ECU and ground points for poor contact.
- If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, turn to the page shown under the "See page" for respective "DTC No." in the DTC chart.
- When 2 or more DTCs are recorded and the problem is not identified, perform circuit inspection of the other DTCs.

Anti-lock brake system

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor RH - Front speed sensor RH circuit - Front speed sensor rotor RH - Sensor installation	BC-16
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	- Front speed sensor LH - Front speed sensor LH circuit - Front speed sensor rotor LH - Sensor installation	BC-16
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor RH - Rear speed sensor RH circuit - Rear speed sensor rotor RH - Sensor installation	BC-22
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	- Rear speed sensor LH - Rear speed sensor LH circuit - Rear speed sensor rotor LH - Sensor installation	BC-22
C0226/21	SFR Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SFRR or SFRH circuit	BC-27
C0236/22	SFL Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SFLR or SFLH circuit	BC-27
C0246/23	SRR Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SRRR or SRRH circuit	BC-27
C0256/24	SRL Solenoid Circuit	- Skid control ECU with actuator (Brake actuator assembly) - SRLR or SRLH circuit	BC-27
C0273/13	Open in ABS Motor Relay Circuit	- ABS motor relay - ABS motor relay circuit	BC-29
C0274/14	Short to B+ in ABS Motor Relay Circuit	- ABS motor relay - ABS motor relay circuit	BC-29
C0278/11	Open in ABS Solenoid Relay Circuit	- ABS solenoid relay - ABS solenoid relay circuit - Skid control ECU with actuator (Brake actuator assembly)	BC-32
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	- ABS solenoid relay - ABS solenoid relay circuit - Skid control ECU with actuator (Brake actuator assembly)	BC-32
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	- Front speed sensor RH - Front speed sensor rotor RH	BC-16
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	- Front speed sensor LH - Front speed sensor rotor LH	BC-16

DTC No.	Detection Item	Trouble Area	See page
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	- Rear speed sensor RH - Rear speed sensor rotor RH	BC-22
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	- Rear speed sensor LH - Rear speed sensor rotor LH	BC-22
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	- Battery - Charging system - Power source circuit	BC-34
C1249/49	Open in Stop Light Switch Circuit	- Stop light switch - Stop light swich circuit	BC-37
C1251/51	Open in Pump Motor Circuit	- ABS pump motor	BC-41

DTC chart of sensor check function

DTC No.	Detection Item	Trouble Area	See page
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor RH - Sensor installation - Sensor rotor	BC-16
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor LH - Sensor installation - Sensor rotor	BC-16
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor RH - Sensor installation - Sensor rotor	BC-22
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor LH - Sensor installation - Sensor rotor	BC-22
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	- Front speed sensor rotor RH	BC-16
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	- Front speed sensor rotor LH	BC-16
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	- Rear speed sensor rotor RH	BC-22
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	- Rear speed sensor rotor LH	BC-22

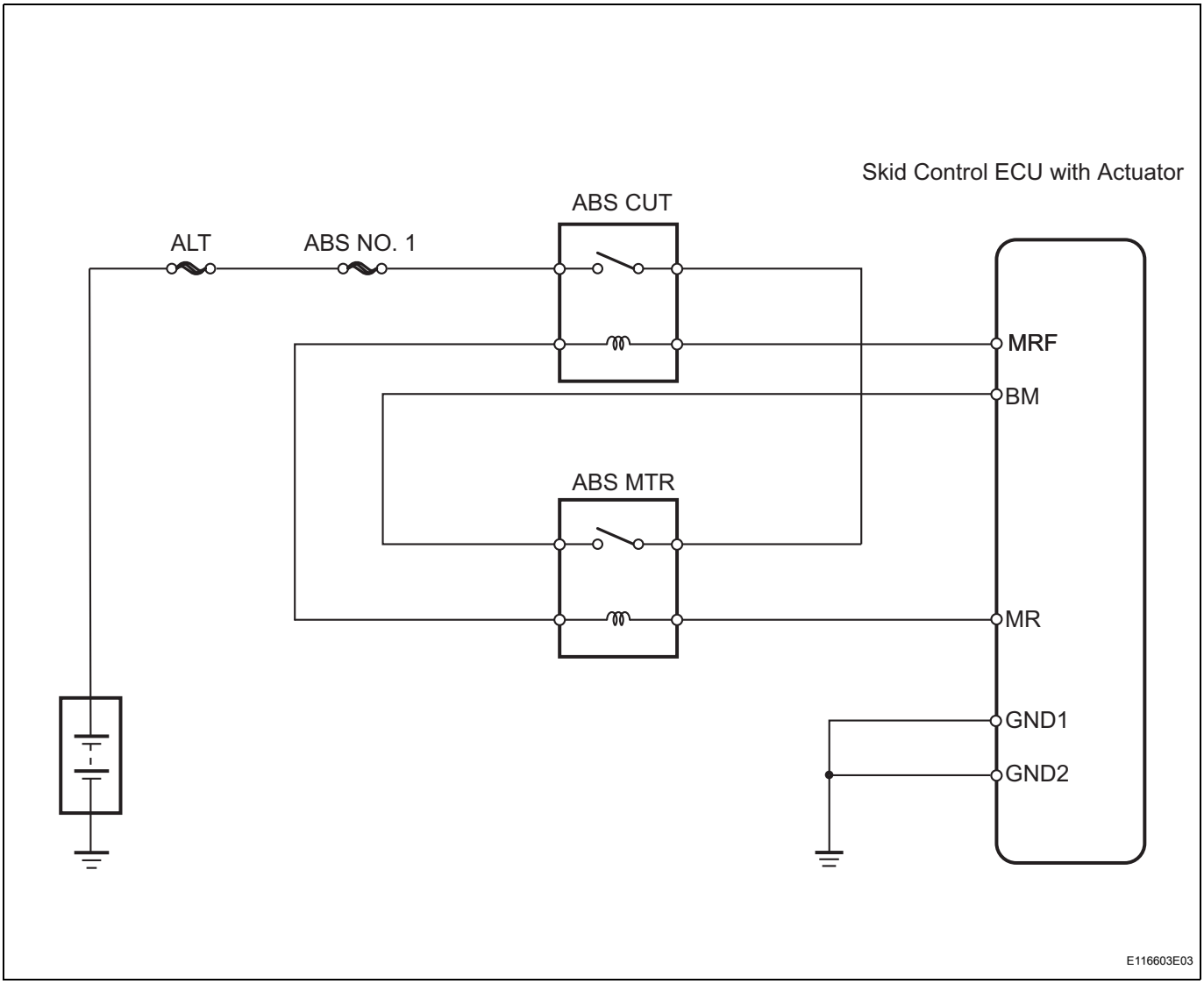
DTC	C1251/51	Open in Pump Motor Circuit

DESCRIPTION

The ABS pump motor is located inside the brake actuator.

DTC No.	DTC Detection Condition	Trouble Area
C1251/51	When either condition below is met: • Actuator pump motor does not operate properly • Actuator pump motor circuit remains open for at least 2 seconds	• Skid control ECU with actuator • Skid control ECU with actuator circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

BC

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 3**

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MTR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS MTR relay operates.

Skid control ECU with actuator

Item	Vehicle Condition / Test Details	Diagnostics Note
ABS MOT RELAY	Turn ABS MTR relay ON / OFF	Operation sound of motor can be heard

OK:

Operation sound of ABS motor is heard.

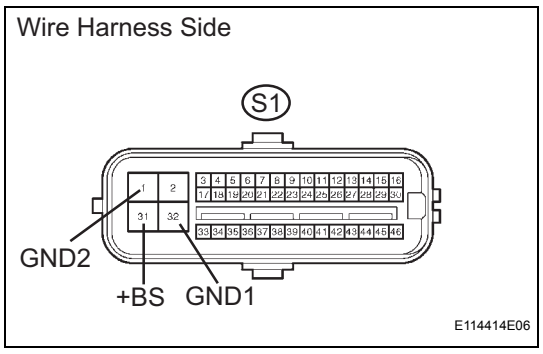
HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.

(b) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Specified Condition
S1-31 (+BM) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

DTC	U0100/65	Lost Communication with ECM / PCM
DTC	U0121/94	CAN Communication Function Fault
DTC	U0123/62	Lost Communication with Yaw Rate Sensor Module
DTC	U0124/95	Lost Communication with Lateral Acceleration Sensor Module
DTC	U0126/63	Lost Communication with Steering Angle Sensor Module

INSPECTION PROCEDURE

1	RECONFIRM DTC

(a) Clear the DTC (see page BC-74).
(b) Turn the ignition switch ON.
(c) Drive the vehicle at a speed of 15 km/h (9 mph) and turn the steering wheel to the right and left.
(d) Check for DTC (see page BC-74). If a DTC of the ABS and VSC is output, make a note of them.

Result

Result	Proceed to
DTC is output fot the CAN communication systemCA-6	A
DTC is output (ABS and VSC DTCs are output)	B
DTC is not output	C

B → REPLACE CIRCUIT INDICATOR BY OUTPUT CODE

C → END

A

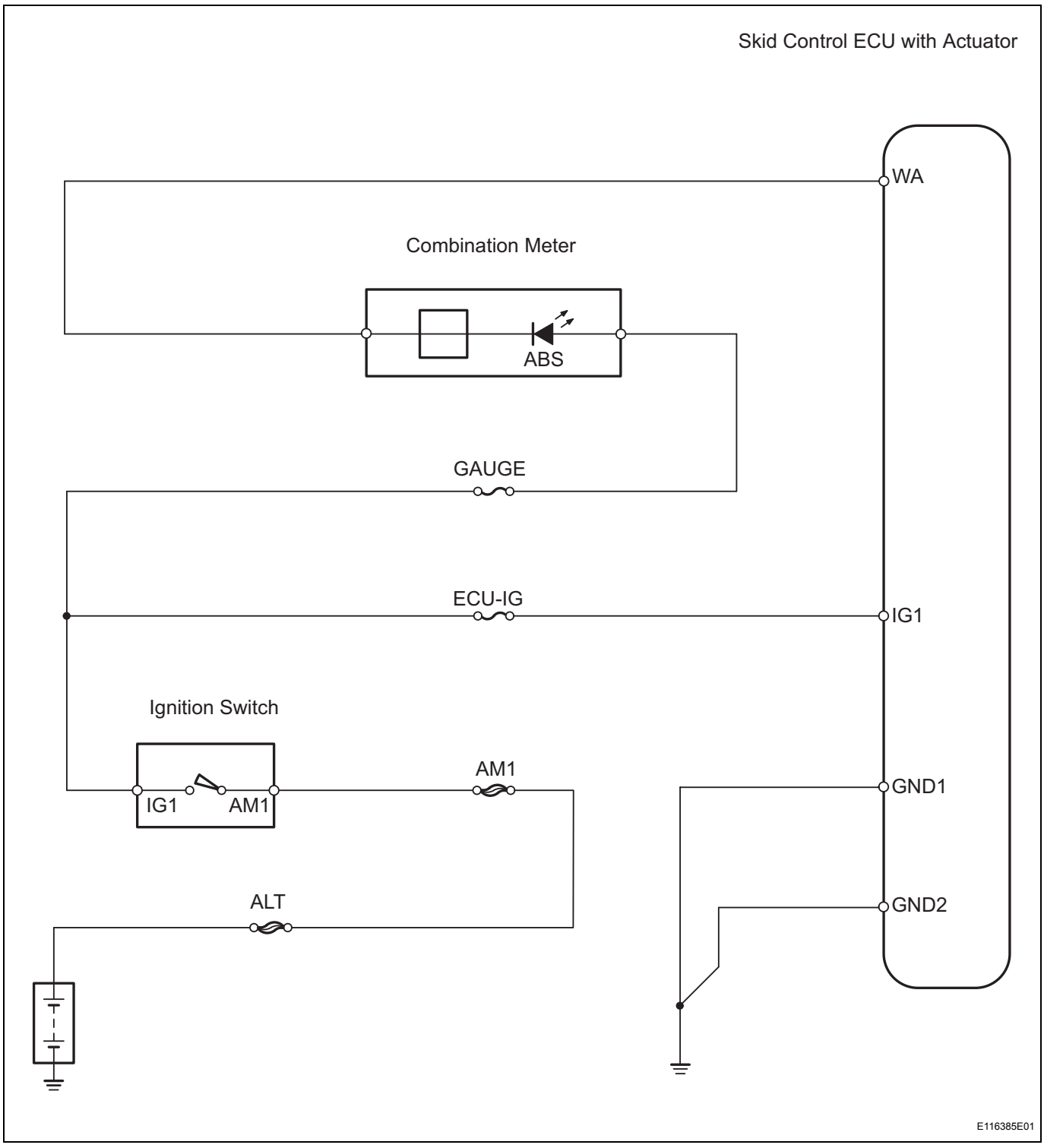
BC GO TO CAN COMMUNICATION SYSTEM

ABS Warning Light Remains ON

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
Always ON	Either condition (1. or 2.) is detected: 1. Voltage of ECU terminal IG1 remains at more than 17 V 2. There is a malfunction in ECU internal circuit	• Power source circuit • ABS warning light circuit • Skid control ECU with actuator • Charging system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**CHECK FOR DTC**

(a) Turn the ignition switch ON.
(b) Check that the ABS warning light illuminates.
(c) Check for DTCs (see page BC-74).

BC

Result

Result	Proceed to
DTC is not output (when using intelligent tester)	A
DTC is not output (when not using intelligent tester)	B
DTC is output	C

B → Go to step 7

C → REPAIR CIRCUIT INDICATED BY OUTPUT DTC

A

2 INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.
OK:
Each ECU connector is properly installed.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3 READ VALUE OF INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 9.5 to 14 V TOO LOW: Below 9.5 V	-

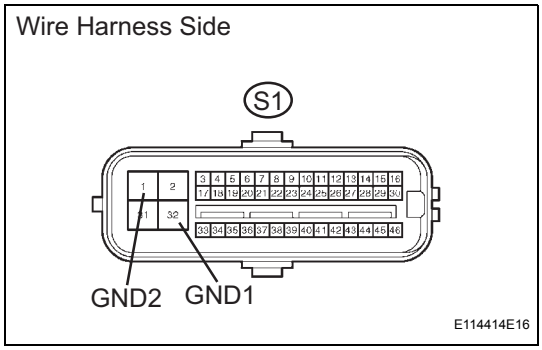
Result

Result	Proceed to
Display is NORMAL	A
Display is not NORMAL	B

B → Go to step 11

A

4	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

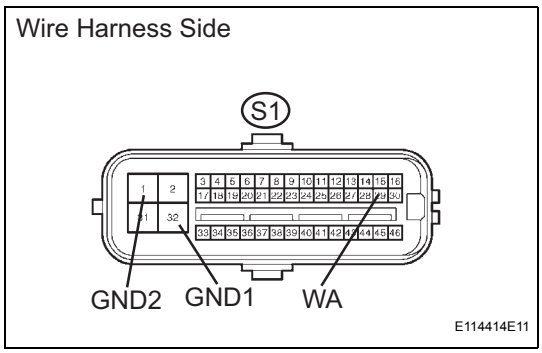
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK ABS WARNING LIGHT



(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-29) to GND1 (S1-32) or GND2 (S1-1) of the connector. Check the ABS warning light.

OK:

ABS warning light turns off.

(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.

OK:

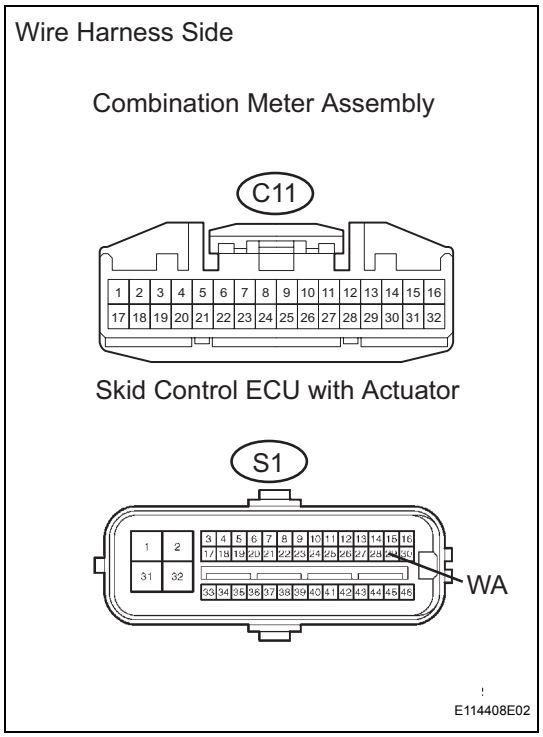
ABS warning light illuminates.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

6	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
S1-29 (WA) - C11-11	Below 1 Ω
S1-29 (WA) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

7	INSPECT SKID CONTROL ECU CONNECTOR

(a) Check that each ECU connector is properly installed.

OK:

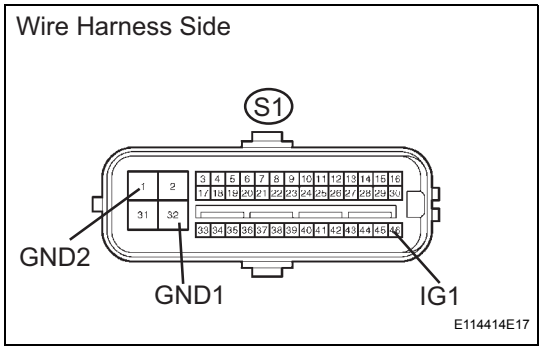
Each ECU connector is properly installed.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

BC

8 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

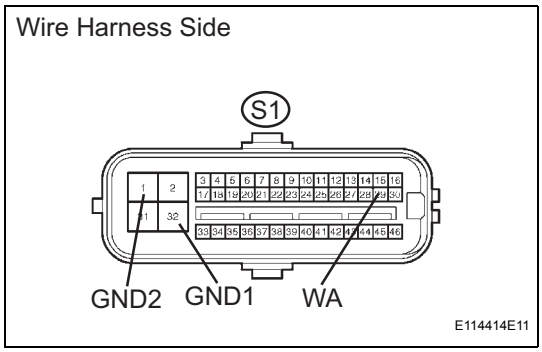
(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

9 CHECK ABS WARNING LIGHT



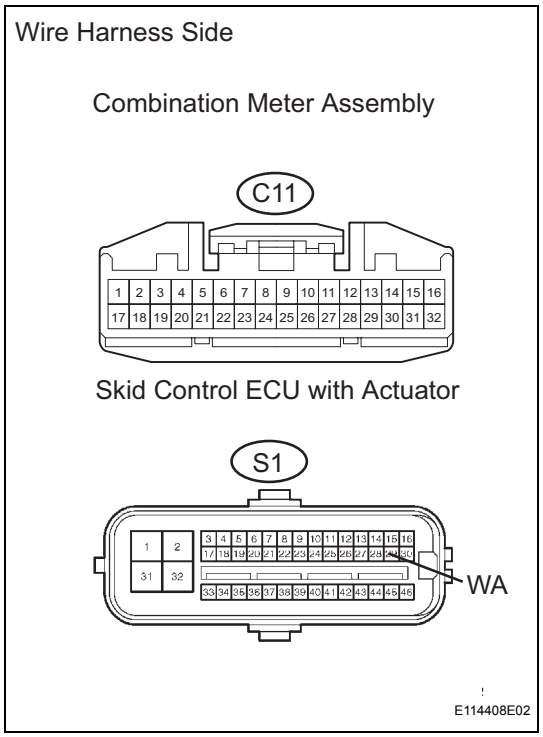
(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Using a service wire, connect terminal WA (S1-29) to GND1 (S1-32) or GND2 (S1-1) of the S1 ECU connector.
Check the ABS warning light.
OK:
ABS warning light turns off.
(d) Turn the ignition switch OFF.
(e) Remove the service wire.
(f) Turn the ignition switch ON.
(g) Check the ABS warning light.
OK:
ABS warning light illuminates.
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

BC

10 CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

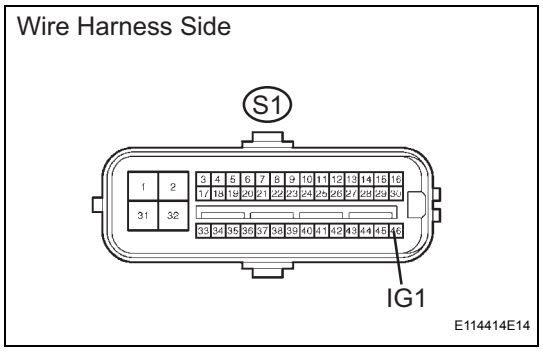
Tester Connection	Specified Condition
S1-29 (WA) - C11-11	Below 1 Ω
S1-29 (WA) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

11 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

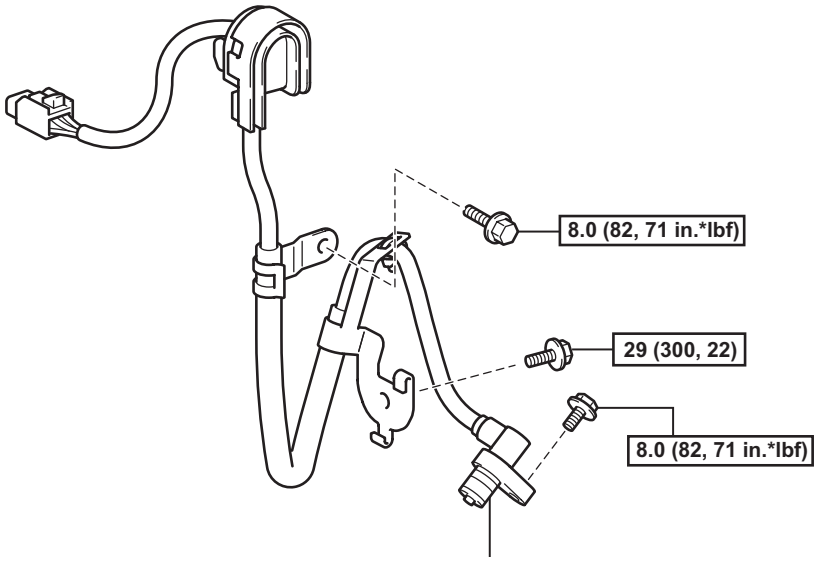
OK

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

FRONT SPEED SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

H

C117773E01

REMOVAL

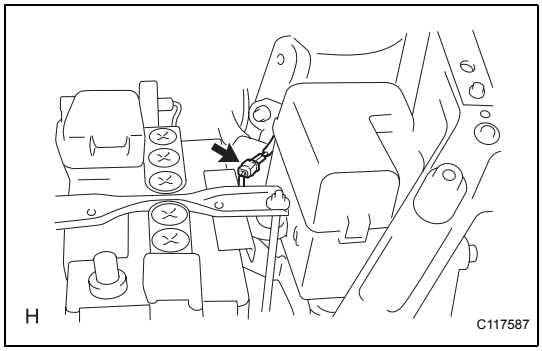
HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE FRONT WHEEL

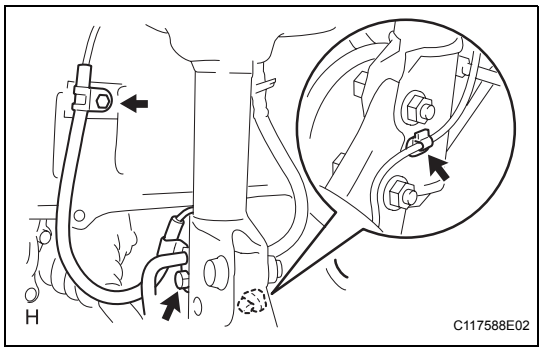
3. REMOVE FRONT SPEED SENSOR LH

(a) Disconnect the speed sensor connector.

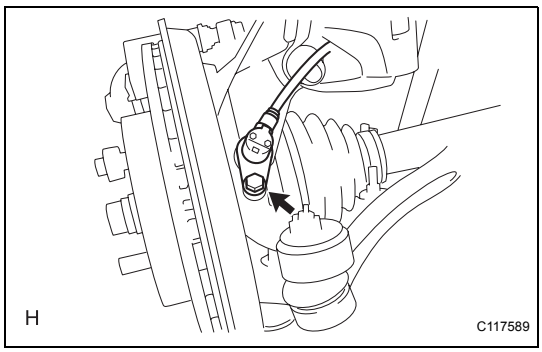


(b) Remove the 2 clamp bolts holding the speed sensor wire harness from the body and shock absorber.

(c) Disconnect the resin clip and speed sensor wire harness from shock absorber.



(d) Remove the bolt and speed sensor.
NOTICE:
Keep the sensor tip and sensor installation hole free from foreign matter.



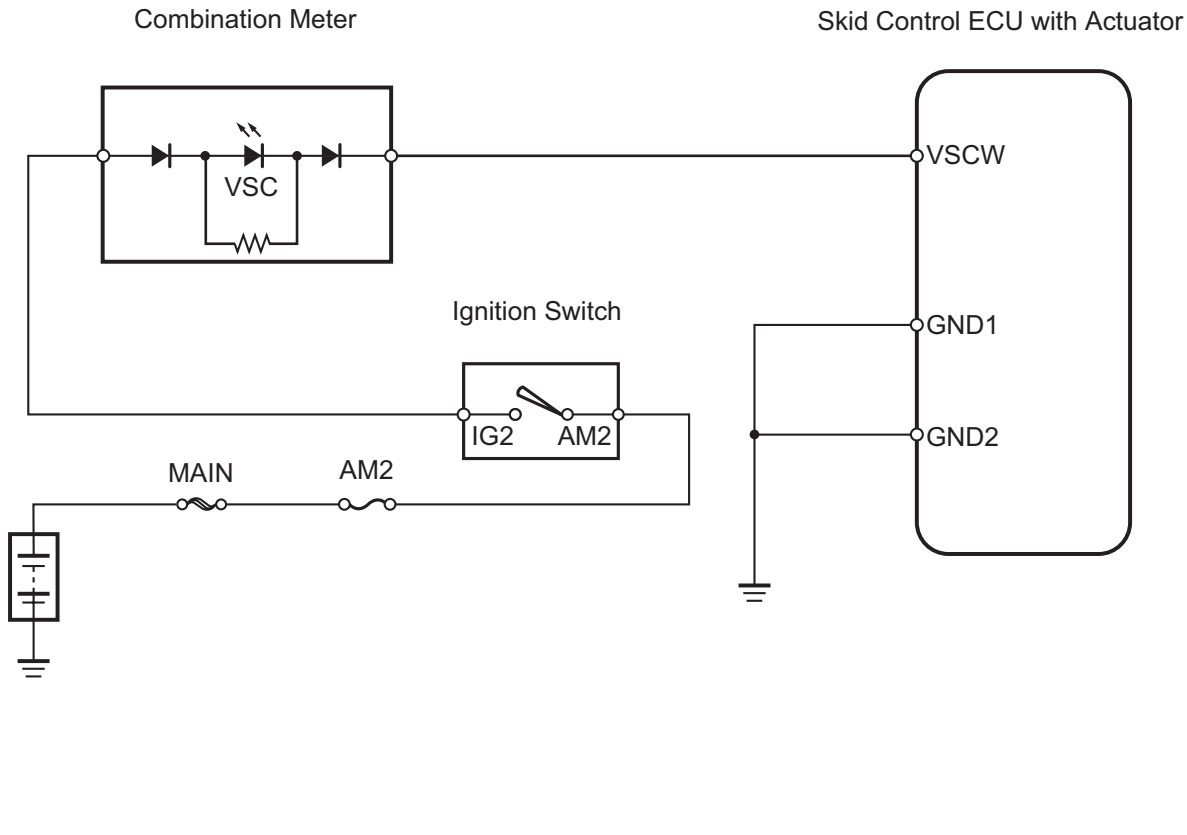
VSC Warning Light Remains ON

DESCRIPTION

If the ECU stores a DTC, the VSC illuminates.

DTC No.	DTC Detection Condition	Trouble Area
Always ON	Malfunction in skid control ECU with actuator	• VSC warning light circuit • Power source circuit • Skid control ECU with actuator

WIRING DIAGRAM



INSPECTION PROCEDURE

BC

1	CHECK FOR DTC

(a) Check for DTCs (see page BC-74).

Result

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

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

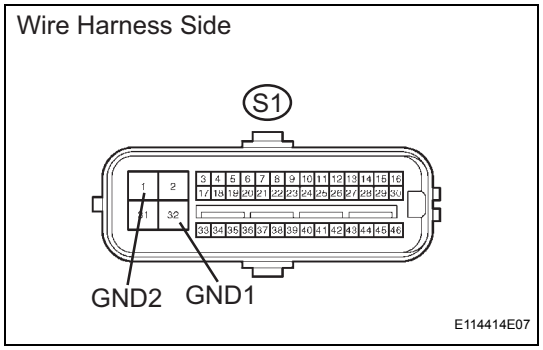
A

2 INSPECT SKID CONTROL ECU CONNECTOR SECURELY CONNECTED

NO → **CONNECT CONNECTOR TO ECU**

YES

3 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

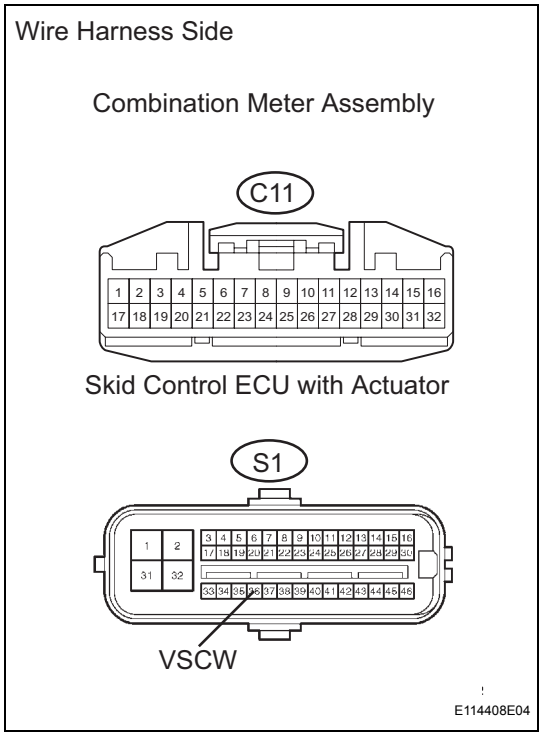
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C11-10 - S1-36 (VSCW)	Below 1 Ω
C11-10 - Body ground	10 kΩ or higher

Result

Result	Proceed to
OK (when using intelligent tester)	A
OK (when not using intelligent tester)	B
NG	C

B → **Go to step 7**

C → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

A

BC

5	READ VALUE OF INTELLIGENT TESTER (IG VOLTAGE)

(a) Check the DATA LIST for proper functioning of the IG power voltage.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / NORMAL / TOO LOW	NORMAL: 10 to 14 V TOO LOW: Below 10 V	-

OK:
NORMAL is displayed.

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (VSC WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the VSC warning light illuminates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Operation of solenoid (clicking sound) can be heard

OK:
VSC warning light illuminates.

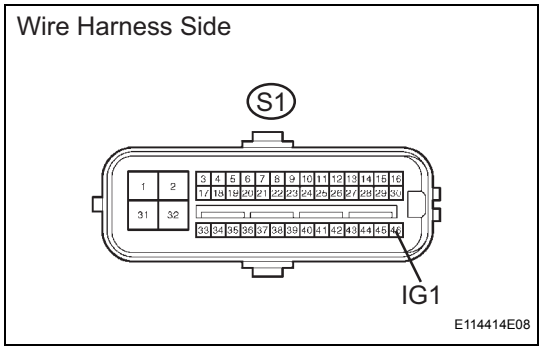
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

7	CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY)



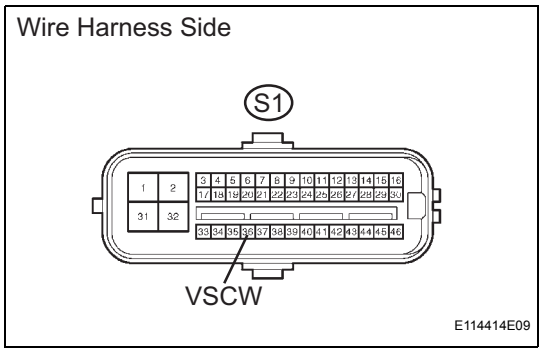
(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Switch Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

8	CHECK VSC WARNING LIGHT



(a) Disconnect the S1 ECU connector.
(b) Turn the ignition switch ON.
(c) Check that the VSC warning light turns off.
OK:
VSC warning light turns off.

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

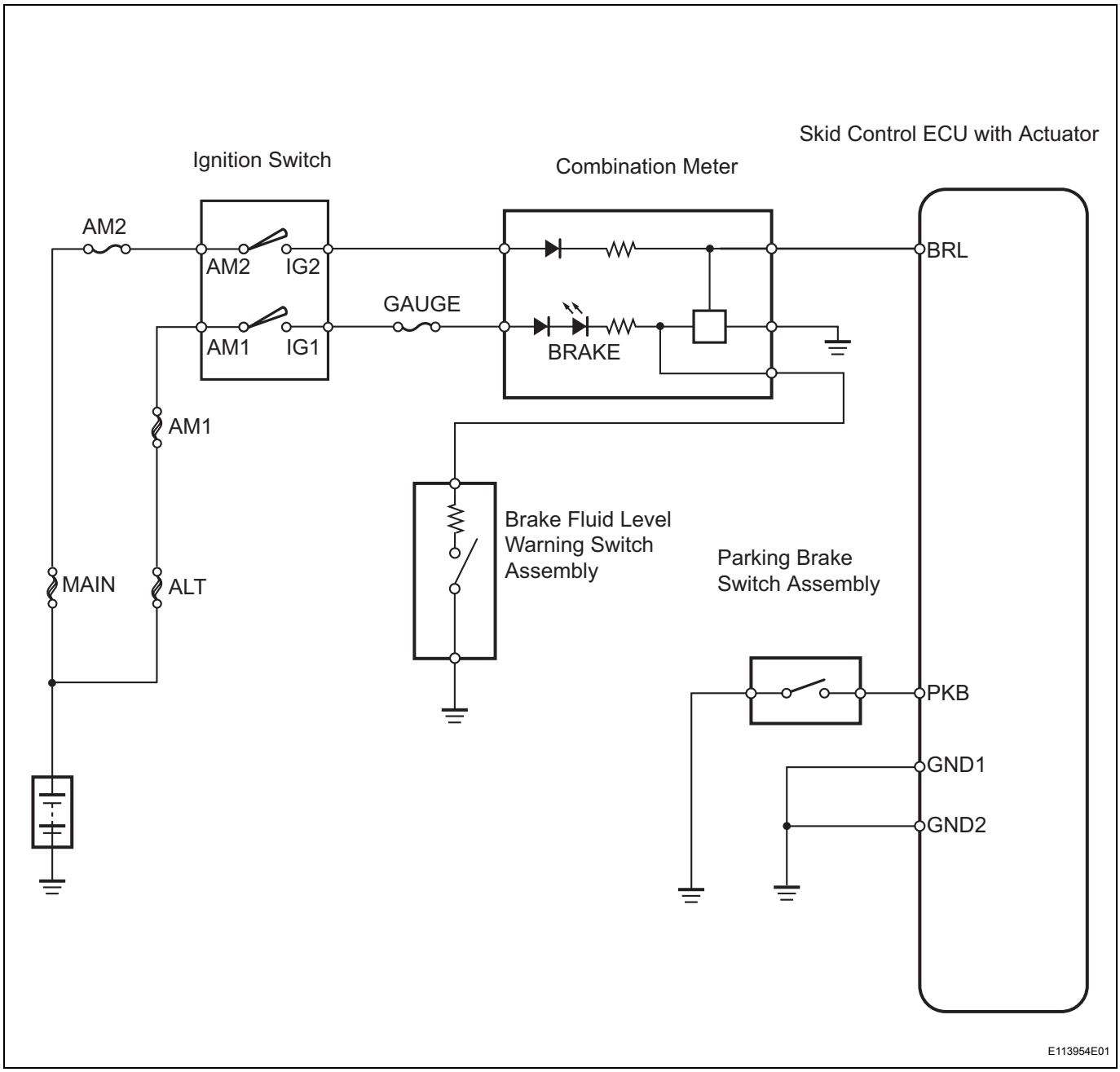
REPLACE BRAKE ACTUATOR ASSEMBLY

Brake Warning Light Circuit

DESCRIPTION

The brake warning light turns on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (BRAKE WARNING LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the BRAKE warning light illuminates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
BRAKE WRN LIGHT	Turns brake warning light ON / OFF	Operation of solenoid (clicking sound) can be heard

OK:

Brake warning light illuminates.

HINT:

When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 CHECK DTC FOR ABS

(a) Check for DTCs (see page BC-74).

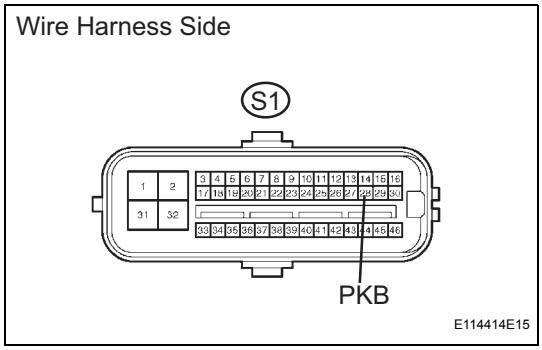
Result

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

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

A

4 CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

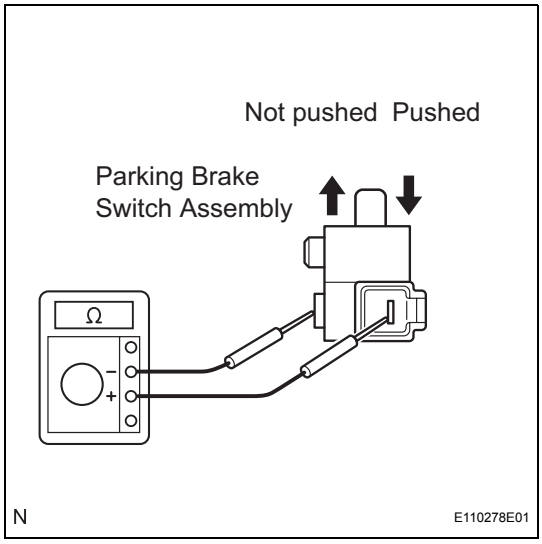
Standard resistance

Tester Connection	Switch Condition	Specified Condition
S1-28 (PKB) - Body ground	Parking brake switch ON	Below 1 Ω
	Parking brake switch OFF	10 kΩ or higher

OK → **Go to step 7**

NG

5 INSPECT PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the parking brake switch.
(b) Measure the resistance of the switch.

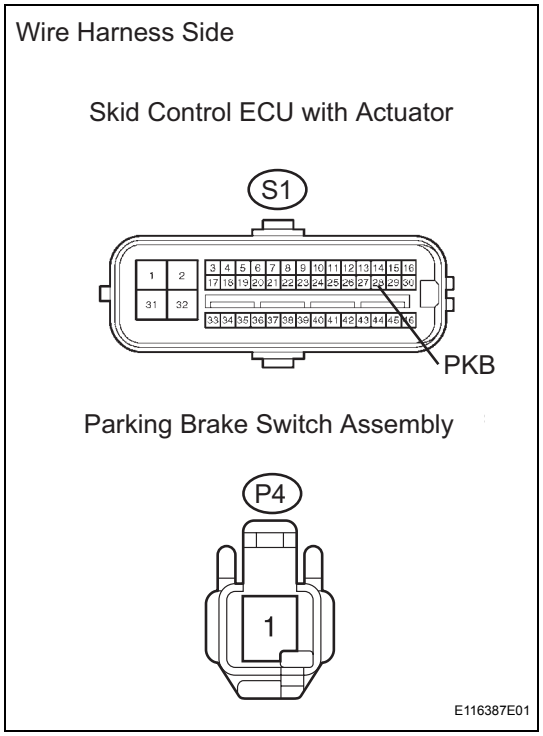
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	Pushed	Below 1 Ω
	Not pushed	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

6 CHECK WIRE HARNESS (SKID CONTROL ECU - PARKING BRAKE SWITCH)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the P4 switch connector.
(c) Measure the resistance of the wire harness side connectors.

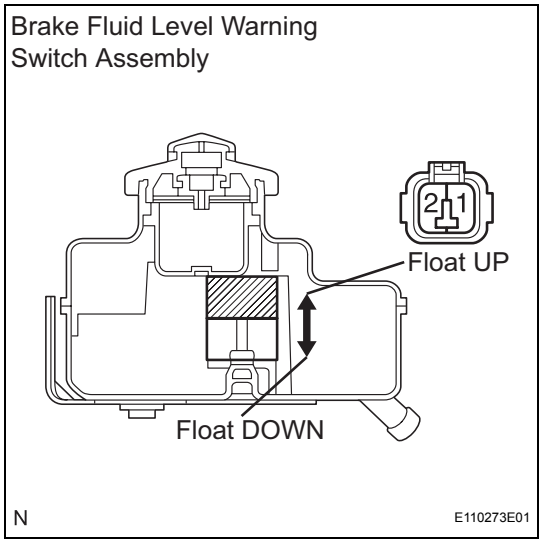
Standard resistance

Tester Connection	Specified Condition
S1-28 (PKB) - P4-1	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7 INSPECT BRAKE FLUID LEVEL WARNING SWITCH ASSEMBLY



(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the B2 switch connector.
(c) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Float DOWN	Below 1 Ω
	Float UP	10 kΩ or higher

NG → **REPLACE BRAKE MASTER CYLINDER SUB-ASSEMBLY**

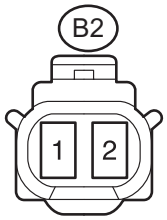
OK

BC

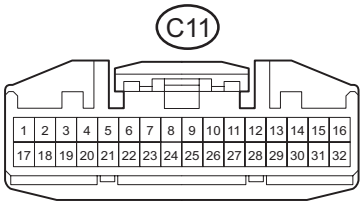
8	CHECK WIRE HARNESS (WARNING SWITCH - COMBINATION METER AND BODY GROUND)

Wire Harness Side

Brake Fluid Level Warning Switch Assembly



Combination Meter Assembly



E116388E01

(a) Disconnect the B2 switch connector.
(b) Disconnect the C11 meter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
B2-1 - C11-15	Below 1 Ω
B2-2 - Body ground	

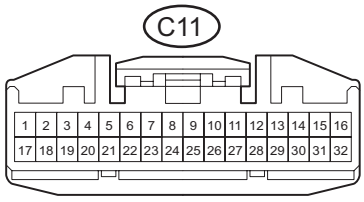
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

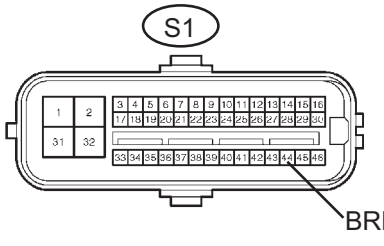
9	CHECK WIRE HARNESS (SKID CONTROL ECU - COMBINATION METER)

Wire Harness Side

Combination Meter Assembly



Skid Control ECU with Actuator



E114408E05

(a) Disconnect the S1 ECU connector.
(b) Disconnect the C11 meter connector.
Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
S1-44 (BRL) - C11-14	Below 1 Ω

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

BC

OK

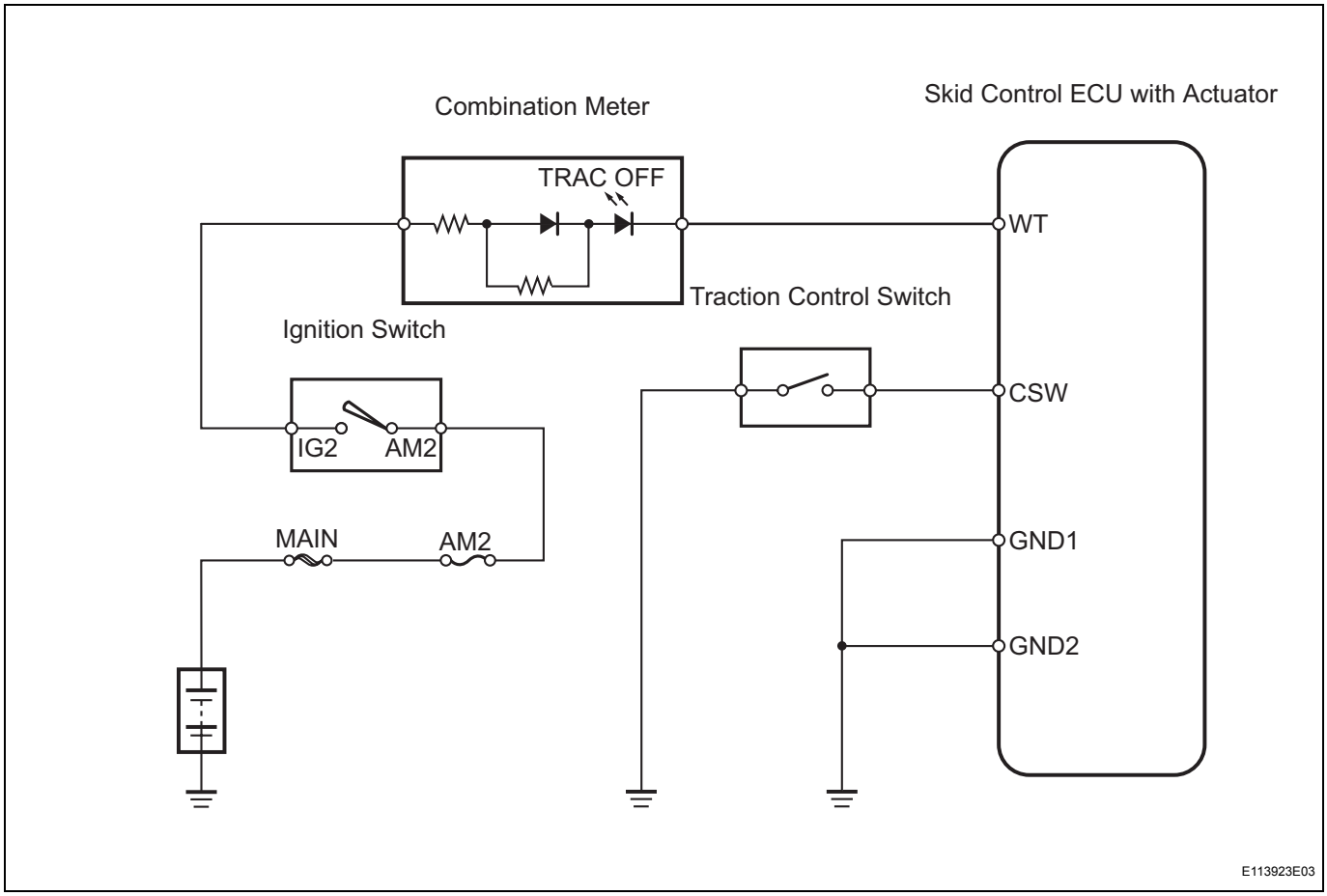
REPLACE BRAKE ACTUATOR ASSEMBLY

TRAC OFF Indicator Light, TRAC OFF Switch Circuit

DESCRIPTION

This is the TRAC control main switch. When the TRAC control switch is pushed, TRAC control turns off and the TRAC OFF indicator light turns on. When the ignition switch is turned OFF and then turned ON, the TRAC control automatically turns on again.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

BC

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 3**

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (TRAC OFF INDICATOR LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the TRAC OFF indicator light illuminates.

Skid control ECU with actuator

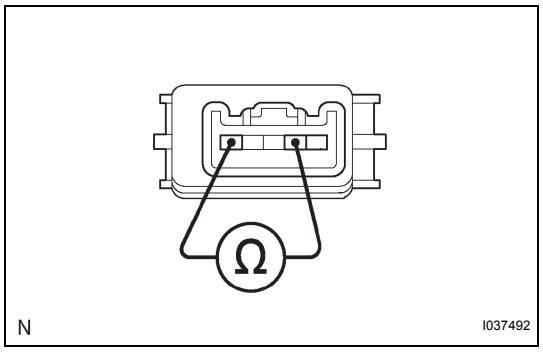
Item	Measurement Item / Range (Display)	Diagnostic Note
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator light ON / OFF	Observe combination meter

OK:
VSC / TRAC OFF indicator light illuminates.

NG → **Go to step 5**

OK

3	INSPECT TRACTION CONTROL SWITCH



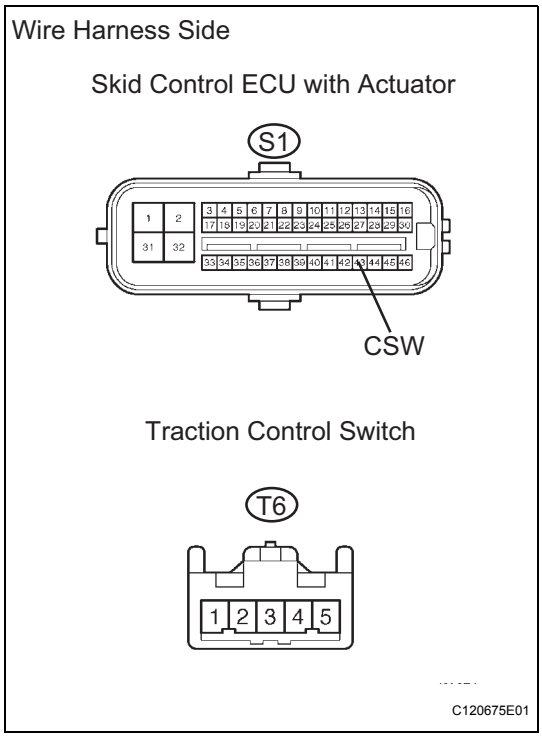
(a) Remove the traction control switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
2 - 5	Pushed (ON)	Below 1 Ω
	Not pushed (OFF)	10 kΩ or higher

NG → **REPLACE TRACTION CONTROL SWITCH**

OK

4	CHECK WIRE HARNESS (TRACTION CONTROL SWITCH - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the T6 switch connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
T6-5 - S1-43 (CSW)	Below 1 Ω
T6-2 - Body ground	

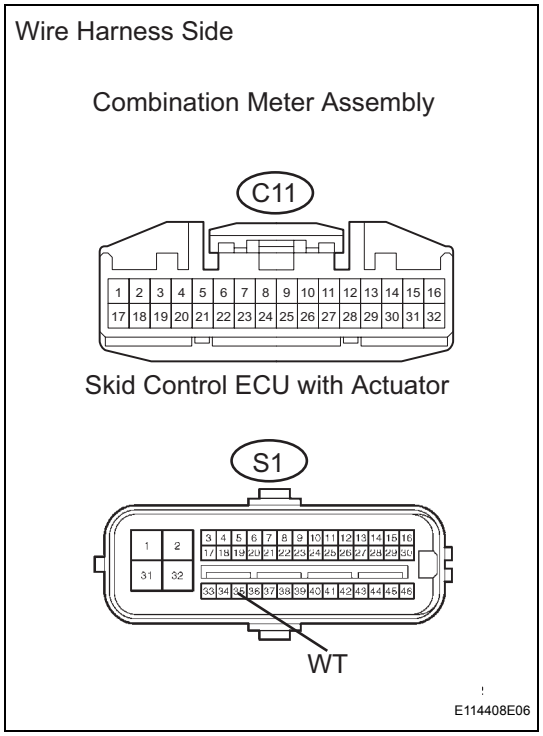
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

5	CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU)



(a) Disconnect the C11 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C1-30 - S1-35 (WT)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

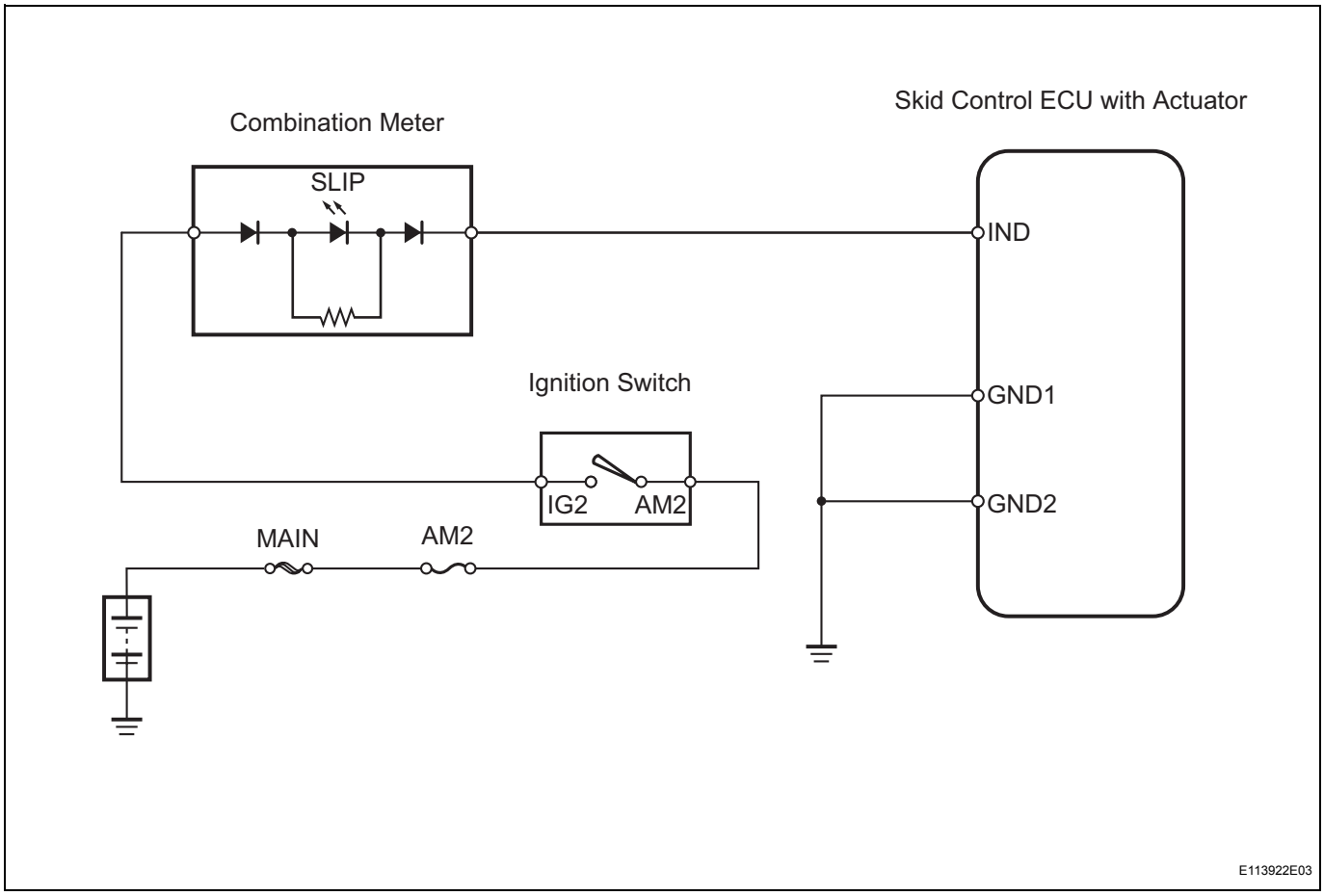
OK → **REPLACE COMBINATION METER ASSEMBLY**

Slip Indicator Light Circuit

DESCRIPTION

The SLIP indicator light blinks during TRAC and VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 4**

A

BC

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SLIP INDICATOR LIGHT)

(a) Select the ACTIVE TEST, generate a control command, and then check that the SLIP indicator light illuminates.

Skid control ECU with actuator

Item	Vehicle Condition/Test Details	Diagnostic Note
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter

NG → Go to step 4

OK

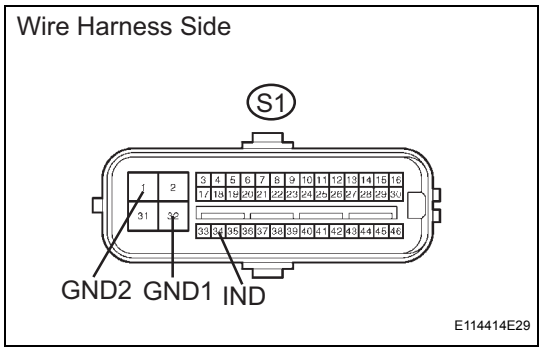
3	CHECK SLIP INDICATOR LIGHT

(a) Check that the SLIP indicator light turns on for 3 seconds soon after the ignition switch is turned ON.

OK → END

NG

4	CHECK WIRE HARNESS (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connector	Condition	Specified Condition
S1-34 (IND) - S1-32 (GND1) or S1-1 (GND2)	Ignition switch ON	10 to 14 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

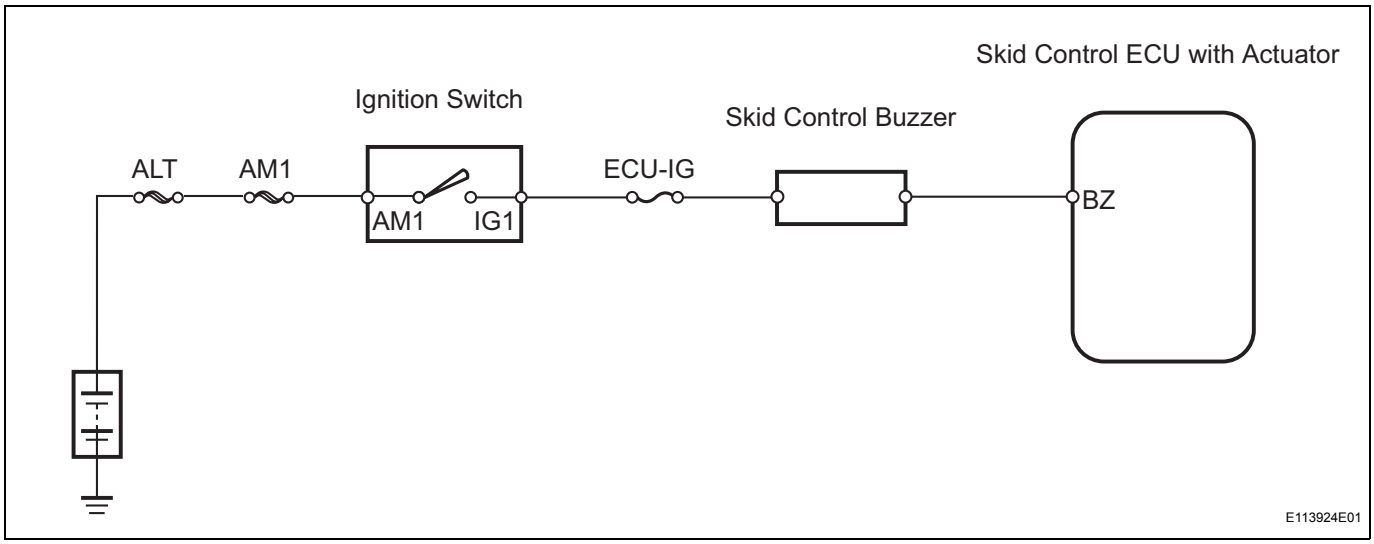
REPLACE BRAKE ACTUATOR ASSEMBLY

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds during VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 3**

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

BC

(a) Select the ACTIVE TEST, generate a control command, and then check that the skid control buzzer sounds.

Skid control ECU with actuator

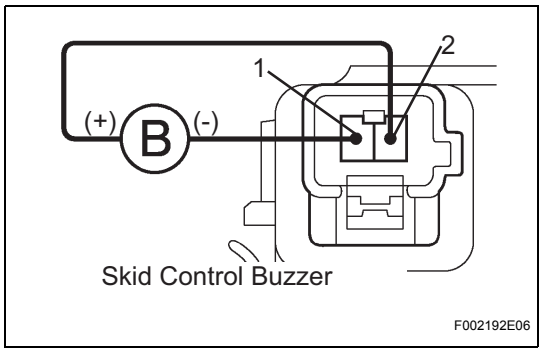
Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

OK:
Normal operation.
HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3 INSPECT SKID CONTROL BUZZER ASSEMBLY

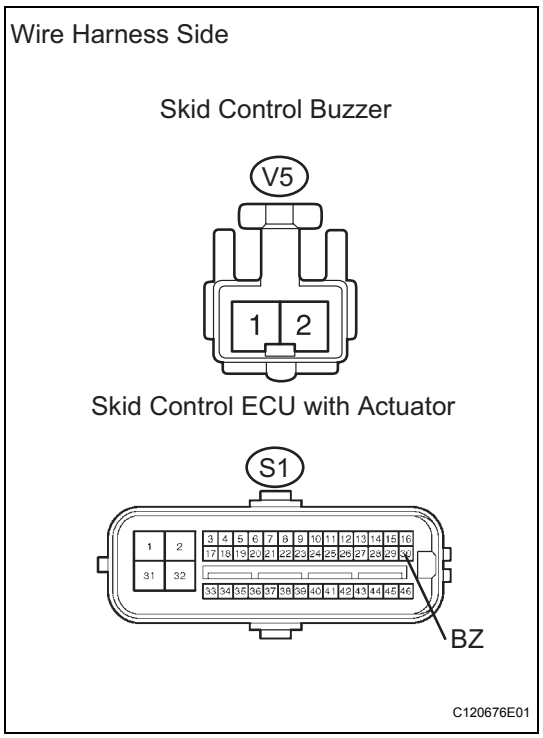


(a) Disconnect the skid control buzzer connector.
(b) Apply positive (+) battery voltage to terminals 1 and 2 of the skid control buzzer connector. Check that the buzzer sounds.
OK:
Skid control buzzer sound is heard.

NG → REPLACE SKID CONTROL BUZZER ASSEMBLY

OK

4 CHECK WIRE HARNESS (SKID CONTROL BUZZER - SKID CONTROL ECU AND BATTERY)



(a) Disconnect the V5 buzzer connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
V5-1 - S1-30 (BZ)	Below 1 Ω

(d) Measure the voltage of the wire harness side connectors.
Standard voltage

Tester Connection	Specified Condition
V5-2 - Body ground	10 to 14 V

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

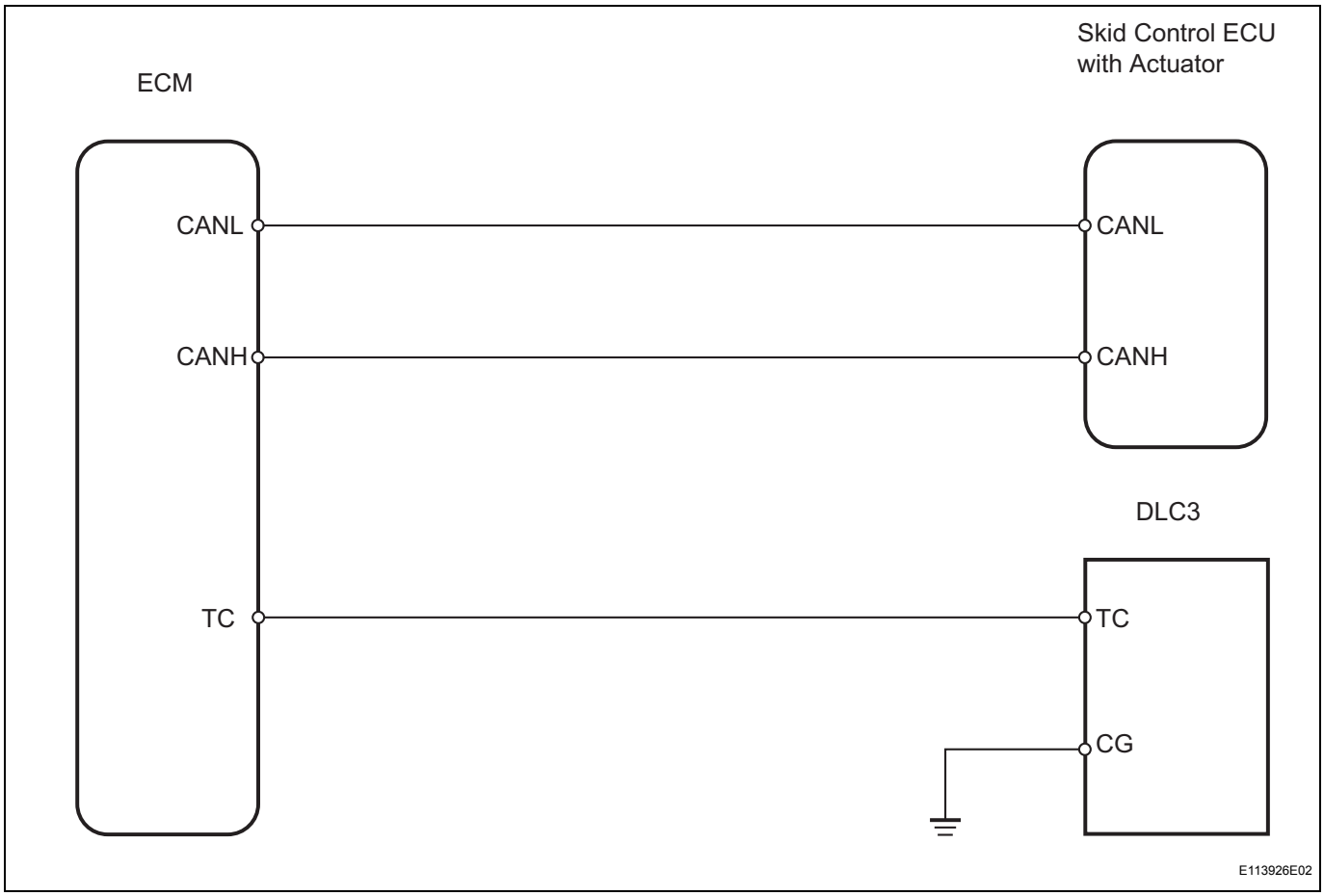
BC

TC and CG Terminal Circuit

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display DTCs by flashing the ABS warning light.

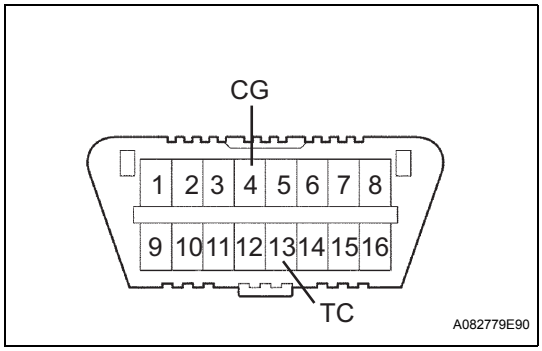
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DLC3 (TC VOLTAGE)

BC



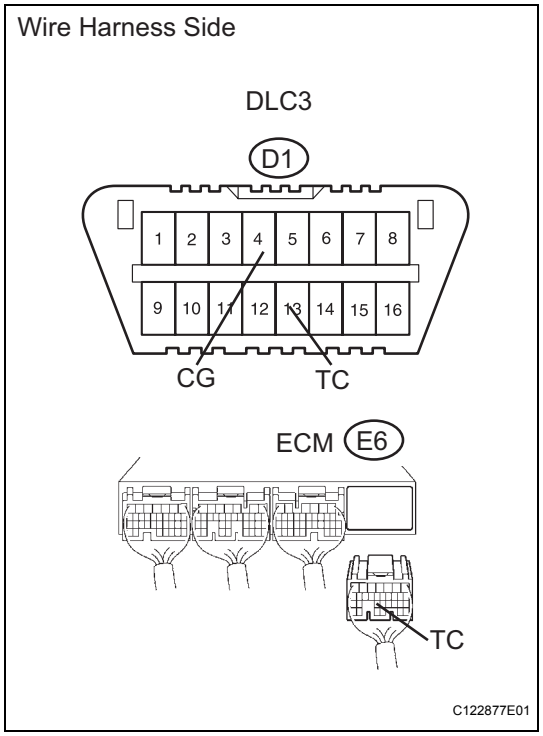
(a) Measure the voltage of the connector.
Standard voltage

Tester Connection	Condition	Specified Condition
D1-13 (TC) - D1-4 (CG)	Ignition switch ON	10 to 14 V

OK → **GO TO CAN COMMUNICATION SYSTEM**

NG

2	CHECK WIRE HARNESS (DLC3 - ECM AND BODY GROUND)



(a) Disconnect the D1 DLC3 connector.
(b) Disconnect the E6 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
D1-13 (TC) - E6-20 (TC)	Below 1 Ω
D1-4 (CG) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

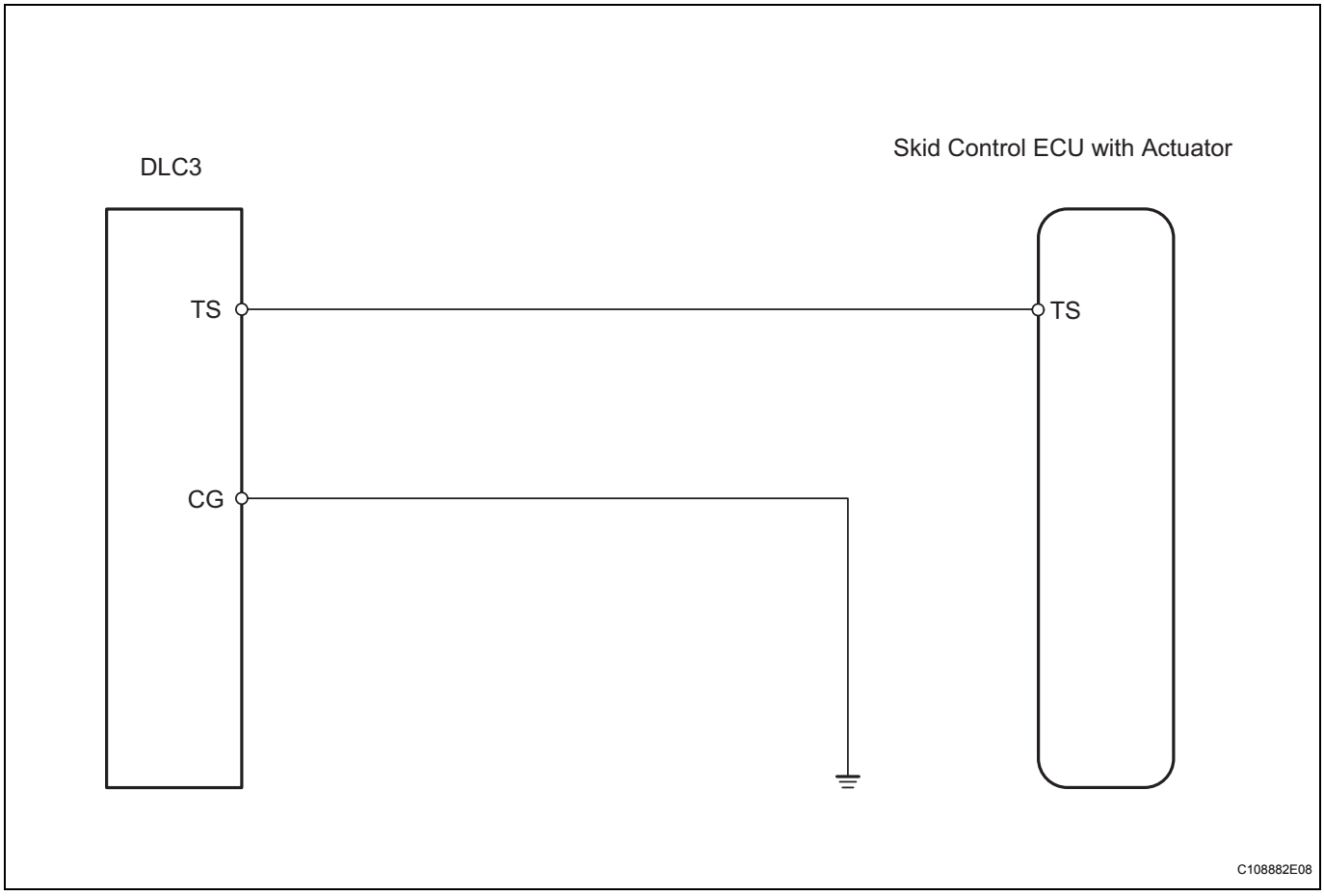
GO TO CAN COMMUNICATION SYSTEM

TS and CG Terminal Circuit

DESCRIPTION

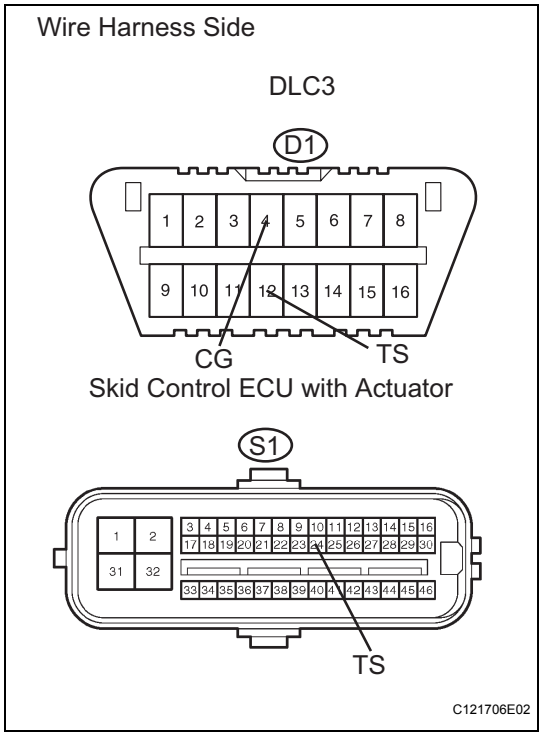
The sensor check circuit detects abnormalities in the sensor signal when they cannot be detected with the DTC check.
Connecting terminals TS and CG of the DLC3 starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (DLC3 - SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the D1 DLC3 connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
D1-4 (CG) - Body ground	Below 1 Ω
D1-12 (TS) - S1-24 (TS)	

HINT:
When replacing the skid control ECU with actuator, perform the zero point calibration (see page BC-69).

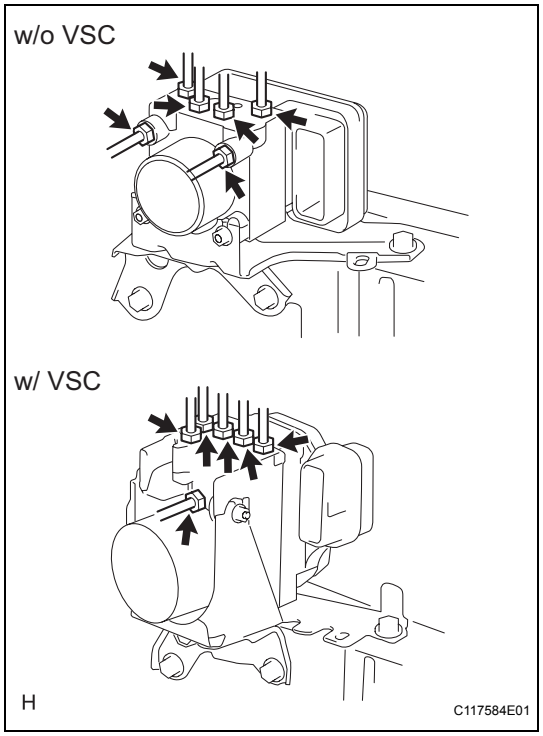
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

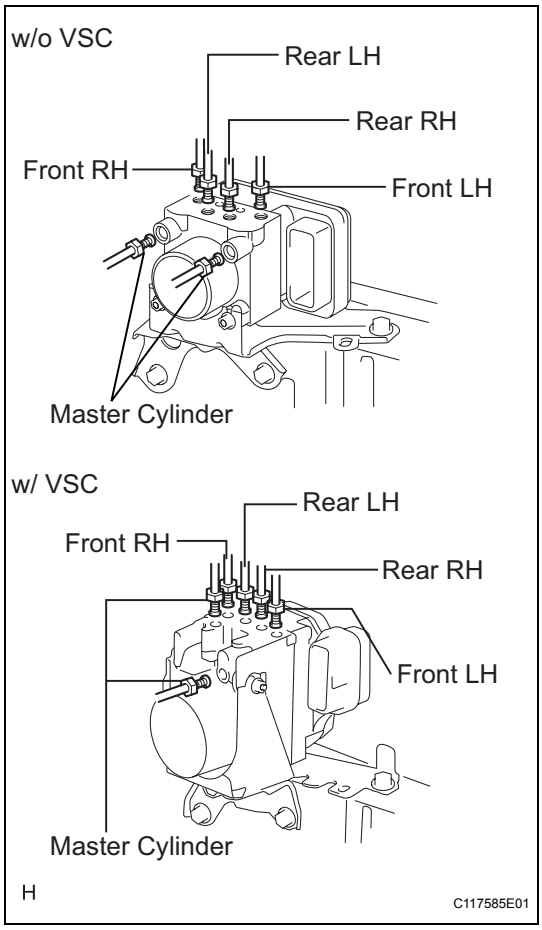
OK

REPLACE BRAKE ACTUATOR ASSEMBLY

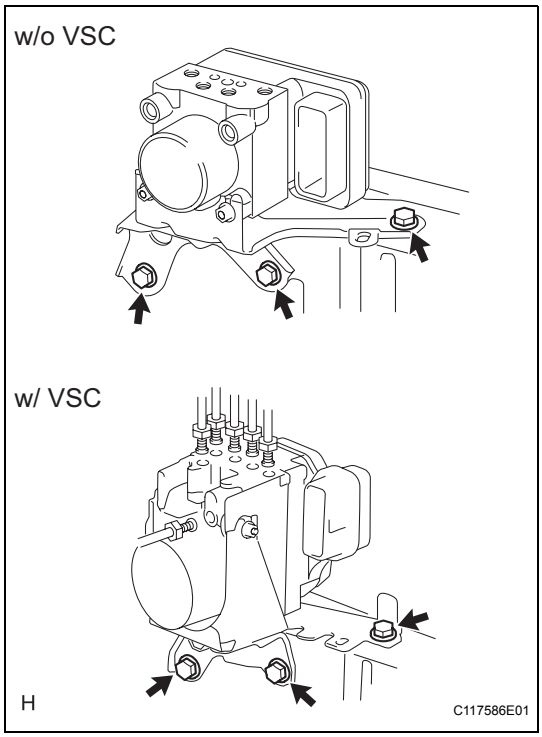
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash off brake fluid immediately if it comes in contact with any painted surface.
3. **REMOVE BRAKE ACTUATOR ASSEMBLY WITH BRACKET**
   (a) Release the latch of the actuator connector and disconnect the connector.
   (b) Using SST, disconnect the 6 brake lines from the brake actuator.
   SST 09023-00101





(c) Place tags or marks to identify the installation locations of each brake line.



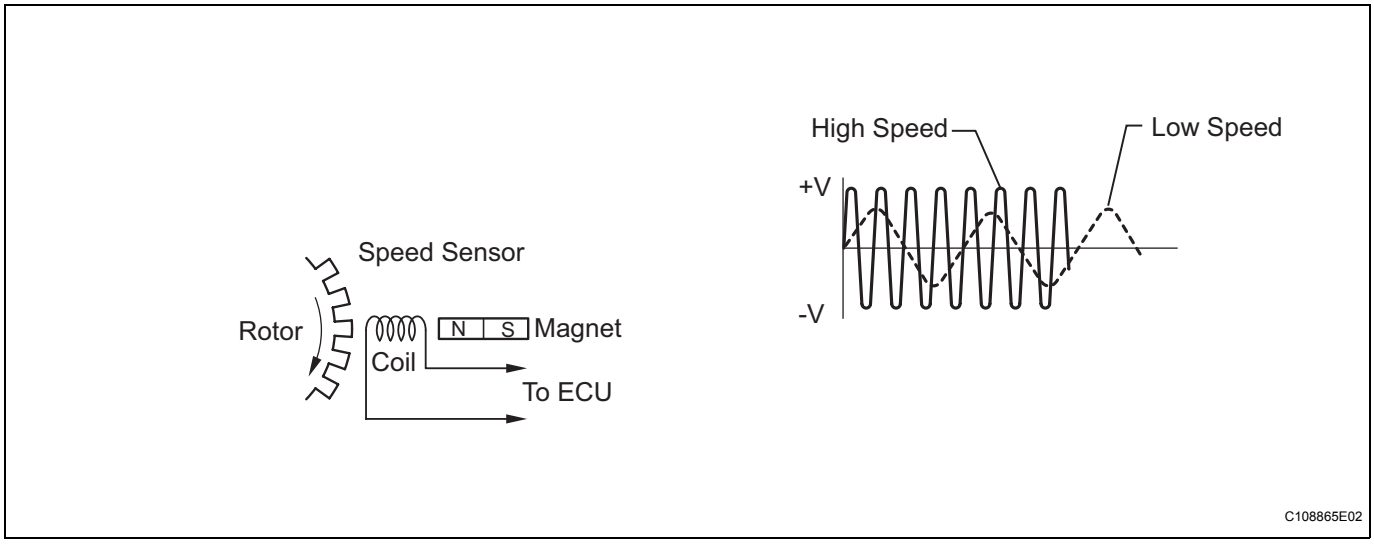
(d) Remove the 3 bolts and brake actuator with the bracket.

4. REMOVE BRAKE ACTUATOR ASSEMBLY

(a) Remove the 2 nuts and brake actuator from the bracket.

DTC	C0200/31	Right Front Wheel Speed Sensor Signal Malfunction
DTC	C0205/32	Left Front Wheel Speed Sensor Signal Malfunction
DTC	C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH
DTC	C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH
DTC	C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)
DTC	C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)
DTC	C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)

DESCRIPTION



The speed sensor detects wheel speed and transmits the appropriate signals to the ECU. These signals are used for control of the ABS.

BC

Each of the front and rear rotors have 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor produces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71, C1272/72, C1275/75 and C1276/76 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1271/71, C1272/72, C1275/75 and C1276/76 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 1 second or more • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.5 seconds or more	• Front speed sensor • Front speed sensor circuit • Speed sensor rotor
C1235/35 C1236/36	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more	• Front speed sensor • Front speed sensor circuit
C1271/71	Detected only during test mode	• Front speed sensor RH • Sensor installation • Sensor rotor
C1272/72	Detected only during test mode	• Front speed sensor LH • Sensor installation • Sensor rotor
C1275/75	Detected only during test mode	Front speed sensor rotor RH
C1276/76	Detected only during test mode	Front speed sensor rotor LH

HINT:
- DTCs C0200/31 and C1235/35 are for the front speed sensor RH.
- DTCs C0205/32 and C1236/36 are for the front speed sensor LH.

WIRING DIAGRAM

BC

INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 4

A

2 READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Check DATA LIST for proper functioning of the front speed sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → Go to step 4

OK

3 CHECK DTC OUTPUT RECUR

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

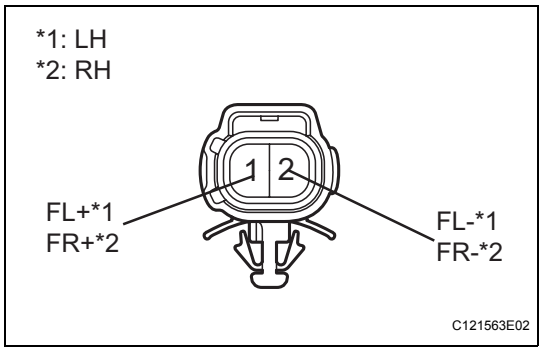
Result	Proceed to
DTC is output	A
DTC is not output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT FRONT SPEED SENSOR



(a) Disconnect the A3 and A4 sensor connectors.
(b) Measure the resistance of the speed sensors.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (FL+) - 2 (FL-)	1.4 to 1.8 kΩ at 20 °C
1 (FL+) - Body ground	10 kΩ or higher
2 (FL-) - Body ground	

RH

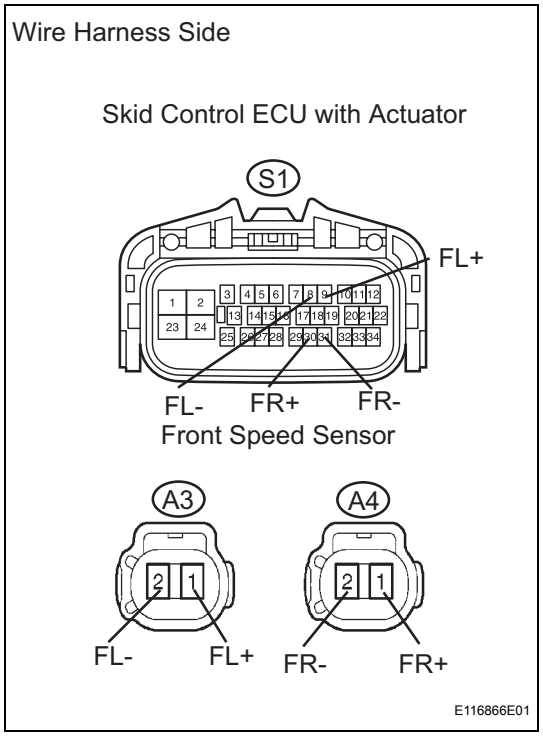
Tester Connection	Specified Condition
1 (FR+) - 2 (FR-)	1.4 to 1.8 kΩ at 20 °C
1 (FR+) - Body ground	10 kΩ or higher
2 (FR-) - Body ground	

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-5).

NG → **REPLACE FRONT SPEED SENSOR**

OK

5 CHECK WIRE HARNESS (SKID CONTROL ECU - FRONT SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A3 and A4 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance:

LH

Tester Connection	Specified Condition
S1-9 (FL+) - A3-1 (FL+)	Below 1 Ω
S1-8 (FL-) - A3-2 (FL-)	
A3-1 (FL+) - Body ground	10 kΩ or higher
A3-2 (FL-) - Body ground	

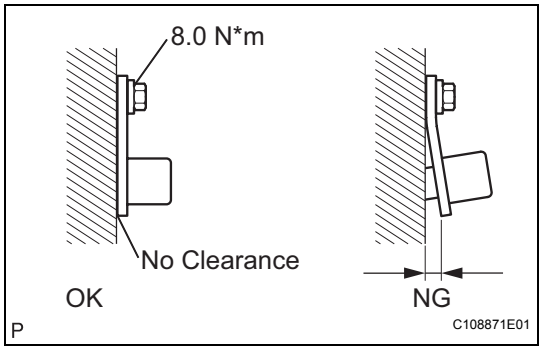
RH

Tester Connection	Specified Condition
S1-31 (FR+) - A4-1 (FR+)	Below 1 Ω
S1-30 (FR-) - A4-2 (FR-)	
A4-1 (FR+) - Body ground	10 kΩ or higher
A4-2 (FR-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 INSPECT FRONT SPEED SENSOR (INSTALLATION)



(a) Check the speed sensor installation.

OK:

The installation bolt is tightened properly.
There is no clearance between the sensor and front steering knuckle.
Torque:
8.0 N*m (82 kgf*cm, 71 in.*lbf)

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-5).

NG → **SECURELY REINSTALL FRONT SPEED SENSOR**

OK

7 INSPECT SPEED SENSOR (TIP)

(a) Remove the front speed sensor.
(b) Check the sensor tip.

OK:

No scratches or foreign matter on sensor tip.

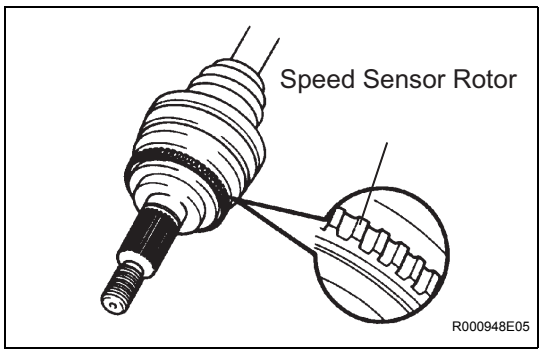
BC

HINT:
Check the speed sensor signal after cleaning or replacing the speed sensor (see page BC-5).

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

8 INSPECT SPEED SENSOR ROTOR



(a) Remove the front axle hub.
(b) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter on sensor rotor.
HINT:
- If foreign matter is attached, remove it and check the output waveform after reassembly.
- Check the speed sensor signal after cleaning or replacing the speed sensor rotor (see page BC-5).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

9 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

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

NG → **END**

A

BC **REPLACE BRAKE ACTUATOR ASSEMBLY**

INSTALLATION

1. INSTALL BRAKE ACTUATOR ASSEMBLY

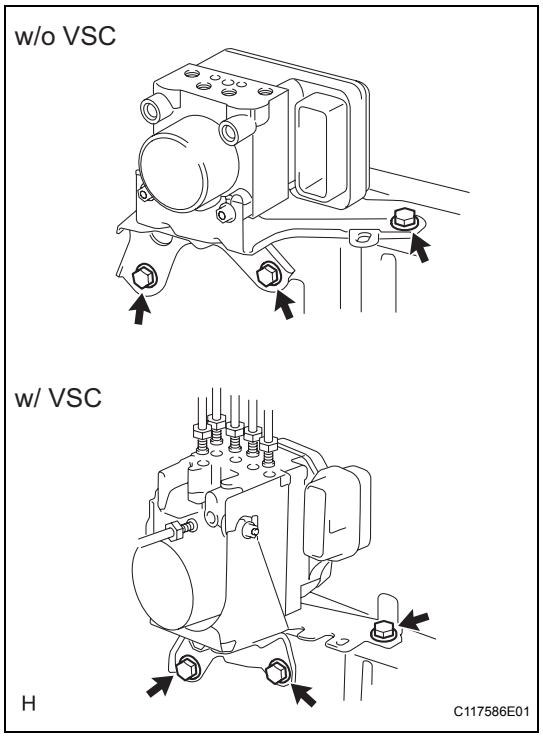
(a) Install the brake actuator to the bracket with the 2 nuts.

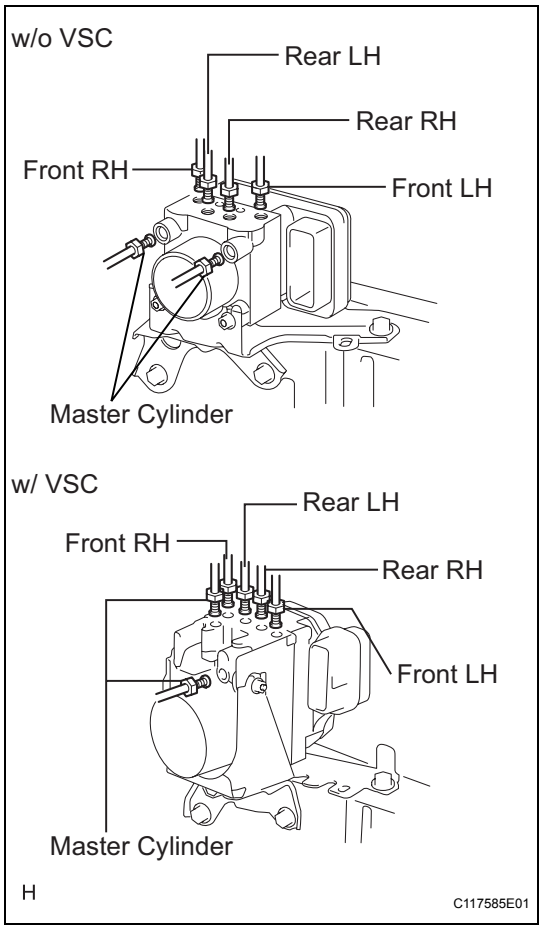
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

2. INSTALL BRAKE ACTUATOR ASSEMBLY WITH BRACKET

(a) Install the brake actuator with bracket with the 3 bolts.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)





(b) Using SST, connect the 6 brake lines to the correct positions of the brake actuator, as shown in the illustration.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf) without SST
14 N*m (143 kgf*cm, 10 ft.*lbf) with SST
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

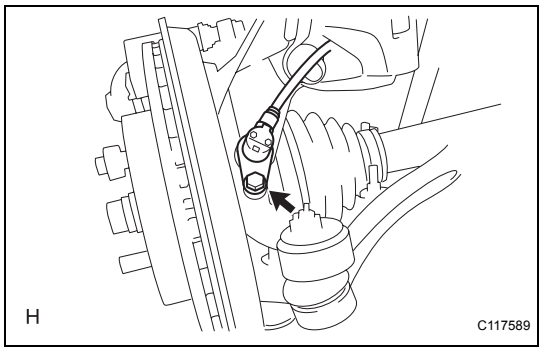
(c) Connect the brake actuator connector.

3. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-3)**
4. **BLEED AIR FROM BRAKE MASTER CYLINDER (See page BR-3)**
5. **BLEED AIR FROM BRAKE LINE (See page BR-4)**
6. **BLEED AIR FROM BRAKE ACTUATOR (w/ VSC) (See page BR-4)**
7. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-6)**
8. **CHECK FOR BRAKE FLUID LEAKAGE**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
10. **CHECK BRAKE ACTUATOR WITH INTELLIGENT TESTER**
    (a) Check the brake actuator with the intelligent tester (see page BC-162).
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

INSTALLATION

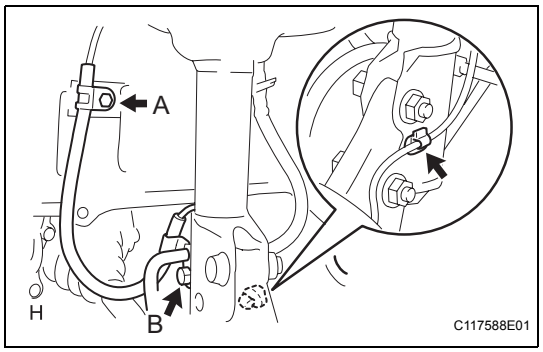
HINT:

- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.



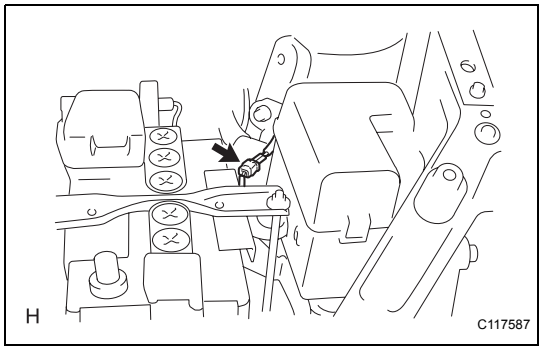
1. INSTALL FRONT SPEED SENSOR LH

(a) Install the speed sensor with the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Keep the sensor tip and sensor installation hole free from foreign matter.



(b) Install the speed sensor wire harness to the body and shock absorber with the 2 clamp bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf) for bolt A
29 N*m (300 kgf*cm, 21 ft.*lbf) for bolt B
NOTICE:
Do not twist the sensor wire when installing it.

(c) Connect the resin clip and speed sensor wire harness to the shock absorber.
NOTICE:
Do not twist the sensor wire when installing it.



(d) Connect the speed sensor connector.
NOTICE:
Do not twist the sensor wire when installing it.

2. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION

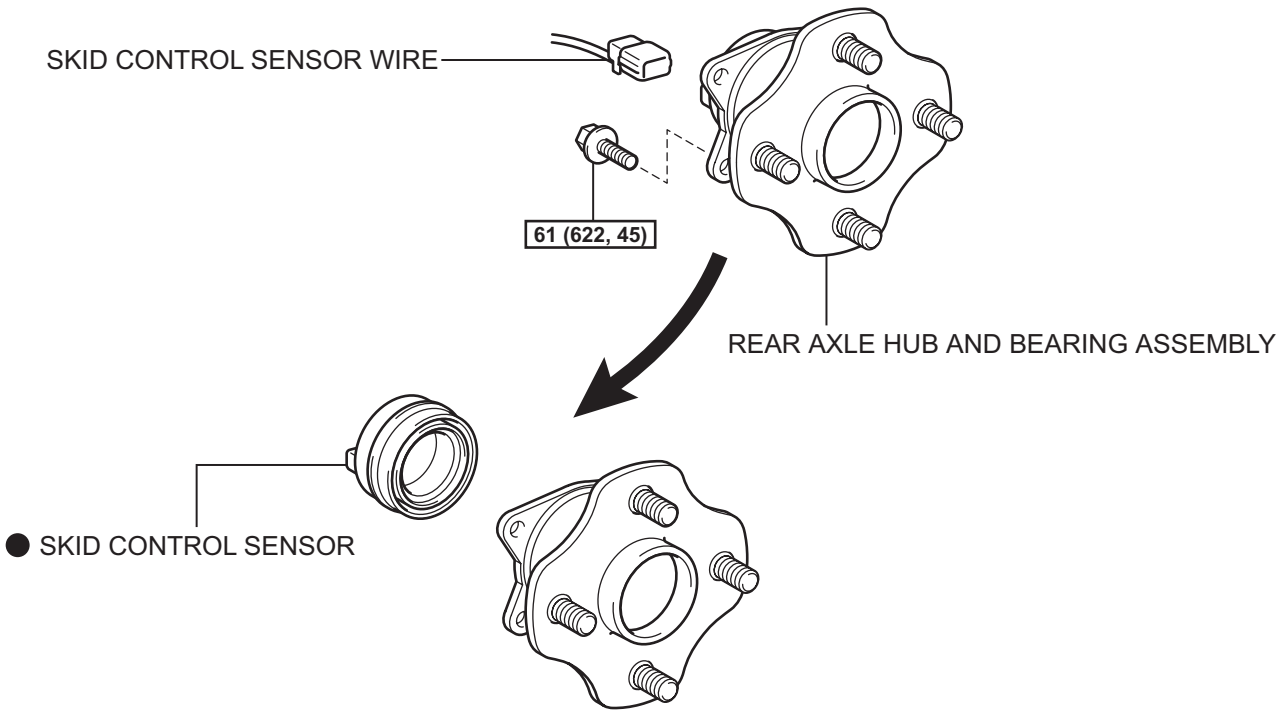
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

5. CHECK ABS SPEED SENSOR SIGNAL

(a) Check the ABS speed sensor signal (see page BC-73).

SKID CONTROL SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

H

C117774E01

REMOVAL

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

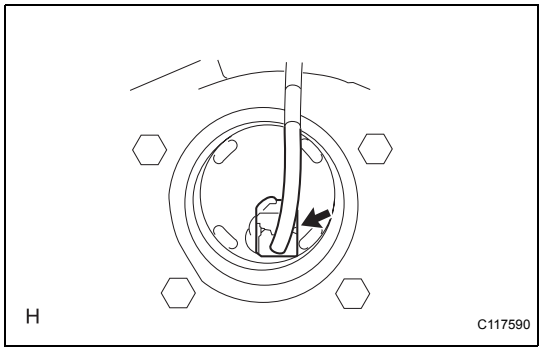
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE REAR WHEEL

3. DISCONNECT SKID CONTROL SENSOR WIRE

(a) Disconnect the connector from the skid control sensor.



4. REMOVE REAR BRAKE DRUM SUB-ASSEMBLY

(a) Put matchmarks on the rear brake drum and axle hub.

(b) Remove the rear brake drum.

5. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY

6. REMOVE SKID CONTROL SENSOR

(a) Mount the hub and bearing in a soft jaw vise.

NOTICE:
Replace the hub and bearing if it is dropped or receives a strong shock.

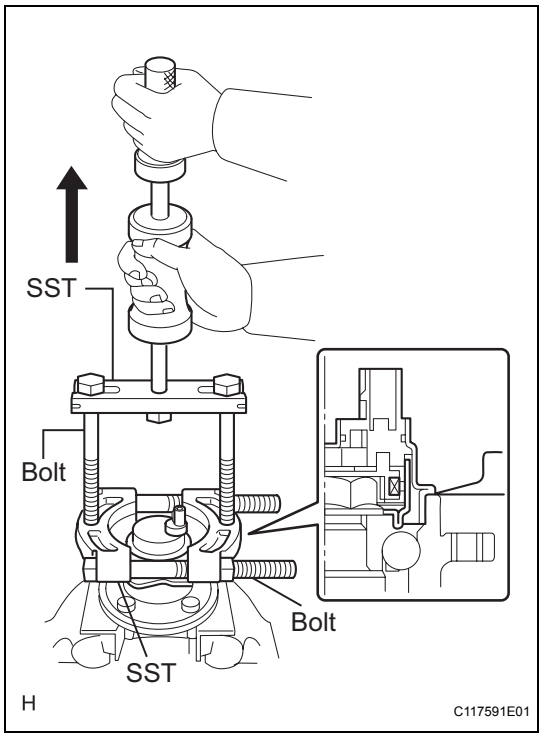
(b) Using a pin punch and hammer, drive out the 2 pins of SST, and remove the 2 attachments from SST.

SST 09520-00031

(c) Using SST and 2 bolts (Diameter: 12 mm, pitch: 1.5 mm), remove the skid control sensor from the rear axle hub.

SST 09520-00031 (09520-00040), 09521-00020, 09950-00020

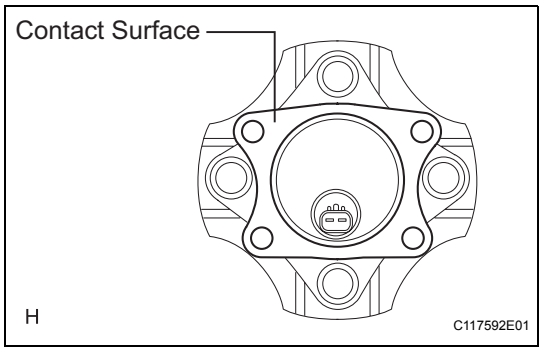
NOTICE:
- **If the sensor rotor is damaged, replace the hub and bearing.**
- **Do not scratch the contacting surface of the axle hub and speed sensor.**



BC

INSTALLATION

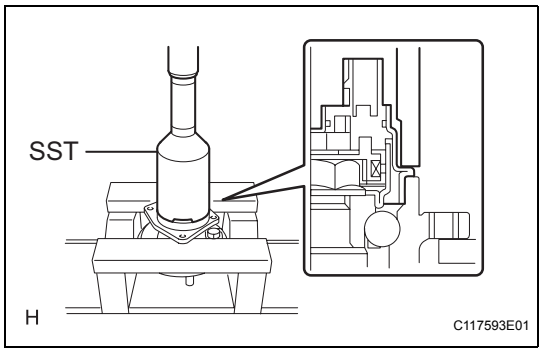
HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.



1. INSTALL SKID CONTROL SENSOR

(a) Clean the contacting surface of the rear axle hub and a new skid control sensor.
NOTICE:
Keep the sensor rotor clean.

(b) Place the skid control sensor on the rear axle hub so that the connector is as low as possible when installed to the vehicle.

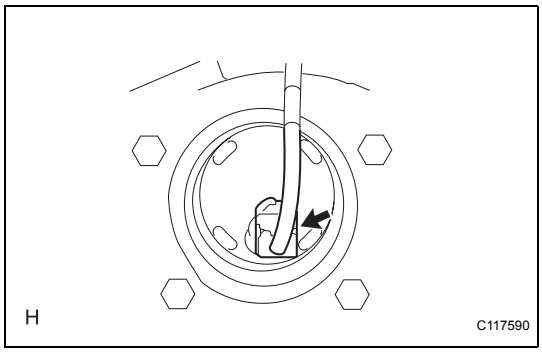


(c) Using SST and a press, install the skid control sensor on the rear axle hub.
SST 09214-76011
NOTICE:
- **Do not tap the skid control sensor directly with a hammer.**
- **Check that there is no foreign matter on the skid control sensor detection portion.**
- **Press in the skid control sensor straight and slowly.**

2. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY (See page AH-15)

3. INSPECT REAR AXLE DEVIATION AND BACKLASH (See page AH-15)

4. INSTALL REAR BRAKE DRUM SUB-ASSEMBLY



5. CONNECT SKID CONTROL SENSOR WIRE

(a) Connect the connector to the skid control sensor.

6. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

8. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

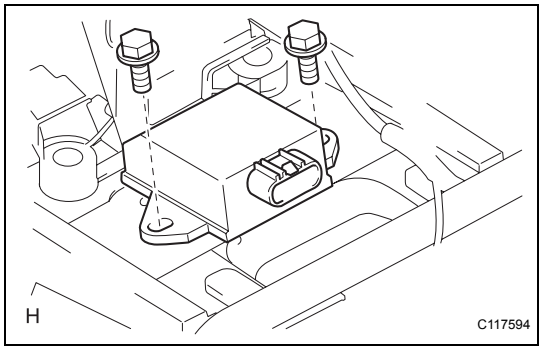
9. CHECK ABS SPEED SENSOR SIGNAL

(a) Check the ABS speed sensor signal (see page BC-73).

INSTALLATION

NOTICE:

- **Do not use the dropped or damaged yaw rate sensor.**
- **Keep the area between the yaw rate sensor bracket and body free from foreign matter.**
- **Make sure of the sensor direction.**



1. **INSTALL YAW RATE SENSOR**
   (a) Install the yaw rate sensor with the 2 bolts.
   Torque: 14 N*m (143 kgf*cm, 10 ft.*lbf)
   (b) Connect the yaw rate sensor connector.
2. **INSTALL REAR CONSOLE BOX ASSEMBLY**
   (a) Install the rear console box (see pageIP-27).
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
5. **PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION**
   (a) Perform yaw rate sensor zero point calibration (see page BC-69).
6. **CHECK VSC SENSOR SIGNAL**
   (a) Check the VSC sensor signal (see page BC-73).

DTC	C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction

DTC	C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction

DTC	C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH

DTC	C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH

DTC	C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)

DTC	C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DTC	C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)

DTC	C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DESCRIPTION

Refer to DTCs C0200/31, C0205/32, C1235/35 and C1236/36.

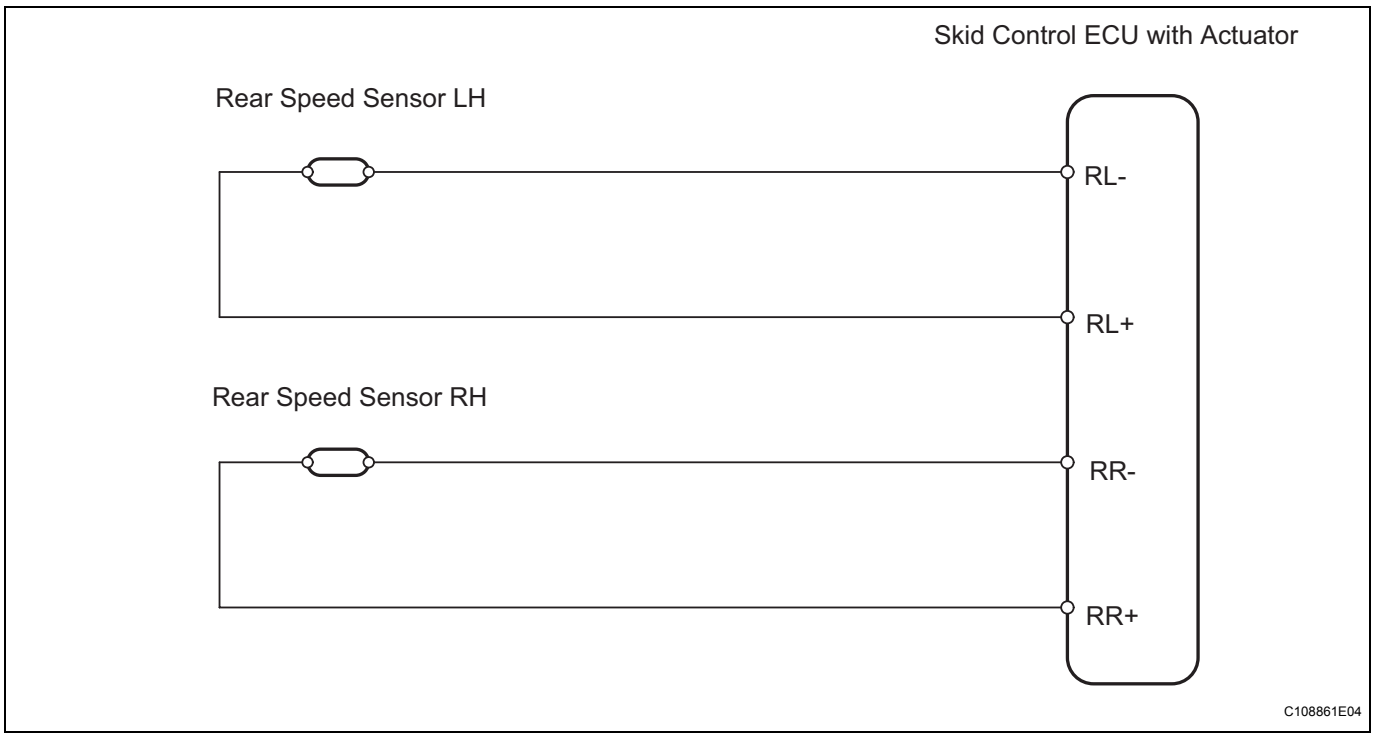
DTCs C1273/73, C1274/74, C1277/77 and C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs C1273/73, C1274/74, C1277/77 and C1278/78 are output only in the test mode.

DTC No.	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	When one of following occurs • With vehicle speed at 10 km/h (6 mph) or more, sensor signal circuit of faulty wheel is open or short for 15 seconds • Momentary interruption of sensor signal of faulty wheel has occurred 7 times or more • Sensor signal circuit is open for 0.2 seconds or more	• Rear speed sensor • Rear speed sensor circuit • Speed sensor rotor
C1238/38 C1239/39	At vehicle speed of 20 km/h (12 mph) or more, condition that noise is included in speed sensor signal continues for 5 seconds or more	• Rear speed sensor • Rear speed sensor circuit
C1273/73	Detected only during test mode	• Rear speed sensor RH • Sensor installation • Sensor rotor
C1274/74	Detected only during test mode	• Rear speed sensor LH • Sensor installation • Sensor rotor

DTC No.	DTC Detection Condition	Trouble Area
C1277/77	Detected only during test mode	Rear speed sensor rotor RH
C1278/78	Detected only during test mode	Rear speed sensor rotor LH

HINT:
- DTCs C0210/33 and C1238/38 are for the rear speed sensor RH.
- DTCs C0215/34 and C1239/39 are for the rear speed sensor LH.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.
Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → **Go to step 4**

A

2 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Check the DATA LIST for proper functioning of the rear speed sensor.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Speed similar to that of speedometer

OK:
There is almost no difference between actual wheel speed and displayed speed value.

NG → **Go to step 4**

OK ↓

3 CHECK DTC OUTPUT RECUR

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 32 km/h (20 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

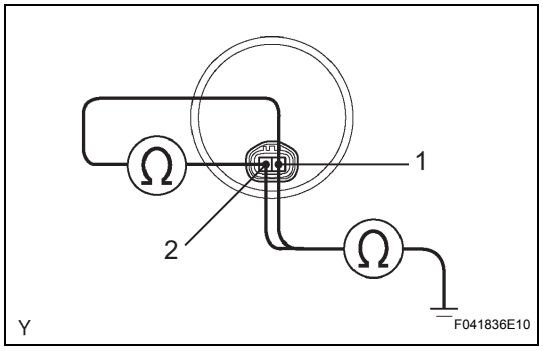
Result	Proceed to
DTC is output	A
DTC is not output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A ↓

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT REAR SPEED SENSOR



(a) Disconnect the A15 and A16 sensor connectors.
(b) Measure the resistance of the speed sensors.
Standard resistance:
LH

Tester Connection	Specified Condition
1 (RL-) - 2 (FL+)	Below 2.2 Ω
1 (RL-) - Body ground	10 kΩ or higher
2 (RL+) - Body ground	

RH

Tester Connection	Specified Condition
1 (RR-) - 2 (RR+)	Below 2.2 Ω
1 (RR-) - Body ground	10 kΩ or higher
2 (RR+) - Body ground	

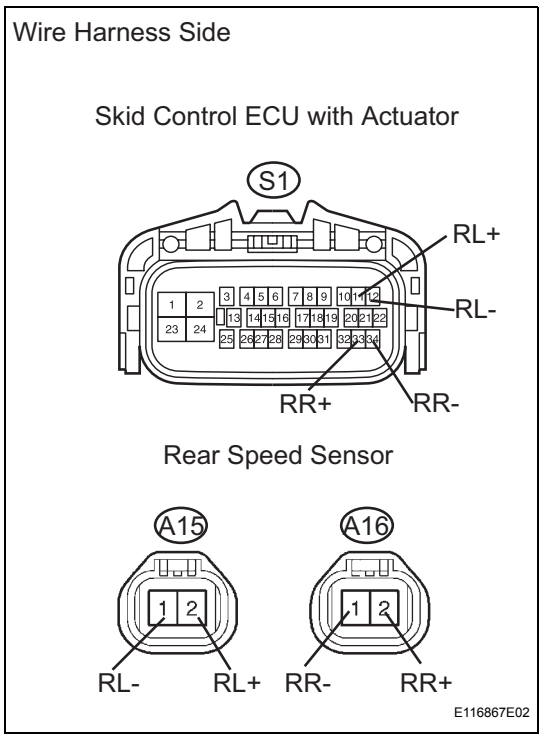
BC

HINT:
Check the speed sensor signal after the speed sensor replacement (see page BC-5).

NG → REPLACE REAR SPEED SENSOR

OK

5 CHECK WIRE HARNESS (SKID CONTROL ECU - REAR SPEED SENSOR)



(a) Disconnect the S1 ECU connector.
(b) Disconnect the A15 and A16 speed sensor connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance:

LH

Tester Connection	Specified Condition
S1-11 (RL+) - A15-2 (RL+)	Below 1 Ω
S1-12 (RL-) - A15-1 (RL-)	
A15-2 (RL+) - Body ground	10 kΩ or higher
A15-1 (RL-) - Body ground	

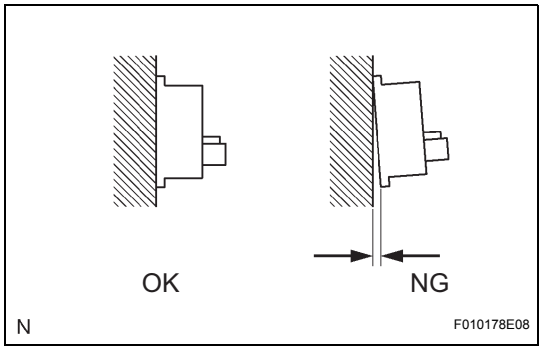
RH

Tester Connection	Specified Condition
S1-33 (RR+) - A16-2 (RR+)	Below 1 Ω
S1-34 (RR-) - A16-1 (RR-)	
A16-2 (RR+) - Body ground	10 kΩ or higher
A16-1 (RR-) - Body ground	

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 INSPECT REAR SPEED SENSOR (INSTALLATION)



(a) Check the sensor installation.

OK:

There is no clearance between the sensor and rear axle carrier.

HINT:
Check the speed sensor signal after replacement (see page BC-5).

NG → REPLACE REAR SPEED SENSOR

OK

7 INSPECT SPEED SENSOR (TIP)

(a) Remove the rear speed sensor.

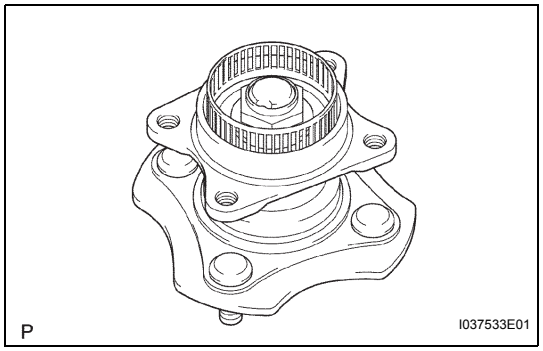
BC

(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
HINT:
Check the speed sensor signal after replacement (see page BC-5).

NG → **REPLACE REAR SPEED SENSOR**

OK

8 INSPECT REAR AXLE HUB AND BEARING ASSEMBLY



(a) Remove the axle hub and disconnect the rear speed sensor.
(b) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter.
Do not reuse skid control sensor.
HINT:
Check the speed sensor signal after replacement (see page BC-5).

NG → **REPLACE REAR AXLE HUB & BEARING ASSEMBLY**

OK

9 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at approximately 30 km/h (19 mph) or more for 60 seconds or more.
(c) Check for DTCs (see page BC-8).
Result

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

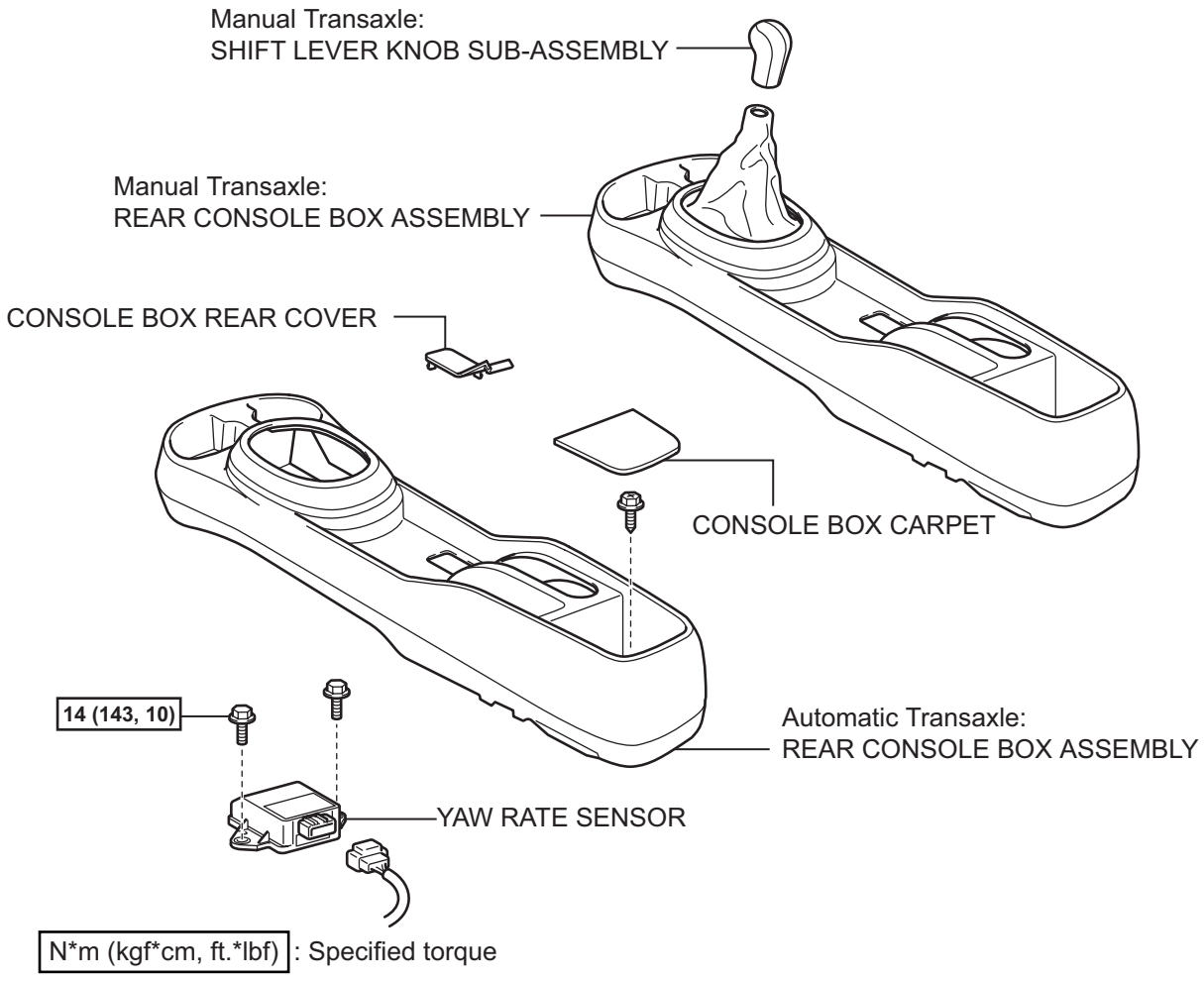
B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

YAW RATE AND ACCELERATION SENSOR (w/ VSC)

COMPONENTS



BC

REMOVAL

NOTICE:

- **Do not use the dropped or damaged yaw rate sensor.**
- **Keep the area between the yaw rate sensor bracket and body free from foreign matter.**
- **Make sure of the sensor direction.**

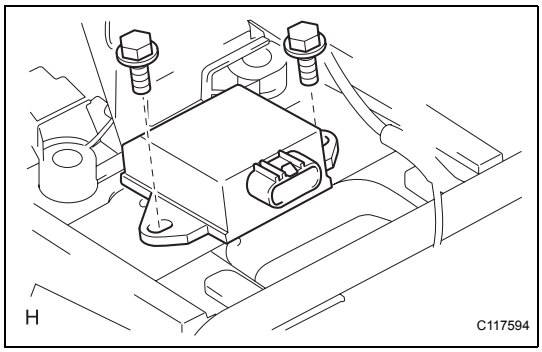
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE REAR CONSOLE BOX ASSEMBLY

(a) Remove the rear console box (see page IP-26).



3. REMOVE YAW RATE SENSOR

(a) Disconnect the yaw rate sensor connector.

(b) Remove the 2 bolts and yaw rate sensor.

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

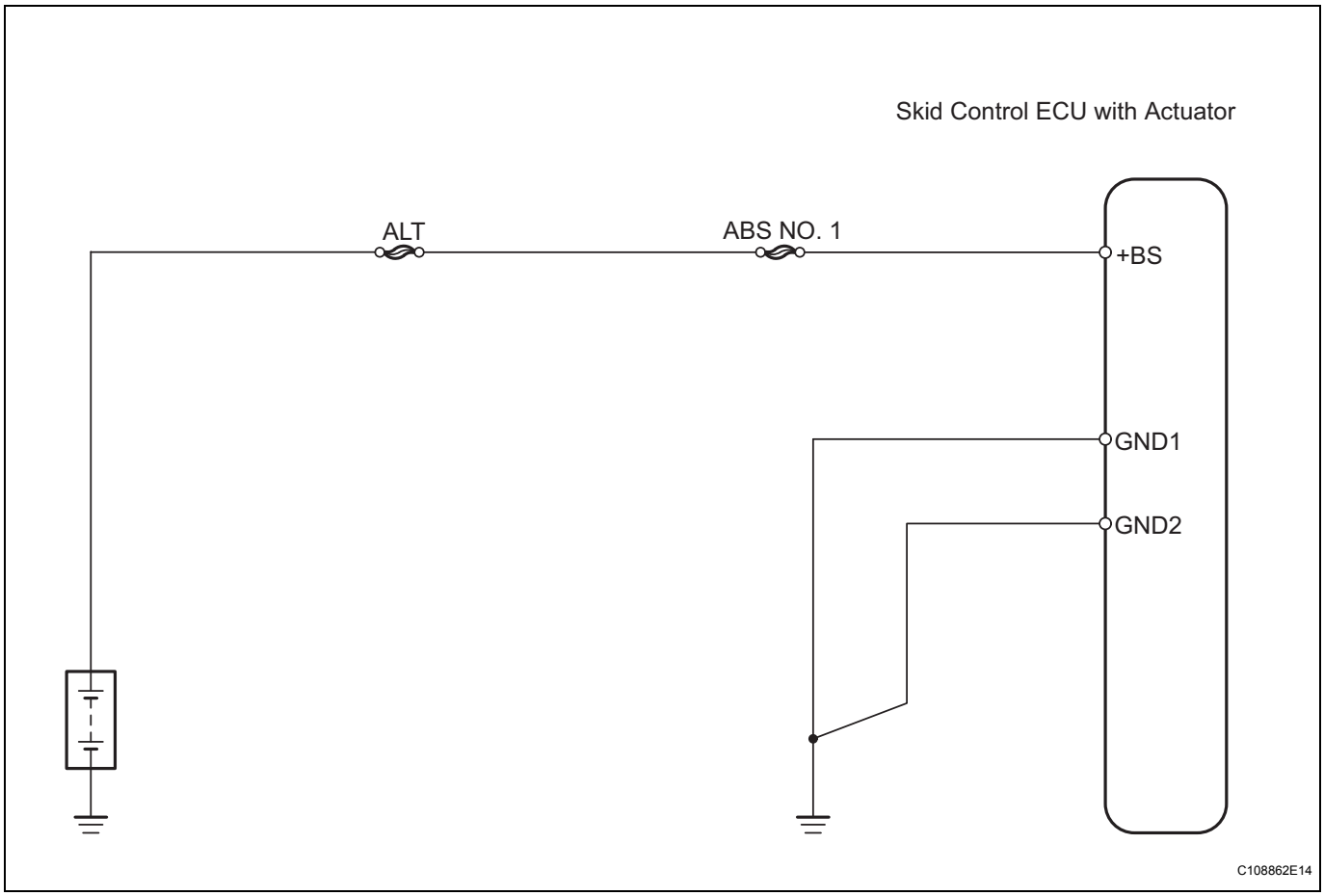
DTC	C0256/24	SRL Solenoid Circuit

DESCRIPTION

ABS solenoids turn on when receiving signals from the ECU. They control braking force by adjusting the pressure applied to the wheel cylinders.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	When either condition below is met: 1. With IG1 terminal voltage at 10 to 16 V, solenoid circuit is open or short for 0.05 seconds or longer 2. With IG1 terminal voltage at 10 to 16 V, ABS control solenoid relay contact is OFF for 0.05 seconds or longer	• Each solenoid circuit • Skid control ECU with actuator

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the solenoid circuit is built into the brake actuator assembly, solenoid circuit inspection and solenoid unit inspection cannot be performed.
Be sure to check if a DTC is output before replacing the brake actuator assembly.

(a) Clear the DTCs (see page BC-8).
(b) Turn the ignition switch ON and check that the ABS warning light illuminates for approximately 3 seconds.
(c) Check for DTCs (see page BC-8).

Result

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

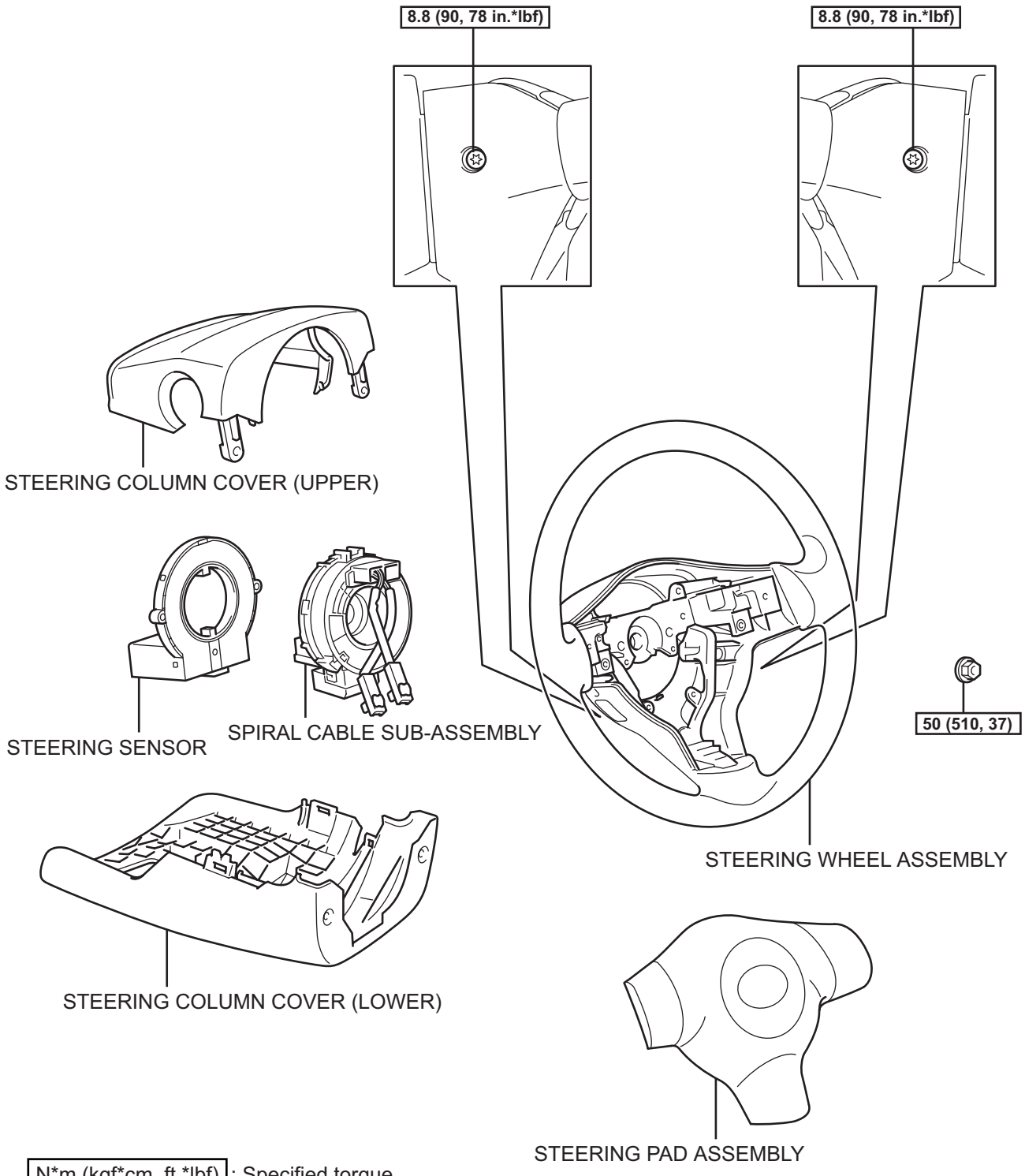
B → REPLACE BRAKE ACTUATOR ASSEMBLY

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

STEERING ANGLE SENSOR (w/ VSC)

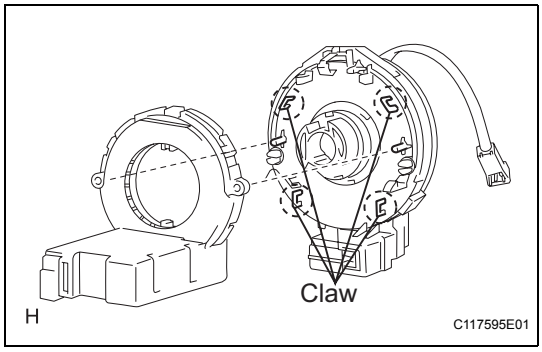
COMPONENTS



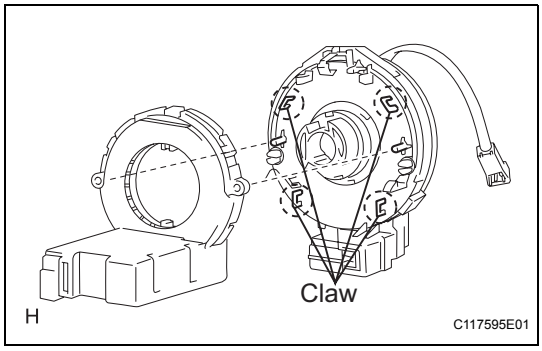
BC

REMOVAL

1. **PRECAUTION**
   (a) Follow the PRECAUTION (see page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE STEERING PAD ASSEMBLY**
5. **REMOVE STEERING WHEEL ASSEMBLY**
6. **REMOVE STEERING COLUMN COVER**
7. **REMOVE SPIRAL CABLE SUB-ASSEMBLY**
8. **REMOVE STEERING SENSOR**
   (a) Release the 4 claw fittings and remove the steering sensor from the spiral cable.



INSTALLATION



1. **INSTALL STEERING SENSOR**
   (a) Install the steering sensor to the spiral cable.
   NOTICE:
   - **Install the claw securely.**
   - **Do not damage the claw fittings.**
2. **ADJUST FRONT WHEEL TO CENTER**
3. **ADJUST SPIRAL CABLE SUB-ASSEMBLY**
4. **INSTALL STEERING COLUMN COVER**
5. **INSTALL STEERING WHEEL ASSEMBLY**
6. **INSPECT STEERING WHEEL CENTER POINT**
7. **INSTALL STEERING PAD ASSEMBLY**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **INSPECT STEERING PAD ASSEMBLY**
10. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

11. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

12. PERFORM VSC SYSTEM CALIBRATION

(a) Perform VSC system calibration (see page BC-69).

13. CHECK ABS WARNING LIGHT

(a) Check the ABS warning light (see page).

14. CHECK VSC WARNING LIGHT

(a) Check the VSC warning light (see page BC-73).

DTC	C0273/13	Open in ABS Motor Relay Circuit

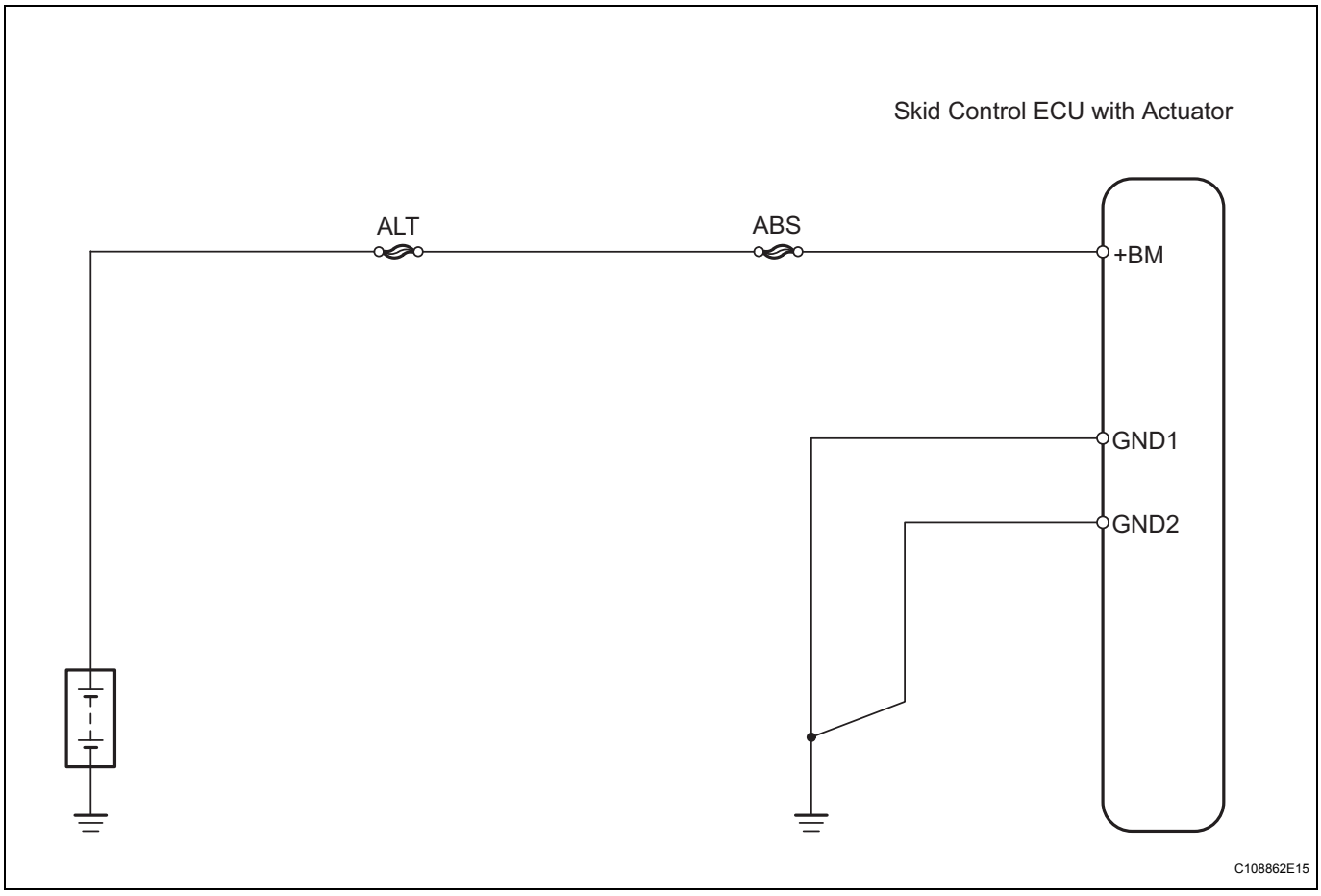
DTC	C0274/14	Short to B+ in ABS Motor Relay Circuit

DESCRIPTION

The ABS MTR relay supplies power to the ABS pump motor. While the ABS is activated, the ECU turns the ABS MTR relay ON and operates the ABS pump motor.

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	With IG1 voltage 10 V or below during initial check or ABS control, pump motor relay is turned on, and relay contact is not on for 0.2 seconds or longer	• ABS motor relay • ABS motor relay circuit
C0274/14	When pump motor relay is turned off, relay contact is on for 3 seconds or longer	• ABS motor relay • ABS motor relay circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHOOSE DIAGNOSIS METHOD

(a) Choose the diagnosis method.

BC

Method

Method	Proceed to
Using intelligent tester	A
Not using intelligent tester	B

B → Go to step 3

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Select the ACTIVE TEST, generate a control command, and then check that the ABS motor relay operates.

Skid control ECU with actuator

Item	Measurement Item / Range (Display)	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard

OK:
Operation sound of motor can be heard.

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

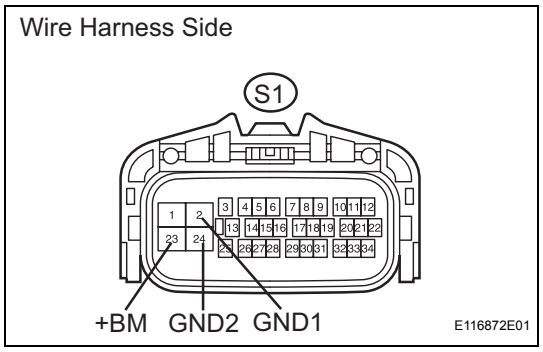
3 INSPECT FUSE (ABS)

(a) Remove the ABS H-fuse from the fusible link block.
(b) Measure the resistance of the H-fuse.
Standard resistance:
Below 1 Ω

NG → REPLACE FUSE

OK

4 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connectors.
Standard voltage

Tester Connection	Specified Condition
S1-23 (+BM) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	

BC

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 RECONFIRM DTC

(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at a speed of 4 mph (6 km/h) or more.
(c) Check for DTCs (see page BC-8).

Result

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

HINT:
- The skid control ECU inspects the motor relay circuit when the stop light switch is turned off and the vehicle is running at a speed of 4 mph (6 km/h) or more.
- These DTCs may be memorized due to a malfunction in the connector terminal condition, etc.

B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0278/11	Open in ABS Solenoid Relay Circuit

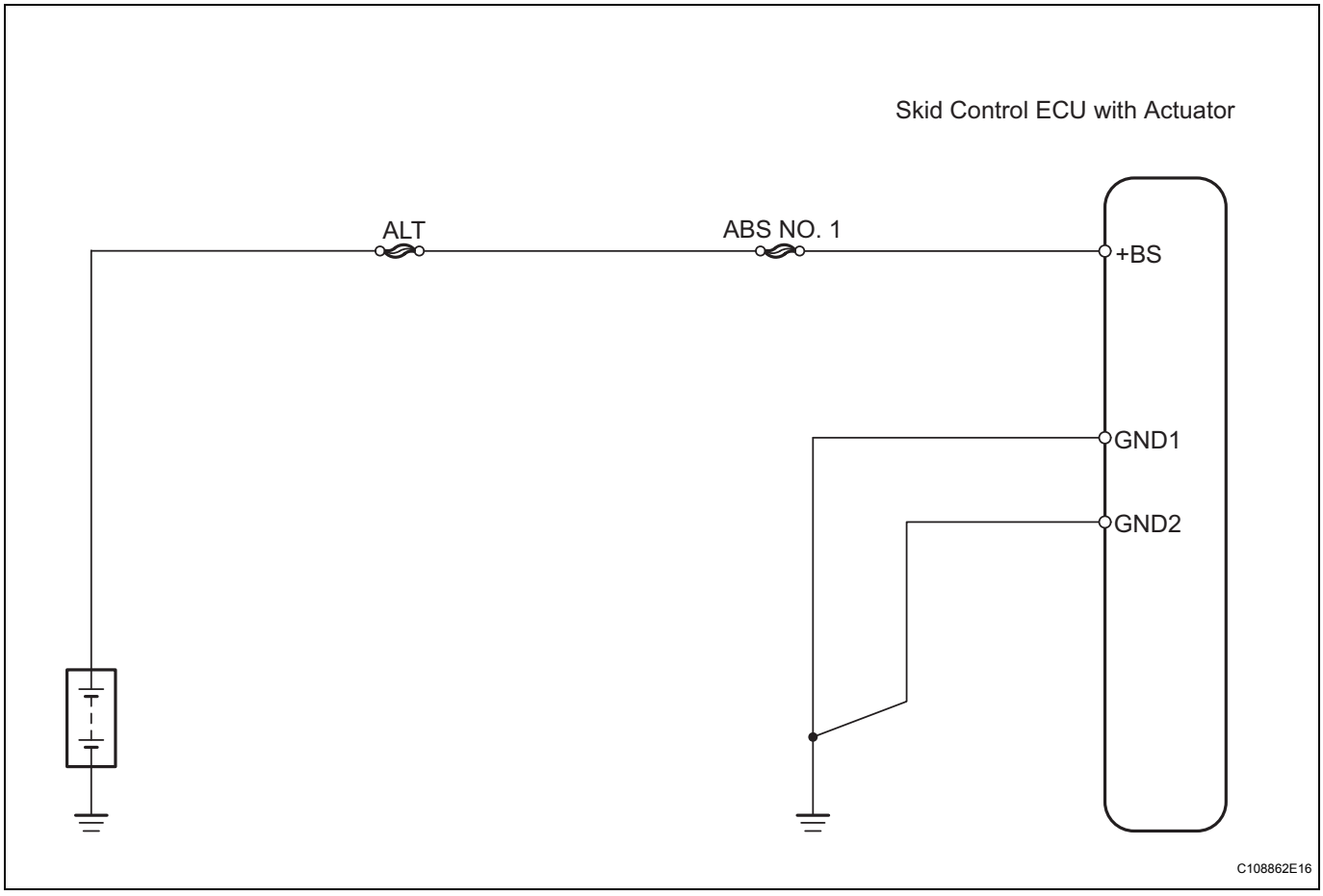
DTC	C0279/12	Short to B+ in ABS Solenoid Relay Circuit

DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the ABS initial check completes, the skid control ECU turns the ABS solenoid relay on.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When solenoid relay is turned on, relay contact is off for 0.2 seconds or longer	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU with actuator
C0279/12	Immediately after IG1 is turned on, when solenoid relay is turned off, relay contact is on for 0.2 seconds or longer	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU with actuator

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (ALT, ABS NO. 1)

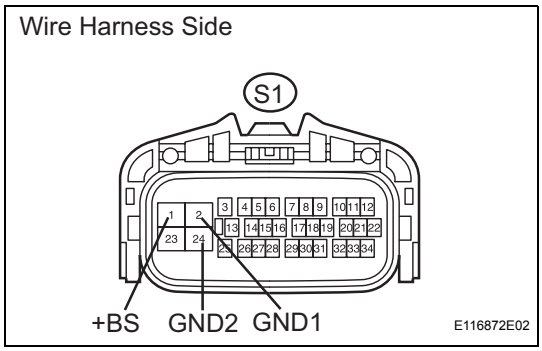
(a) Remove the ALT and ABS NO. 1 H-fuses from the engine room junction block.
(b) Measure the resistance of the H-fuses.

Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
S1-1 (+BS) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-2 (GND1) - Body ground	Below 1 Ω
S1-24 (GND2) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 RECONFIRM DTC

HINT:
These codes are output when a problem is detected in the brake actuator assembly.
As the ABS motor relay is built into the brake actuator assembly, ABS motor relay and solenoid unit inspection cannot be performed.
Be sure to check if a DTC is output before replacing the brake actuator assembly.
(a) Clear the DTCs (see page BC-8).
(b) Drive the vehicle at 6 km/h (4 mph) or more.
(c) Check for DTCs (see page BC-8).
Result

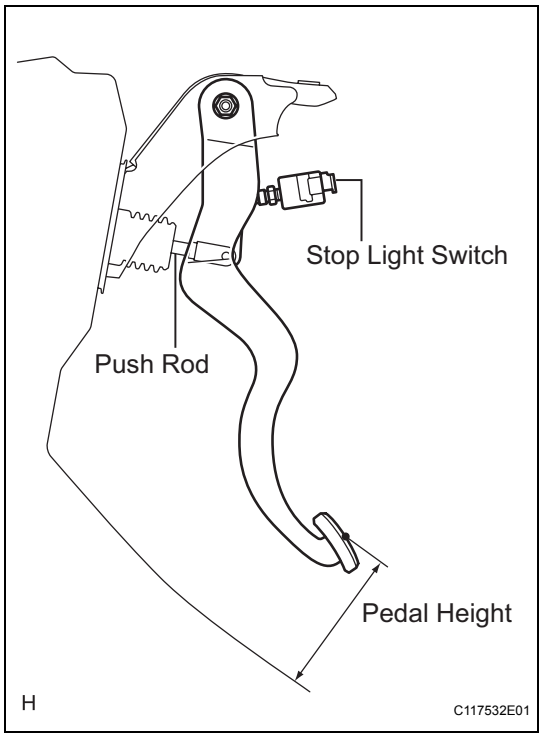
Result	Proceed to
DTC is output	A
DTC is not output	B

B → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

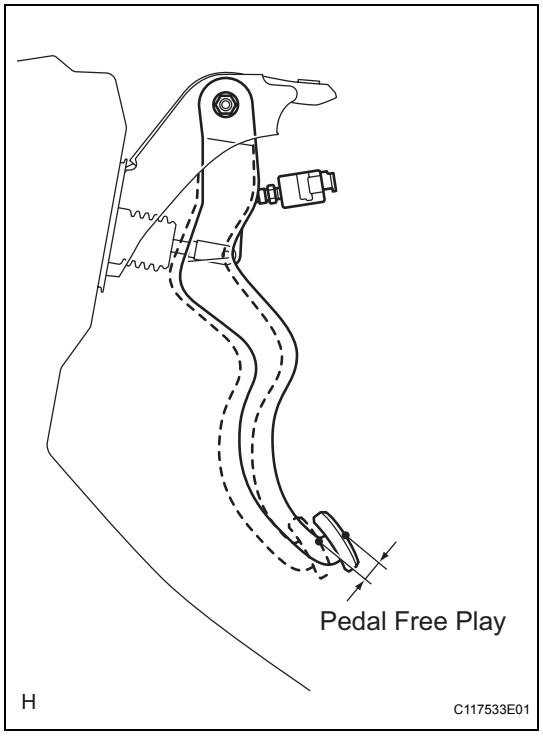


ADJUSTMENT

1. CHECK AND ADJUST BRAKE PEDAL HEIGHT

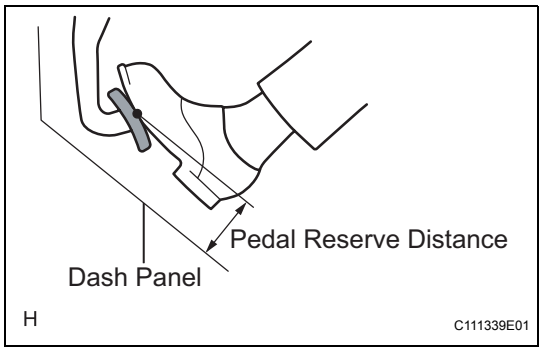
(a) Check brake pedal height.
Standard pedal height from dash panel:
124.5 to 134.5 mm (4.902 to 5.293 in.)

(b) Adjust brake pedal height.
(1) Remove the lower instrument finish panel.
(2) Disconnect the connector from the stop light switch.
(3) Loosen the stop light switch lock nut, and remove the stop light switch.
(4) Loosen the brake master cylinder push rod clevis lock nut.
(5) Adjust the pedal height by turning the pedal push rod.
(6) Tighten the push rod lock nut.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
(7) Install the stop light switch.
(8) Connect the connector to the stop light switch.
(9) Depress the pedal 5 to 15 mm (0.20 to 0.59 in.). Rotate the switch until the stop lights illuminate. Then tighten the lock nut.
(10) After the installation, depress the pedal 5 to 15 mm (0.20 to 0.59 in.), and check that the stop lights illuminate.



2. CHECK BRAKE PEDAL FREE PLAY

(a) Stop the engine and depress the brake pedal several times until there is no vacuum in the booster. Then release the pedal.
(b) Depress the pedal until resistance is felt.
(c) Check the pedal's free play by measuring the distance between the position in the previous step and the pedal's released position.
Standard pedal free play:
1.0 to 6.0 mm (0.04 to 0.24 in.)
If the clearance is not as specified, check the switch clearance in the next step.
If the free play is as specified, proceed to the "check brake pedal reserve distance" procedures.
(d) Check the switch clearance.
Standard stop light switch clearance:
0.5 to 2.4 mm (0.020 to 0.094 in.)
If the clearance is not as specified, adjust the clearance and recheck the pedal's free play.
If the clearance is as specified, troubleshoot the brake system and proceed to the "check brake pedal reserve distance" procedures.



3. CHECK BRAKE PEDAL RESERVE DISTANCE

(a) Release the parking brake lever. Start the engine.

(b) Depress the pedal and check the pedal reserve distance.

(1) Depress the pedal with a force of 490 N (50 kgf, 110 lbf).

(2) Measure the distance between the pedal and asphalt sheet shown in the illustration.

Standard pedal reserve distance

Model	Specified Condition
w/ VSC	More than 55 mm (2.17 in.)
w/o VSC	More than 50 mm (1.97 in.)

If the distance is not as specified, troubleshoot the brake system.

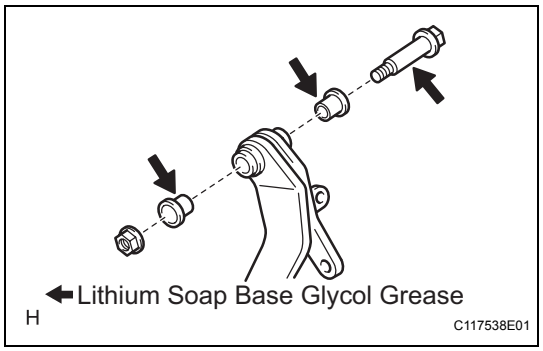
INSTALLATION

1. INSTALL BRAKE PEDAL PAD

(a) Install the brake pedal pad to the brake pedal.

2. INSTALL STOP LIGHT SWITCH ASSEMBLY

(a) Install the stop light switch to the support with the nut.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

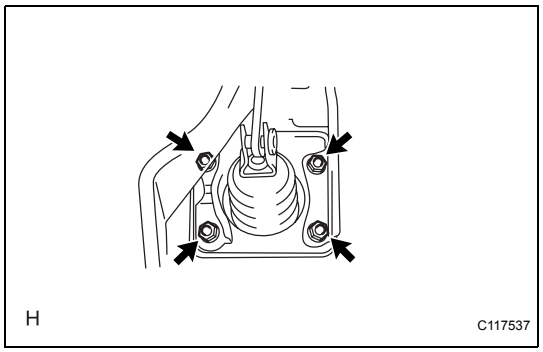


3. INSTALL BRAKE PEDAL SUB-ASSEMBLY

(a) Apply lithium soap base glycol grease to the ends and sides of 2 new brake pedal bushes and brake pedal shaft.

(b) Install the switch cushion.

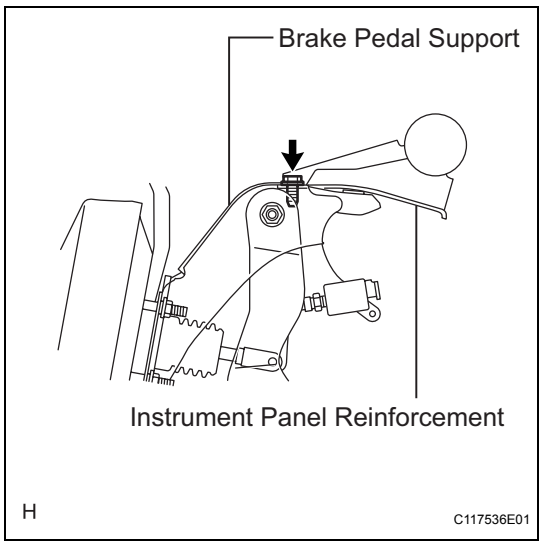
(c) Install the brake pedal and 2 brake pedal bushes to the brake pedal support with the brake pedal shaft and nut.
Torque: 37 N*m (375 kgf*cm, 27 ft.*lbf)

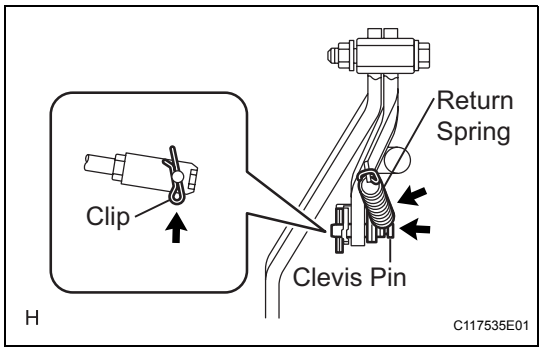


4. INSTALL BRAKE PEDAL SUPPORT SUB-ASSEMBLY

(a) Install the brake pedal support with the 4 nuts.
Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)

(b) Install the bolt on the brake pedal support.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)





5. **CONNECT MASTER CYLINDER PUSH ROD CLEVIS**
   (a) Apply lithium soap base glycol grease to the clevis pin.
   (b) Install the clevis pin and clip.
   NOTICE:
   The direction for the clip installation is as shown in the illustration.
   (c) Install the brake pedal return spring.
   (d) Connect the stop light switch connector to the stop light switch.
6. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY**
   (a) Install the instrument panel (see page IP-10).
7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
8. **CHECK AND ADJUST BRAKE PEDAL HEIGHT (See page BR-9)**
9. **CHECK BRAKE PEDAL FREE PLAY (See page BR-9)**
10. **CHECK BRAKE PEDAL RESERVE DISTANCE (See page BR-10)**
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
12. **CHECK SRS WARNING LIGHT (w/ SRS Airbag)**
    (a) Check the SRS warning light (see page RS-28).

INSPECTION

1. CHECK AND ADJUST BRAKE BOOSTER PUSH ROD

NOTICE:

The brake booster interior must not be a vacuum when adjusting the booster. Stop the engine and depress the brake pedal several times until there is no vacuum in the booster.

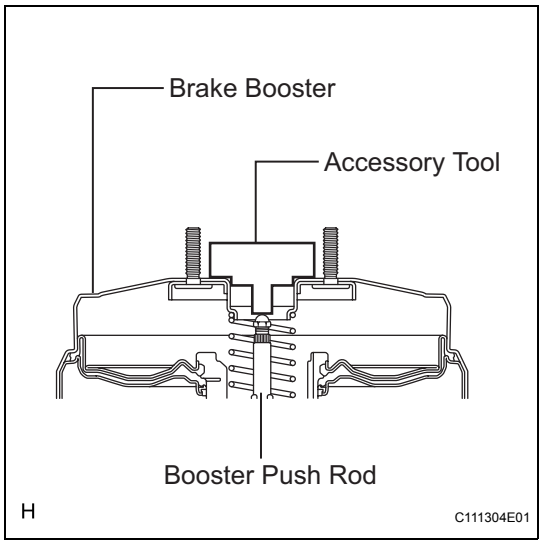
HINT:

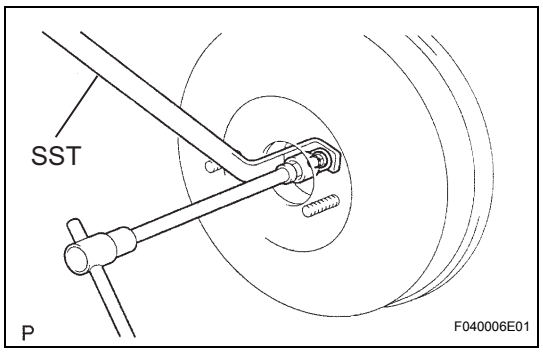
Adjust the booster push rod when the master cylinder is replaced with a new one. Adjustment is not necessary when the master cylinder is reinstalled and booster is replaced with a new one.

(a) Apply chalk to the tip of an accessory tool.
HINT:
An accessory tool is included with each new master cylinder.

(b) Place the accessory tool on the booster.

(c) Confirm that there is no clearance between the booster push rod and accessory tool.
If there is clearance between the tool and shell of the booster, the rod is protruding too far.
If chalk does not transfer from the tool to the rod, the rod is not protruding far enough.
In both cases, adjust the rod in the next step.





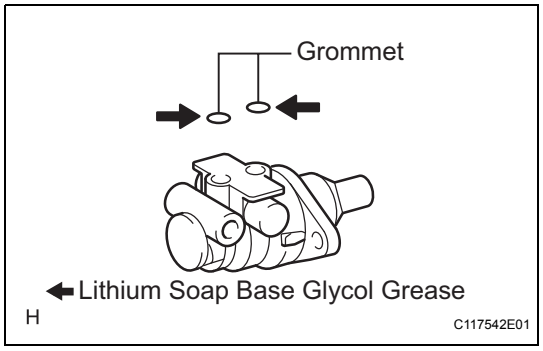
(d) To adjust the clearance of the rod, first depress the pedal so that the rod protrudes. Then fix the rod in place using SST and rotate the hexagon cap nut to adjust the clearance.
SST 09737-00020

INSTALLATION

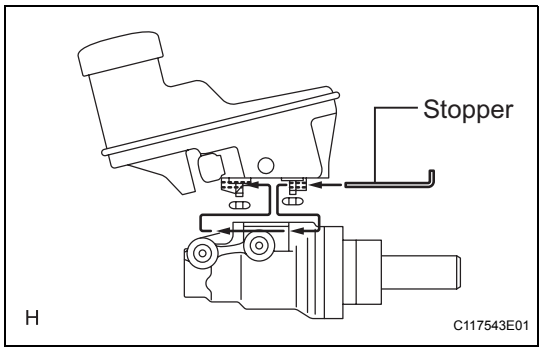
1. INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY

(a) Apply lithium soap base glycol grease to 2 new grommets and install them to the brake master cylinder.

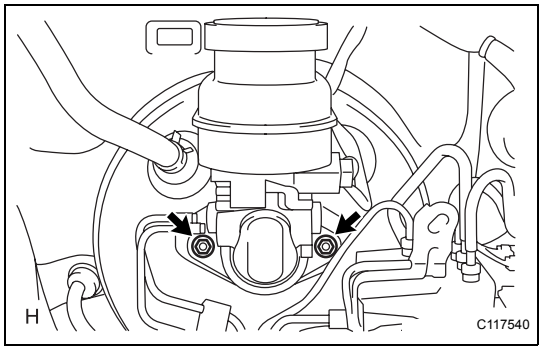
(b) Install the cap and strainer to the brake master cylinder reservoir.



BR

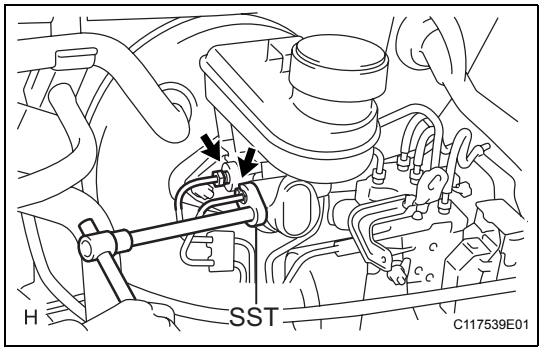


(c) Install the brake master cylinder reservoir with the reservoir stopper.
NOTICE:
Install the stopper securely to the groove of the reservoir and master cylinder.



2. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY

(a) Install the brake master cylinder to the booster with the 2 nuts.
Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)



(b) Using SST, connect the 2 brake lines to the brake master cylinder.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf) without SST
14 N*m (143 kgf*cm, 10 ft.*lbf) with SST
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

(c) Connect the level warning light switch connector.

3. CONNECT CLUTCH RESERVOIR TUBE (for Manual Transaxle)

(a) Slide the clip and connect the clutch reservoir tube.

4. INSTALL AIR CLEANER CAP SUB-ASSEMBLY

5. FILL RESERVOIR WITH BRAKE FLUID (See page BR-3)

6. BLEED AIR FROM BRAKE MASTER CYLINDER (See page BR-3)

7. BLEED AIR FROM BRAKE LINE (See page BR-4)

8. BLEED AIR FROM CLUTCH LINE (for Manual Transaxle) (See page CL-12)

9. CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-6)

10. CHECK FOR BRAKE FLUID LEAKAGE

BRAKE SYSTEM

PRECAUTION

- Take extra care to replace each part properly. Improper installation or repair could affect the performance of the brake system and cause a driving hazard.
- It is very important to keep the brake system parts and the work area clean when repairing the brake system.
- If the vehicle is equipped with a mobile communication system, refer to the precautions in the INTRODUCTION section.

PROBLEM SYMPTOMS TABLE

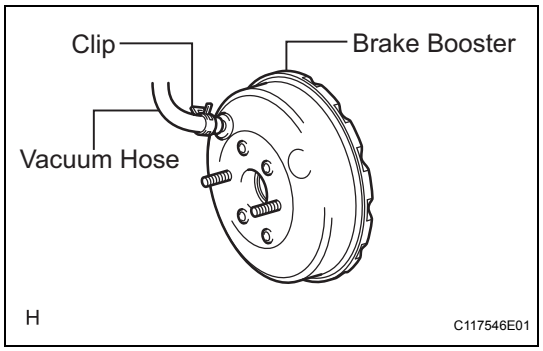
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

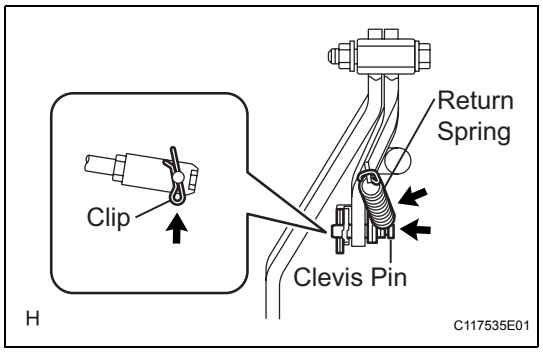
Brake system

Symptom	Suspected area	See page
Low pedal or spongy pedal	1. Fluid leaks in brake system	-
	2. Air in brake system	BR-3
	3. Piston seals (worn or damaged)	BR-25
	4. Wheel cylinder cup (worn or damaged)	BR-33
	5. Rear brake shoe clearance (adjustment necessary)	BR-38
	6. Brake master cylinder (faulty)	BR-12
	7. Booster push rod (adjustment necessary)	BR-13
Brake drag	1. Brake pedal free play (minimal)	BR-9
	2. Parking brake lever travel (adjustment necessary)	PB-1
	3. Parking brake wire (stuck)	PB-4
	4. Rear brake shoe clearance (adjustment necessary)	BR-38
	5. Pad (cracked or distorted)	BR-26
	6. Lining (cracked or distorted)	BR-33
	7. Piston, for front (stuck or frozen)	BR-25
	8. Piston, for rear (stuck or frozen)	BR-33
	9. Tension or return spring (faulty)	BR-31
	10. Booster push rod (adjustment necessary)	BR-13
	11. Vacuum leaks in booster system	BR-18
Brake pull	1. Piston, for front (stuck or frozen)	BR-25
	2. Piston, for rear (stuck or frozen)	BR-33
	3. Pad (oily, cracked or distorted)	BR-26
	4. Lining (oily, cracked or distorted)	BR-33
	5. Disc (scored)	BR-26
Brake pedal is depressed firmly but brake is insufficient	1. Fluid leaks in brake system	-
	2. Air in brake system	BR-3
	3. Pad (worn, cracked, distorted, oily or glazed)	BR-26
	4. Lining (worn, cracked, distorted, oily or glazed)	BR-33
	5. Rear brake shoe clearance (adjustment necessary)	BR-38
	6. Disc (scored)	BR-26
	7. Booster push rod (adjustment necessary)	BR-13
	8. Vacuum leaks in booster system	BR-18
Noise from brakes	1. Pad (cracked, distorted, dirty or glazed)	BR-26
	2. Lining (cracked, distorted, dirty or glazed)	BR-33
	3. Installation bolt (loose)	BR-23
	4. Disc (scored)	BR-26
	5. Pad support plate (loose)	BR-23
	6. Sliding pin (worn)	BR-23
	7. Anchor, return or tension spring (faulty)	BR-31
	8. Anti squeal shim (damaged)	BR-23
	9. Shoe hold down spring (damaged)	BR-31

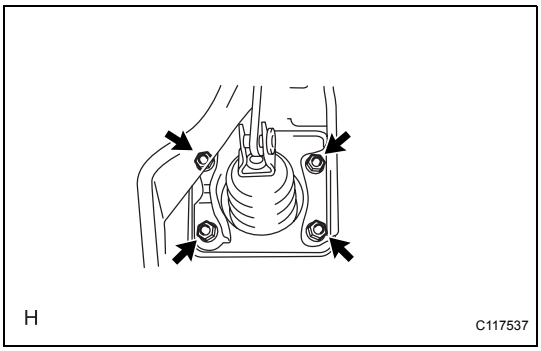
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash off brake fluid immediately if it comes in contact with any painted surface.
3. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY**
4. **DISCONNECT CLUTCH RESERVOIR TUBE (for Manual Transaxle)**
   (a) Slide the clip and disconnect the clutch reservoir tube.
5. **REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY**
   (a) Remove the brake master cylinder (see page BR-12).
6. **REMOVE BATTERY**
7. **REMOVE BRAKE ACTUATOR ASSEMBLY WITH BRACKET**
   (a) Remove the brake actuator with bracket (see page BC-163).
8. **REMOVE BRAKE BOOSTER ASSEMBLY**
   (a) Slide the clip and disconnect the vacuum hose from the brake booster.





   (b) Remove the brake pedal return spring, clip and clevis pin.
   (c) Loosen the push rod clevis lock nut.

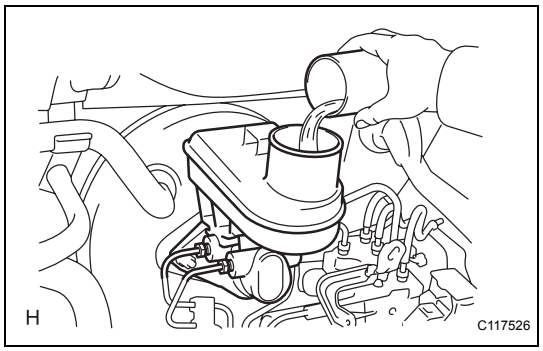


(d) Remove the 4 nuts and push rod clevis.
(e) Pull out the brake booster and gasket.

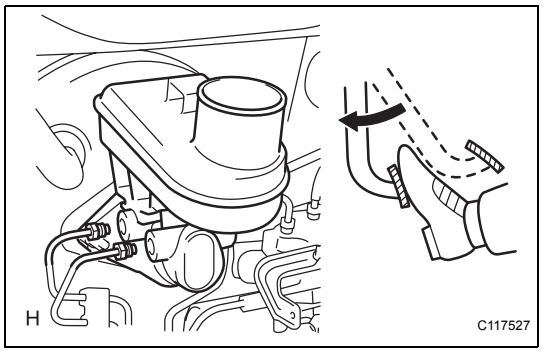
BRAKE FLUID

BLEEDING

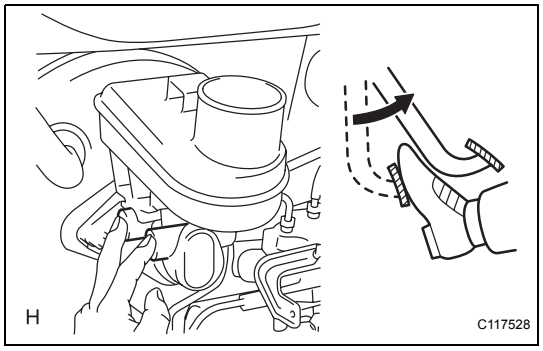
HINT:
If any work is performed on the brake system or if air in the brake lines is suspected, bleed air from the brake system.
NOTICE:
Wash off brake fluid immediately if it comes in contact with any painted surface.



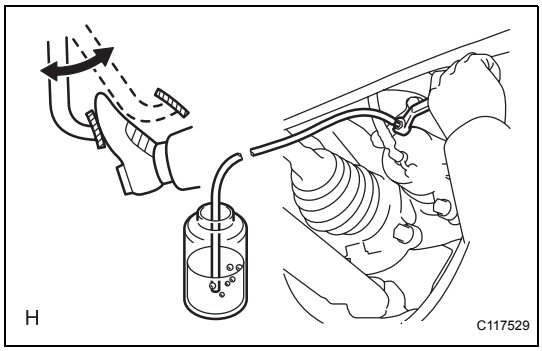
1. FILL RESERVOIR WITH BRAKE FLUID
Fluid:
SAE J1703 or FMVSS No. 116 DOT3



2. BLEED AIR FROM BRAKE MASTER CYLINDER
HINT:
If the master cylinder has been disassembled or if the reservoir becomes empty, bleed air from the master cylinder.
(a) Using SST, disconnect the brake lines from the master cylinder.
SST 09023-00101
(b) Slowly depress and hold the brake pedal.



(c) Cover the outer holes with your fingers, and release the pedal.
(d) Repeat the 2 previous steps 3 or 4 times.
(e) Using SST, connect the brake lines to the master cylinder.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf) without SST
14 N*m (143 kgf*cm, 10 ft.*lbf) with SST
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



3. BLEED AIR FROM BRAKE LINE

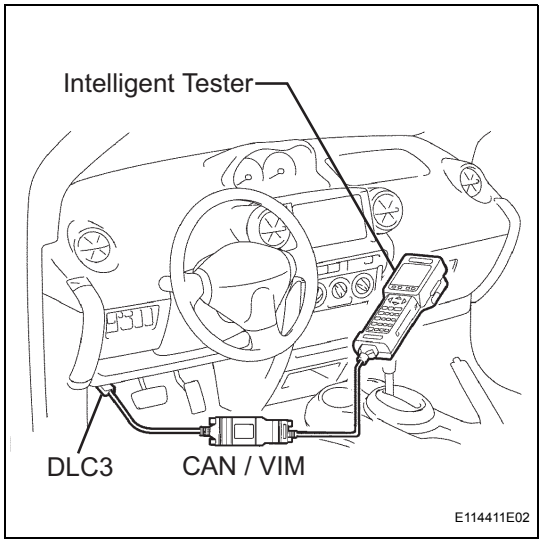
(a) Remove the bleeder plug cap.
(b) Connect a vinyl tube to one of the bleeder plugs.
(c) Depress the pedal several times, and then loosen the bleeder plug with the pedal depressed.
(d) When fluid stops coming out, immediately tighten the bleeder plug. Then release the pedal.
(e) Repeat the 2 previous steps until all the air in the fluid is gone.
(f) Tighten the bleeder plug.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
(g) Install the cap.
(h) Bleed air from the brake line for each wheel by repeating the above procedures.

4. BLEED AIR FROM BRAKE ACTUATOR (w/ VSC)

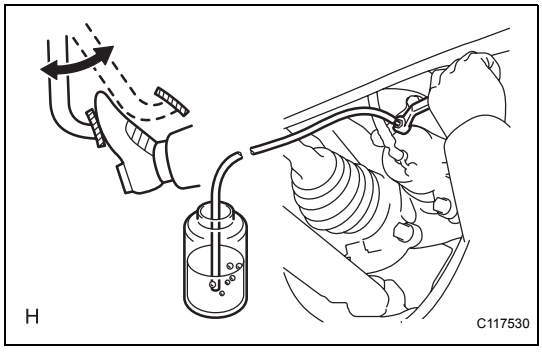
NOTICE:

- **After bleeding air from the brake system, the height and/or feel of the pedal may still be awkward. If so, use the intelligent tester to bleed air from the actuator.**
- **Perform the air bleeding by following the steps displayed on the intelligent tester.**
- **Make sure that the fluid in the reservoir does not become empty.**

(a) With the engine stopped, depress the pedal more than 20 times.



(b) Connect the intelligent tester (with CAN VIM) to the DLC3, and then turn the ignition switch ON.
NOTICE:
Do not start the engine.
(c) Select "AIR BLEEDING" on the intelligent tester.
HINT:
Please refer to the intelligent tester operator's manual for further details.
(d) Bleed air from the brake line in "Step 1: Increase" on the intelligent tester display.
(1) Remove the bleeder plug cap.



(2) Connect a vinyl tube to either one of the bleeder plugs.
(3) Depress the pedal several times, and then loosen the bleeder plug with the pedal depressed.
(4) When fluid stops coming out, immediately tighten the bleeder plug. Then release the pedal.
(5) Repeat the 2 previous steps until all the air in the fluid is gone.

(6) Tighten the bleeder plug.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
(7) Install the cap.
(8) Repeat the 7 previous steps to bleed air from the brake line for each wheel.

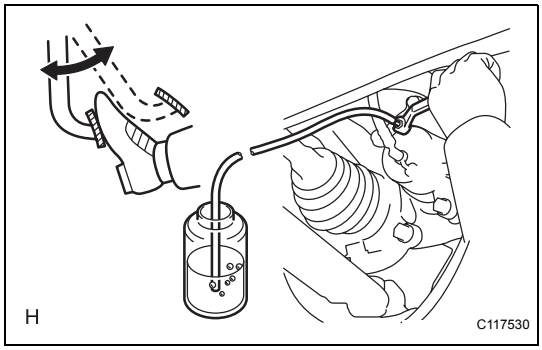
(e) Bleed air from the suction line in "Step 2: Inhalation" on the intelligent tester display.
(1) Remove the bleeder plug cap.
(2) Connect a vinyl tube to the bleeder plug at the right front wheel or the right rear wheel and loosen the bleeder plug.
(3) Using the intelligent tester, operate the actuator to bleed the air.
NOTICE:
The operation stops automatically in 4 seconds. At this time, be sure to release the pedal.
(4) View the intelligent tester display and check that the operation has stopped.
(5) Repeat the 2 previous steps until all the air in the fluid is gone.
(6) Tighten the bleeder plug.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
(7) Install the cap.
(8) Repeat the 7 previous steps to bleed air from the brake line for each wheel.

(f) Bleed air from the pressure reduction line in "Step 3: Decrease" on the intelligent tester display.
(1) Remove the bleeder plug cap.
(2) Connect a vinyl tube to either one of the bleeder plugs.
(3) Loosen the bleeder plug.
(4) Using the intelligent tester, operate the actuator. At the same time, depress the pedal and maintain this position.
NOTICE:
- **The operation stops automatically in 4 seconds. When performing this procedure continuously, an interval of at least 20 seconds is required.**
- **When the operation is completed, the pedal slightly goes down. This is normal and it occurs when the solenoid opens.**
- **During this procedure, the pedal may seem heavy, but completely depress it so that the fluid comes out from the bleeder plug.**
- **Be sure to keep depressing the pedal. Never depress and release the pedal repeatedly.**

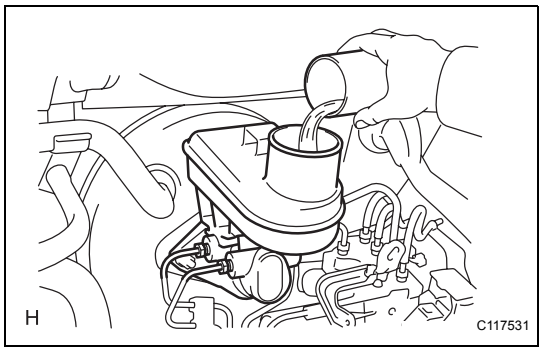
(5) Tighten the bleeder plug, and then release the pedal.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

(6) Repeat the 3 previous steps until all the air in the fluid is gone.
(7) Install the cap.
(8) Repeat the 7 previous steps to bleed air from the brake line for each wheel.

(g) Bleed air from the brake line again in "Step 4: Increase" on the intelligent tester display.
(1) Remove the bleeder plug cap.



(2) Connect a vinyl tube to one of the bleeder plugs.
(3) Depress the pedal several times, and then loosen the bleeder plug with the pedal depressed.
(4) When fluid stops coming out, immediately tighten the bleeder plug. Then release the pedal.
(5) Repeat the 2 previous steps until all the air in the fluid is gone.
(6) Tighten the bleeder plug.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
(7) Install the cap.
(8) Repeat the 7 previous steps to bleed air from the brake line for each wheel.

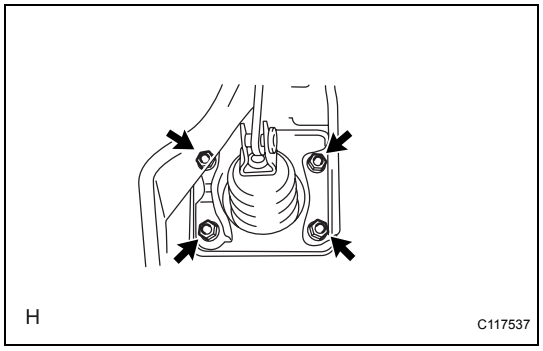


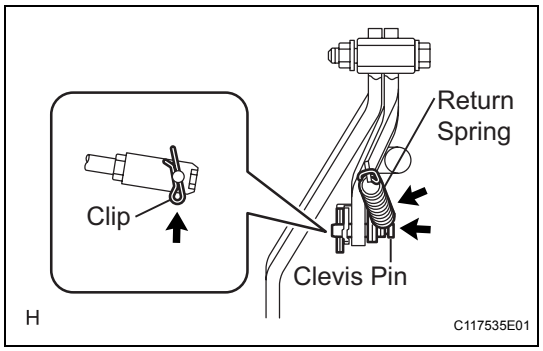
5. CHECK BRAKE FLUID LEVEL IN RESERVOIR

(a) Check the fluid level. If necessary, add fluid.
Fluid:
SAE J1703 or FMVSS No. 116 DOT3

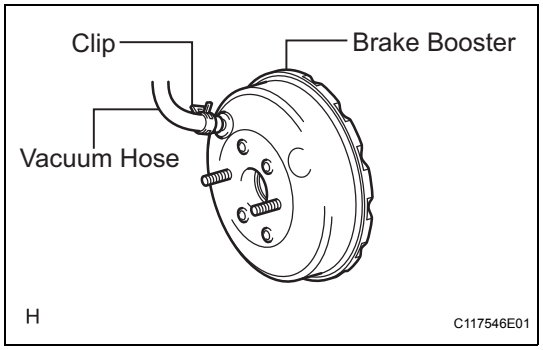
INSTALLATION

1. **INSTALL BRAKE BOOSTER ASSEMBLY**
   (a) Install the brake booster and a new gasket.
   (b) Install the booster and a new gasket with the 4 nuts.
   Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)
   (c) Install the push rod clevis to the booster.





   (d) Apply lithium soap base glycol grease to the clevis pin.
   (e) Install the clip and clevis pin.
   NOTICE:
   The clip must be installed as shown in the illustration.
   (f) Install the brake pedal return spring.



   (g) Connect the vacuum hose to the brake booster and slide the clip.

2. **CHECK AND ADJUST BRAKE BOOSTER PUSH ROD (See page BR-13)**
3. **INSTALL BRAKE ACTUATOR ASSEMBLY WITH BRACKET (See page BC-165)**
4. **INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY (See page BR-15)**
5. **CONNECT CLUTCH RESERVOIR TUBE (for Manual Transaxle)**
   (a) Slide the clip and connect the clutch reservoir tube.
6. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY**
7. **INSTALL BATTERY**
8. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-3)**
9. **BLEED AIR FROM BRAKE MASTER CYLINDER (See page BR-3)**
10. **BLEED AIR FROM BRAKE LINE (See page BR-4)**
11. **BLEED AIR FROM CLUTCH LINE (for Manual Transaxle) (See page CL-12)**
12. **CHECK AND ADJUST BRAKE PEDAL HEIGHT (See page BR-9)**
13. **CHECK BRAKE PEDAL FREE PLAY (See page BR-9)**

14. **CHECK BRAKE PEDAL RESERVE DISTANCE (See page BR-10)**

15. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-6)**

16. **CHECK FOR BRAKE FLUID LEAKAGE**

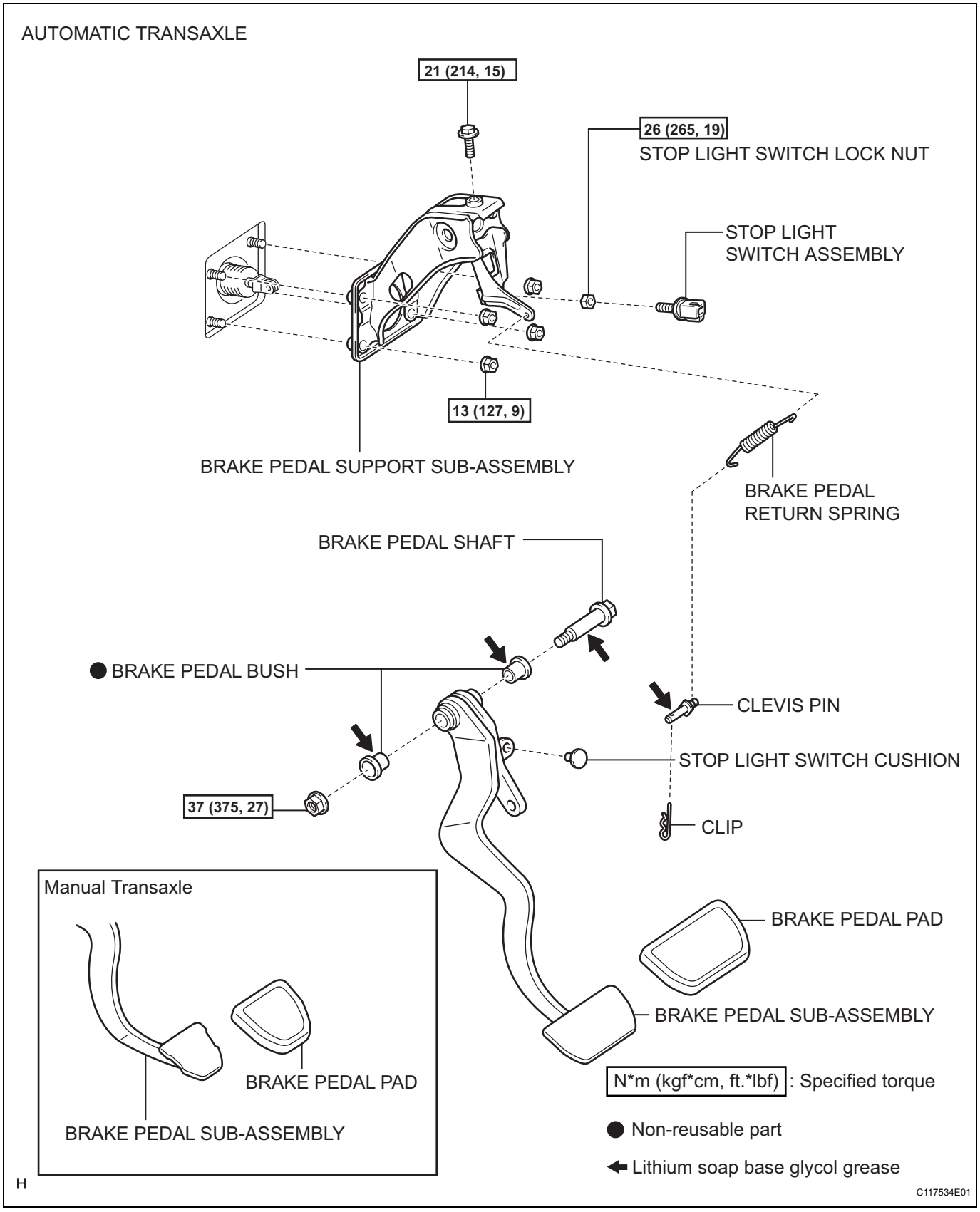
17. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

18. **CHECK BRAKE ACTUATOR WITH INTELLIGENT TESTER**
    (a) Check the brake actuator with the intelligent tester (see page BC-162).

19. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

BRAKE PEDAL

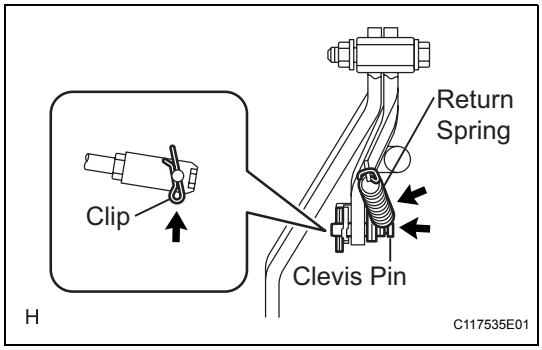
COMPONENTS



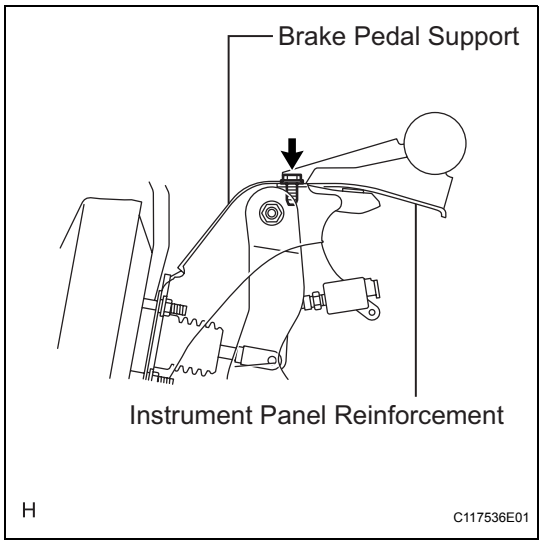
BR

REMOVAL

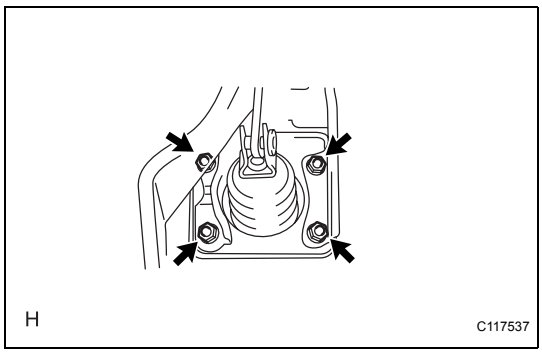
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-6)**
3. **DISCONNECT MASTER CYLINDER PUSH ROD CLEVIS**
   (a) Disconnect the stop light switch connector.
   (b) Remove the brake pedal return spring.
   (c) Remove the clip and clevis pin, and disconnect the master cylinder push rod clevis from the brake pedal.



4. **REMOVE BRAKE PEDAL SUPPORT SUB-ASSEMBLY**
   (a) Remove the bolt from the brake pedal support.



   (b) Remove the 4 nuts and brake pedal support.



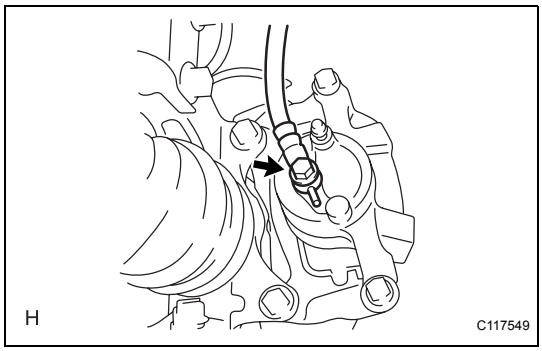
5. **REMOVE BRAKE PEDAL SUB-ASSEMBLY**
   (a) Remove the brake pedal shaft and nut from the brake pedal support.
   (b) Remove the brake pedal and 2 bushes.
   (c) Remove the stop lamp switch cushion.
6. **REMOVE STOP LIGHT SWITCH ASSEMBLY**
   (a) Loosen the stop light switch lock nut.
   (b) Remove the stop light switch from the brake pedal support.
7. **REMOVE BRAKE PEDAL PAD**
   (a) Remove the brake pedal pad from the brake pedal.

REMOVAL

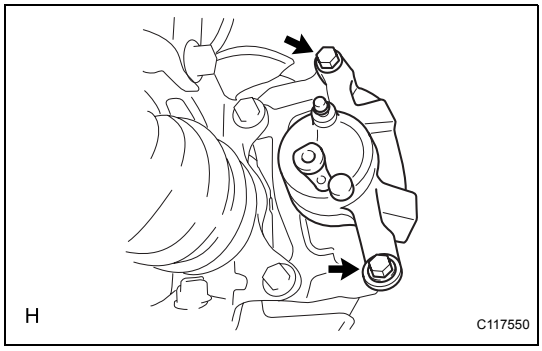
HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

1. REMOVE FRONT WHEEL

2. DRAIN BRAKE FLUID
NOTICE:
Wash off brake fluid immediately if it comes in contact with any painted surface.



3. REMOVE FRONT DISC BRAKE CYLINDER SUB-ASSEMBLY LH
(a) Remove the union bolt and gasket from the front disc brake cylinder, and then disconnect the flexible hose.

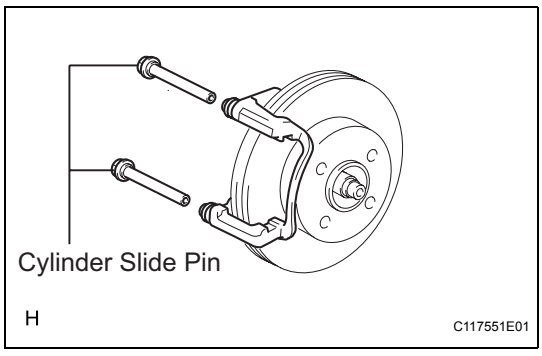


(b) Hold the brake cylinder slide pin, and remove the 2 bolts and brake cylinder.

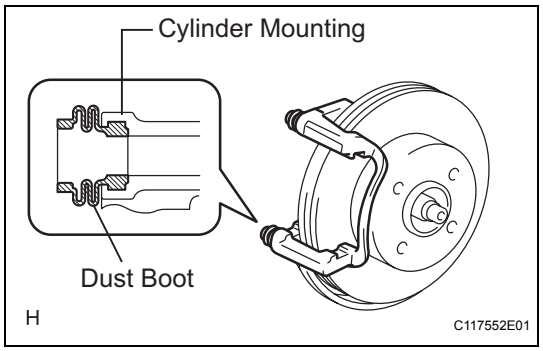
4. REMOVE FRONT DISC BRAKE PAD
(a) Remove the 2 pads with anti squeal shims.

5. REMOVE FRONT ANTI SQUEAL SHIM
(a) Remove the No. 1 and No. 2 shims from each pad.

6. REMOVE FRONT DISC BRAKE PAD SUPPORT PLATE
(a) Remove the 2 support plates from the cylinder mounting.

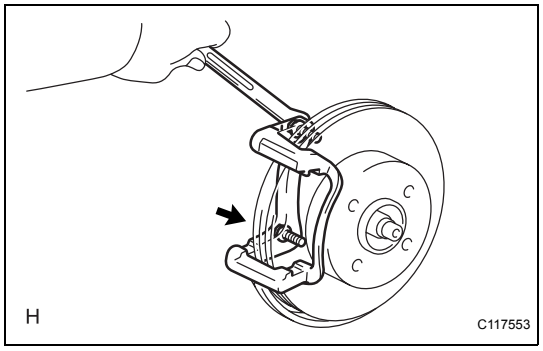


7. REMOVE FRONT DISC BRAKE CYLINDER SLIDE PIN
(a) Remove the 2 slide pins from the cylinder mounting.



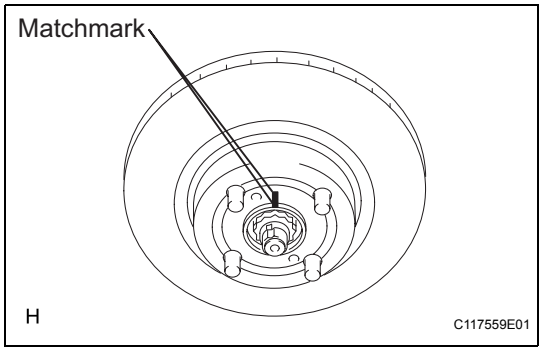
8. REMOVE FRONT DISC BRAKE DUST BOOT

(a) Remove the 2 bush dust boots from the cylinder mounting.



9. REMOVE FRONT DISC BRAKE CYLINDER MOUNTING LH

(a) Remove the 2 bolts and cylinder mounting.

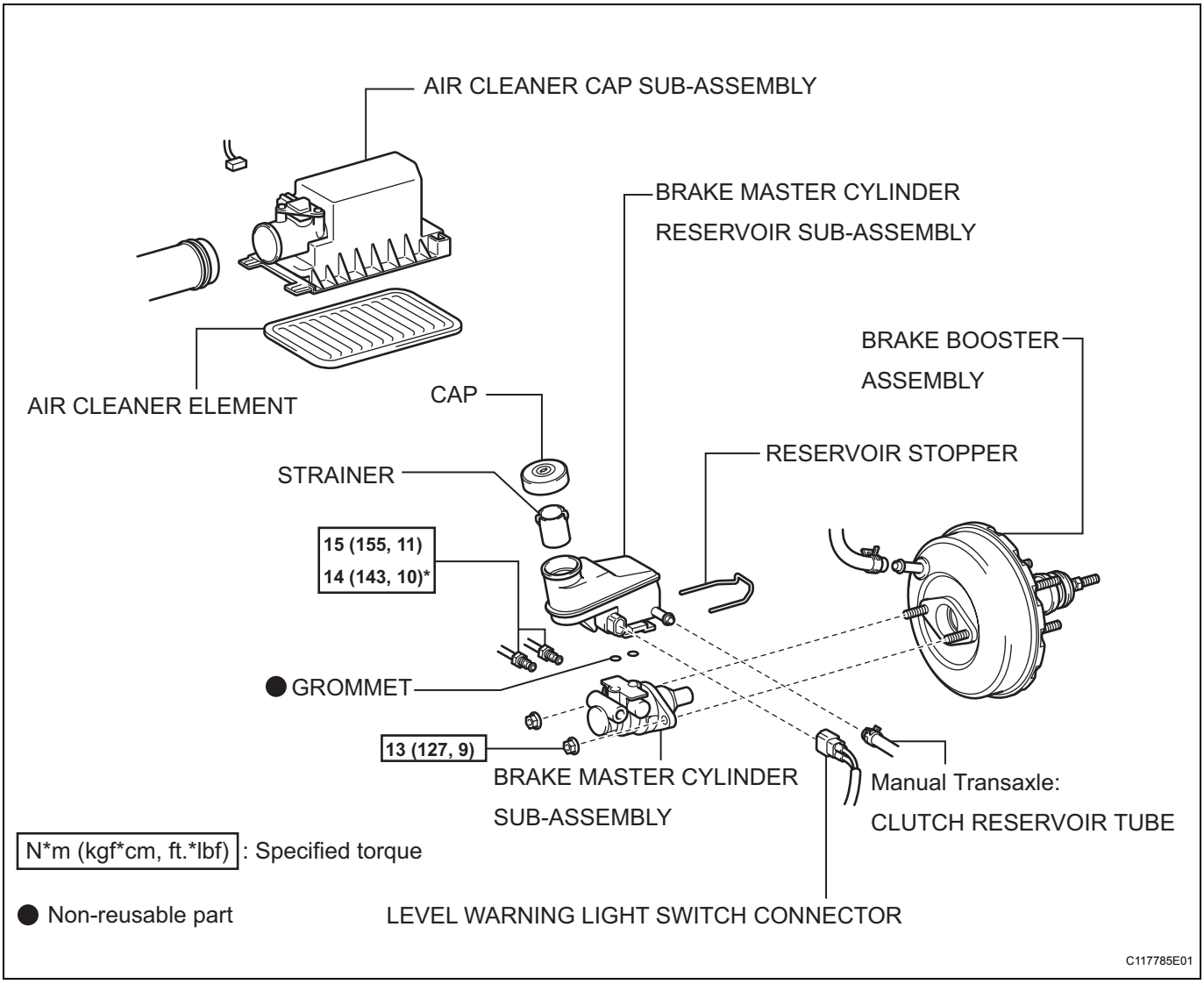


10. REMOVE FRONT DISC

(a) Place matchmarks on the disc and axle hub.
(b) Remove the disc.

BRAKE MASTER CYLINDER

COMPONENTS



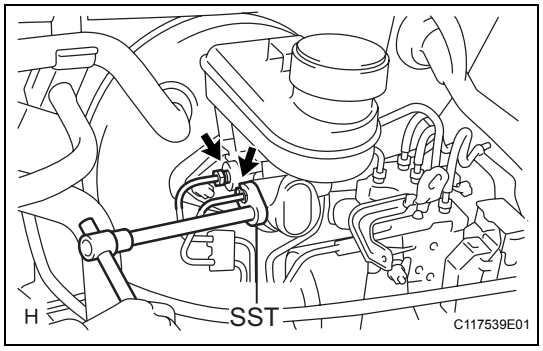
REMOVAL

1. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash off brake fluid immediately if it comes in contact with any painted surface.

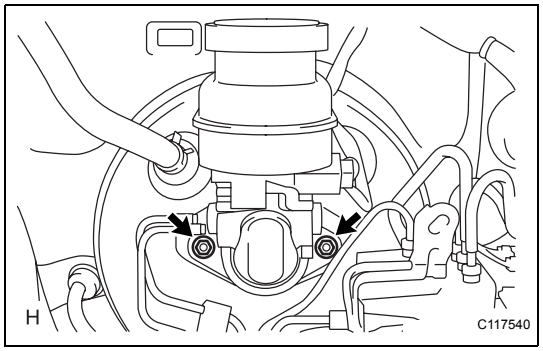
2. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY**

3. **DISCONNECT CLUTCH RESERVOIR TUBE (for Manual Transaxle)**
   (a) Slide the clip and disconnect the clutch reservoir tube.

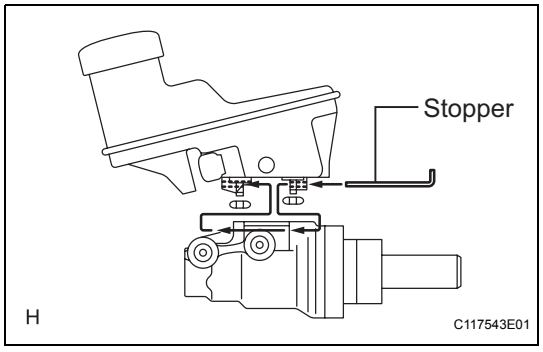
4. **REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY**
   (a) Disconnect the level warning light switch connector.
   (b) Using SST, disconnect the 2 brake lines from the brake master cylinder.
   SST 09023-00101

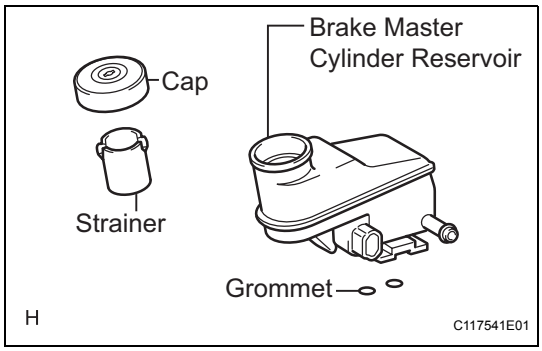


   (c) Remove the 2 nuts, and pull out the brake master cylinder.



5. **REMOVE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
   (a) Pull out the brake master cylinder reservoir stopper.

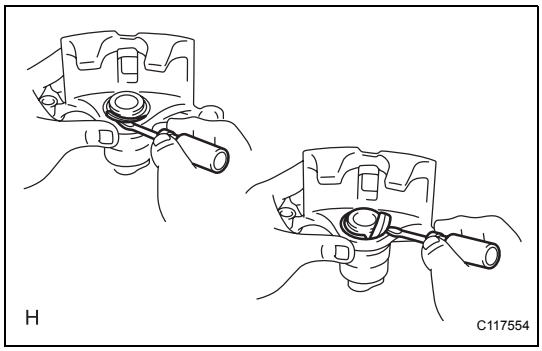




(b) Remove the brake master cylinder reservoir and 2 grommets from the brake master cylinder.
(c) Remove the cap and strainer from the brake master cylinder reservoir.

DISASSEMBLY

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.



1. REMOVE CYLINDER BOOT

(a) Using a screwdriver, remove the set ring and cylinder boot.

NOTICE:

Be careful not to damage the brake piston and cylinder.

2. REMOVE FRONT DISC BRAKE PISTON

(a) Place a cloth between the brake piston and brake cylinder.

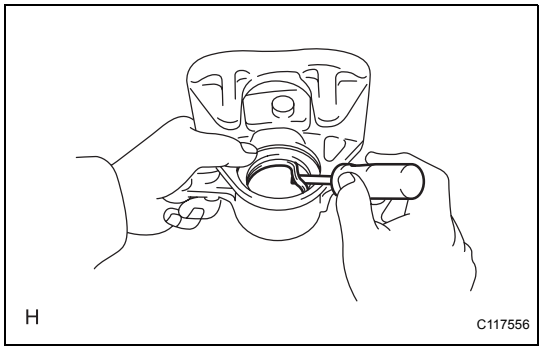
(b) Use compressed air to remove the piston from the cylinder.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.

NOTICE:

Be careful not to spatter the brake fluid.



3. REMOVE PISTON SEAL

(a) Using a screwdriver, pry out the piston seal from the brake cylinder.

NOTICE:

Be careful not to damage the inner cylinder and cylinder groove.

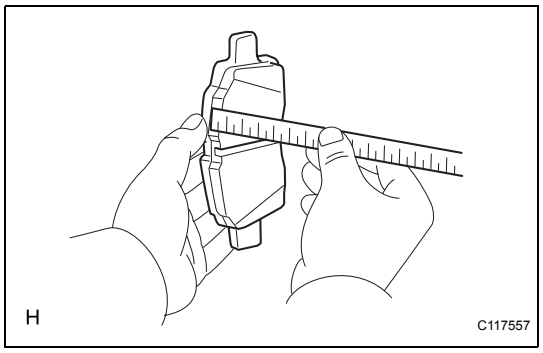
4. REMOVE FRONT DISC BRAKE BLEEDER PLUG

(a) Remove the bleeder plug from the brake cylinder.

INSPECTION

1. CHECK BRAKE CYLINDER AND PISTON

(a) Check the cylinder bore and piston for rust or scoring.
If necessary, replace the cylinder and piston.

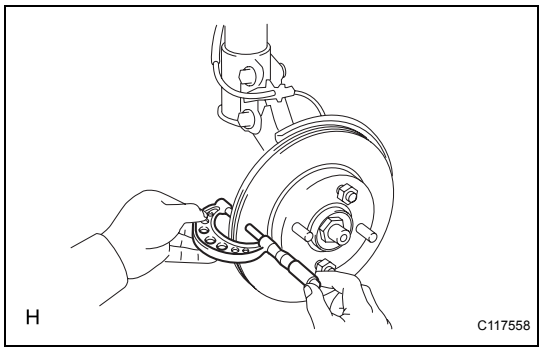


2. CHECK PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.
Standard thickness:
11.0 mm (0.433 in.)
Minimum thickness:
1.0 mm (0.039 in.)
If the pad lining thickness is equal to or less than the minimum, replace the pad.

3. CHECK FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Check the 2 support plates.
HINT:
Make sure that the support plates have sufficient rebound and are free from deformation, cracks, wear, rust and dirt.
If necessary, replace the support plates.

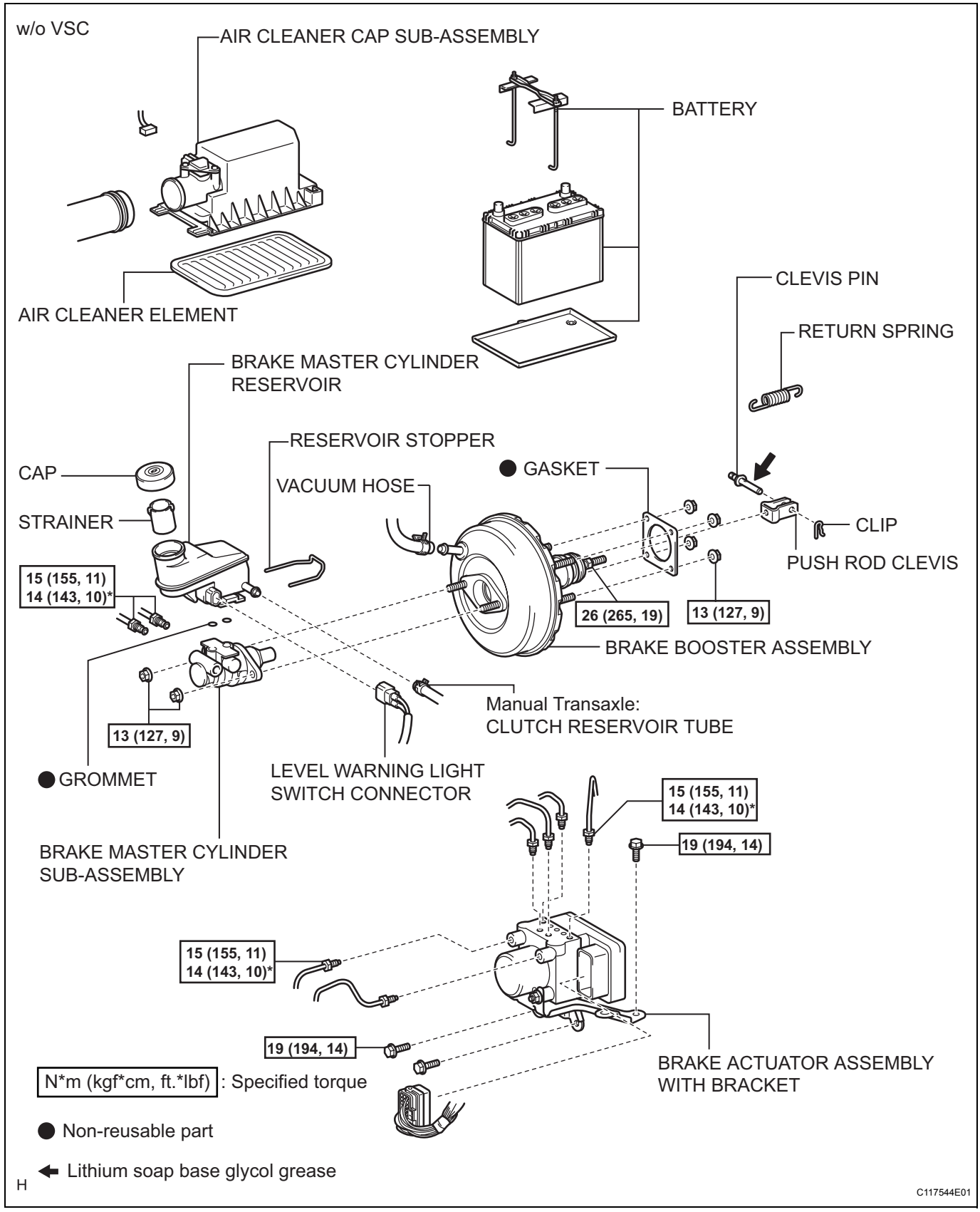


4. CHECK DISC THICKNESS

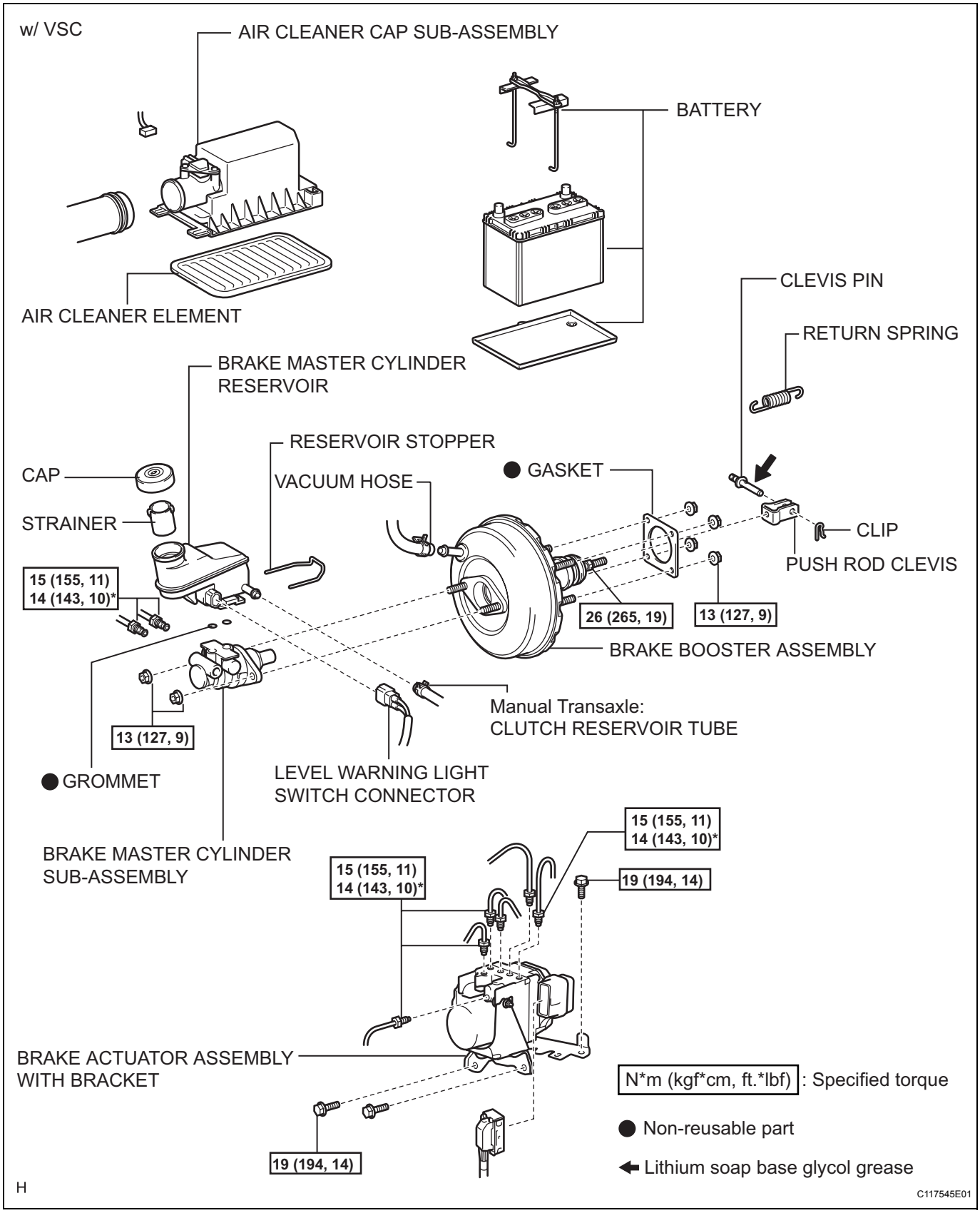
(a) Using a micrometer, measure the disc thickness.
Standard thickness:
22.0 mm (0.866 in.)
Minimum thickness:
20.0 mm (0.787 in.)
If the disc thickness is less than the minimum, replace the disc.

BRAKE BOOSTER

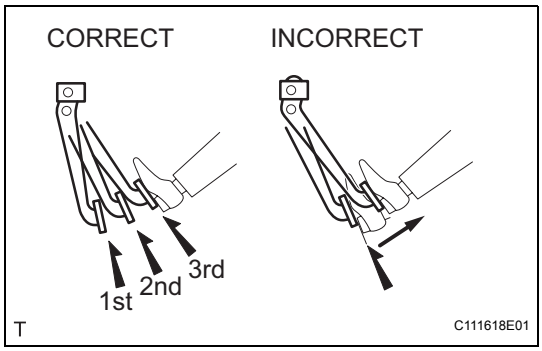
COMPONENTS



BR


w/ VSC
AIR CLEANER CAP SUB-ASSEMBLY
AIR CLEANER ELEMENT
BATTERY
CLEVIS PIN
RETURN SPRING
BRAKE MASTER CYLINDER RESERVOIR
RESERVOIR STOPPER
CAP
STRAINER
VACUUM HOSE
● GASKET
CLIP
PUSH ROD CLEVIS
15 (155, 11)
14 (143, 10)*
26 (265, 19)
13 (127, 9)
BRAKE BOOSTER ASSEMBLY
Manual Transaxle:
CLUTCH RESERVOIR TUBE
13 (127, 9)
● GROMMET
LEVEL WARNING LIGHT SWITCH CONNECTOR
BRAKE MASTER CYLINDER SUB-ASSEMBLY
15 (155, 11)
14 (143, 10)*
19 (194, 14)
BRAKE ACTUATOR ASSEMBLY WITH BRACKET
19 (194, 14)
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
Lithium soap base glycol grease
H
C117545E01

BR



ON-VEHICLE INSPECTION

1. CHECK BRAKE BOOSTER ASSEMBLY

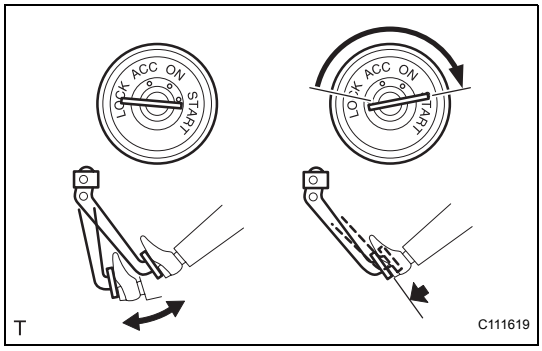
(a) Airtightness check.

(1) Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly.

(2) Make sure the booster is airtight. Check that the distance the pedal can be depressed decreases gradually in correlation with each subsequent press of the pedal.
If the pedal is not as specified, check the check valve.
If the check valve is normal, replace the booster.

(3) Start the engine. Depress and hold down the pedal, and stop the engine.

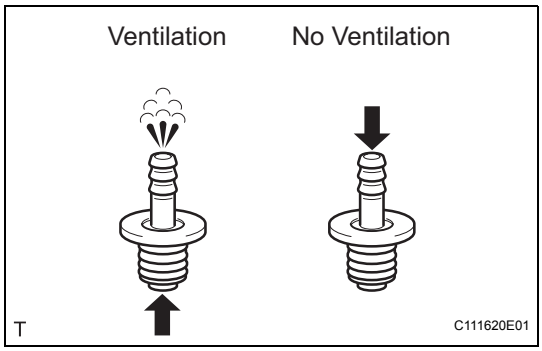
(4) Make sure the booster is airtight. Hold the pedal for 30 seconds and check that there is no change in the pedal reserve distance.
If the pedal is not as specified, check the check valve.
If the check valve is normal, replace the booster.



(b) Operation check.

(1) Depress the pedal several times with the ignition switch OFF and check that there is no change in the pedal reserve distance.

(2) Depress and hold down the pedal, and start the engine. Check that the pedal can only be depressed slightly.
If the pedal is not as specified, check the check valve.
If the check valve is normal, replace the booster.



2. CHECK BRAKE VACUUM CHECK VALVE ASSEMBLY

(a) Check the check valve.

(1) Slide the clip and disconnect the vacuum hose.

(2) Remove the check valve from the booster.

(3) Check that there is ventilation from the booster to the engine, and no ventilation from the engine to the booster.
If the results are not as specified, replace the check valve.

REASSEMBLY

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

1. TEMPORARILY TIGHTEN FRONT DISC BRAKE BLEEDER PLUG

(a) Install the bleeder plug to the brake cylinder.
HINT:
The bleeder plug will be tightened to a torque specification in the "bleed air from brake line" procedures.

(b) Install the bleeder plug cap.

2. INSTALL PISTON SEAL

(a) Apply lithium soap base glycol grease to a new piston seal.

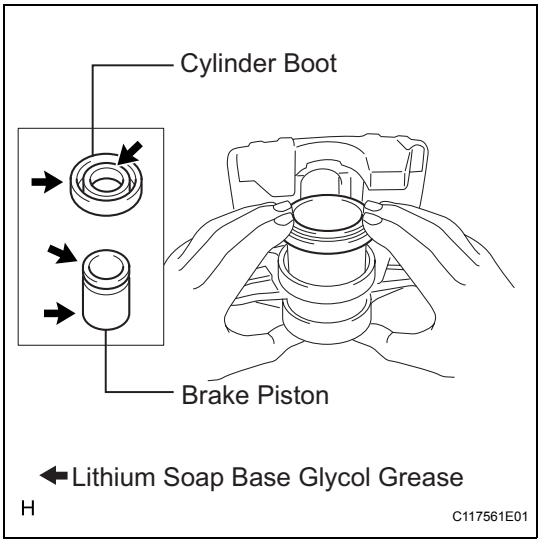
(b) Install the piston seal to the brake cylinder.

3. INSTALL FRONT DISC BRAKE PISTON

(a) Apply lithium soap base glycol grease to the brake piston and a new cylinder boot.

(b) Install the cylinder boot to the brake piston.

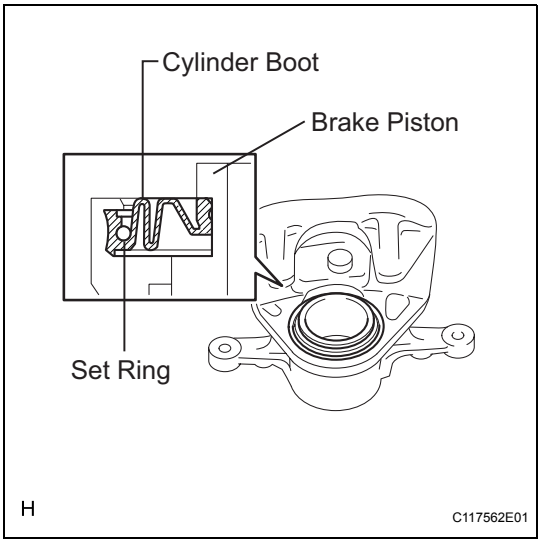
(c) Install the piston (with boot) to the brake cylinder.
NOTICE:
Do not forcibly install the piston to the cylinder.



4. INSTALL CYLINDER BOOT

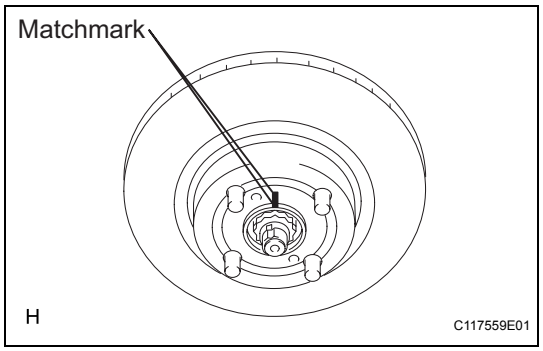
(a) Install the cylinder boot to the brake cylinder.
NOTICE:
Install the boot securely to the grooves of the cylinder and piston.

(b) Using a screwdriver, install the set ring.
NOTICE:
Be careful not to damage the boot.



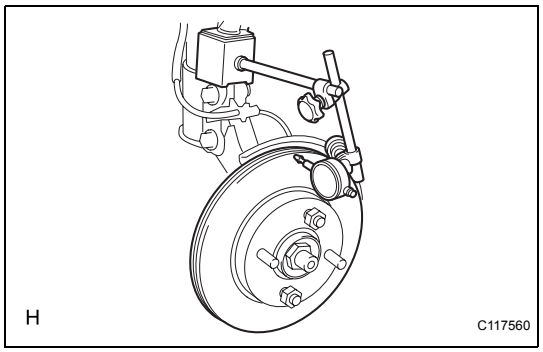
INSTALLATION

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.



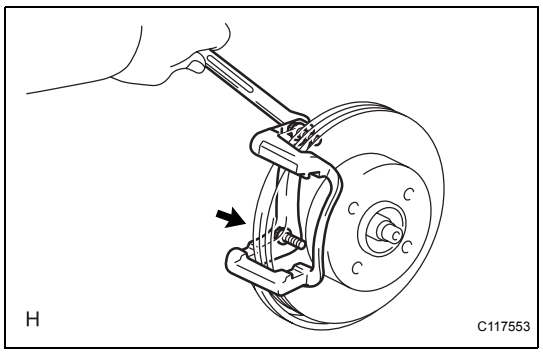
1. INSTALL FRONT DISC

(a) Align the matchmarks and install the disc.
HINT:
When replacing the disc with a new one, select the installation position where the front disc has the minimum runout.



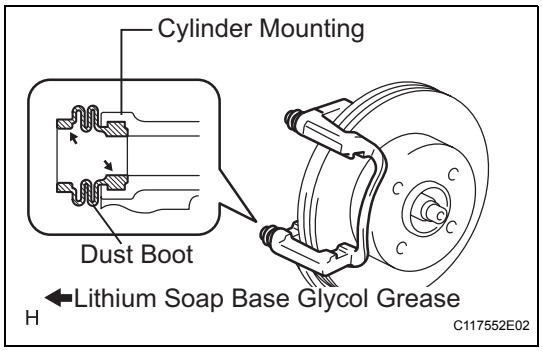
2. CHECK DISC RUNOUT

(a) Check the bearing play in the axial direction and check the axle hub runout (see page AH-15).
(b) Temporarily install the disc to the hub with the hub nuts.
(c) Using a dial indicator, measure the disc runout 10.0 mm (0.39 in.) from the outer edge of the disc.
Maximum disc runout:
0.05 mm (0.0020 in.)
If the runout is greater than the maximum, change the installation positions of the disc and axle so that the runout will become minimal.
If the runout is greater than the maximum even when the installation positions are changed, grind the disc.
If the disc thickness is less than the minimum, replace the disc.
(d) Remove the 2 hub nuts.



3. INSTALL FRONT DISC BRAKE CYLINDER MOUNTING LH

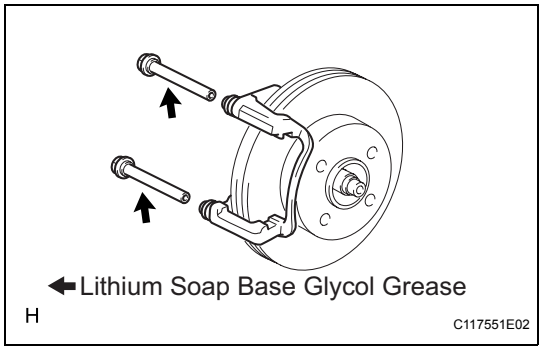
(a) Install the cylinder mounting with the 2 bolts.
Torque: 88 N*m (900 kgf*cm, 65 ft.*lbf)



4. INSTALL FRONT DISC BRAKE DUST BOOT

(a) Apply lithium soap base glycol grease to the contact surface of the 2 bush dust boots.

(b) Install the 2 bush dust boots to the cylinder mounting.



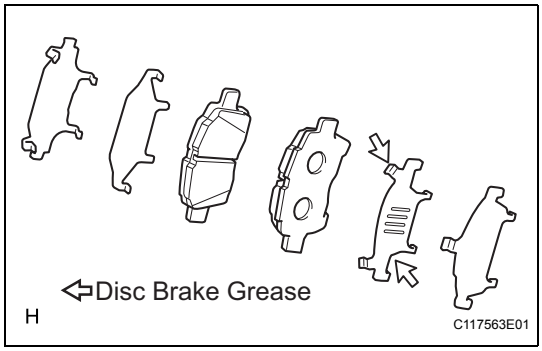
5. INSTALL FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the sliding part and contact surface of the 2 slide pins.

(b) Install the 2 slide pins to the cylinder mounting.

6. INSTALL FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Install the 2 support plates to the cylinder mounting.



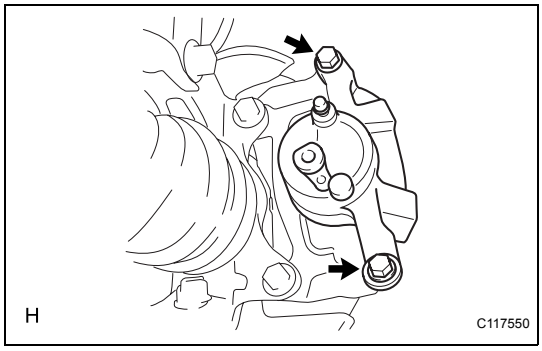
7. INSTALL FRONT ANTI SQUEAL SHIM

(a) Apply disc brake grease to the both sides of each No. 1 shim.

(b) Install the No. 1 and No. 2 shims to each pad.
NOTICE:
- **When replacing worn pad, the shims must be replaced together with the pads.**
- **Install the shims in the correct positions and direction.**

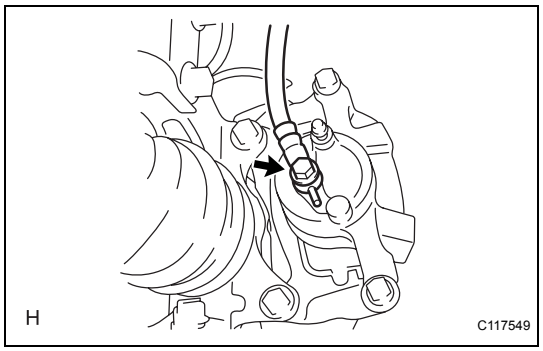
8. INSTALL FRONT DISC BRAKE PAD

(a) Install the 2 brake pads to the cylinder mounting.
NOTICE:
There should be no oil or grease on the friction surfaces of the pads and disc.



9. INSTALL FRONT DISC BRAKE CYLINDER SUB-ASSEMBLY LH

(a) Install the brake cylinder with the 2 bolts.
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)

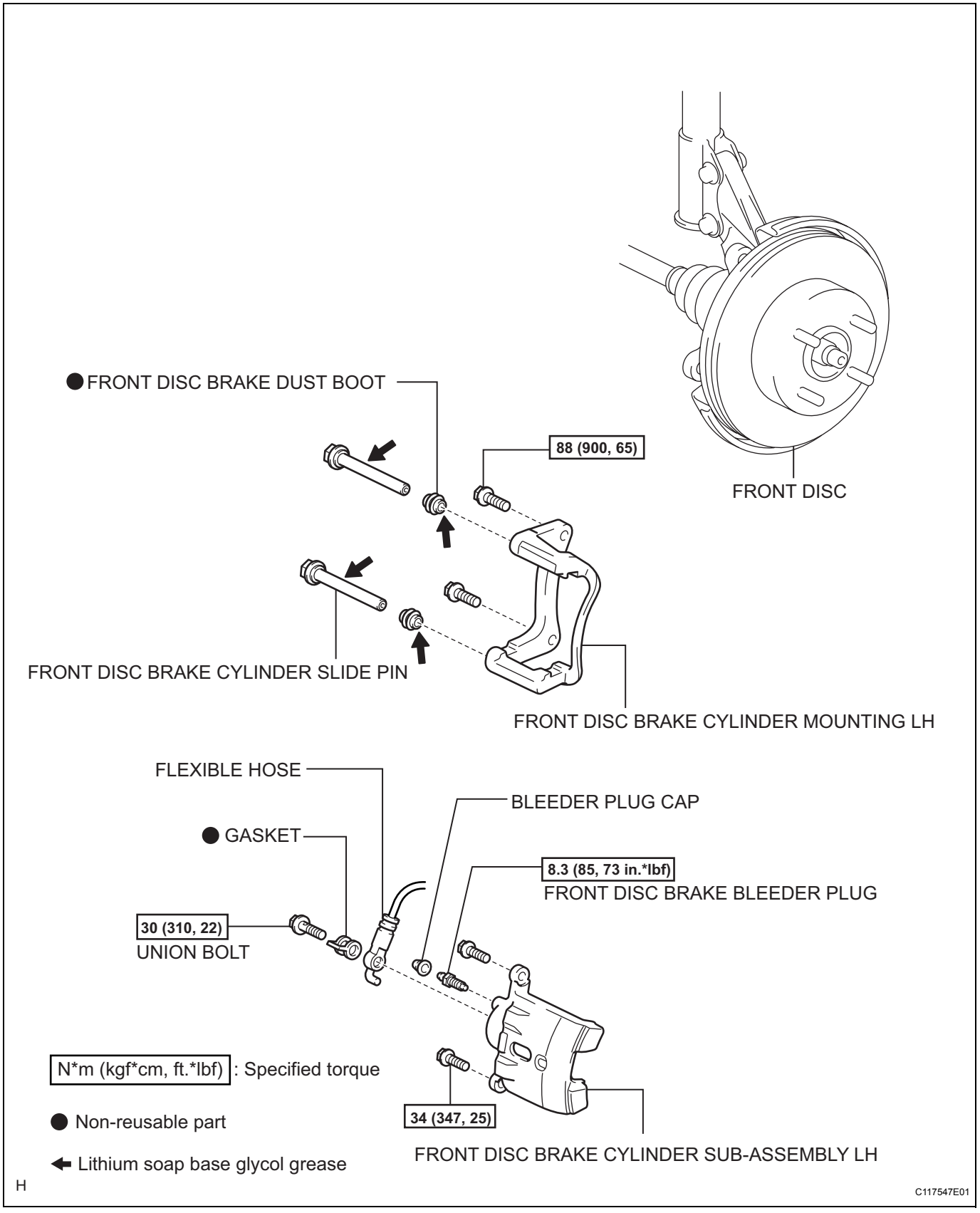


(b) Connect the flexible hose with a new gasket and the union bolt.
Torque: 30 N*m (310 kgf*cm, 22 ft.*lbf)
HINT:
Install the flexible hose lock securely in the lock hole in the brake cylinder.

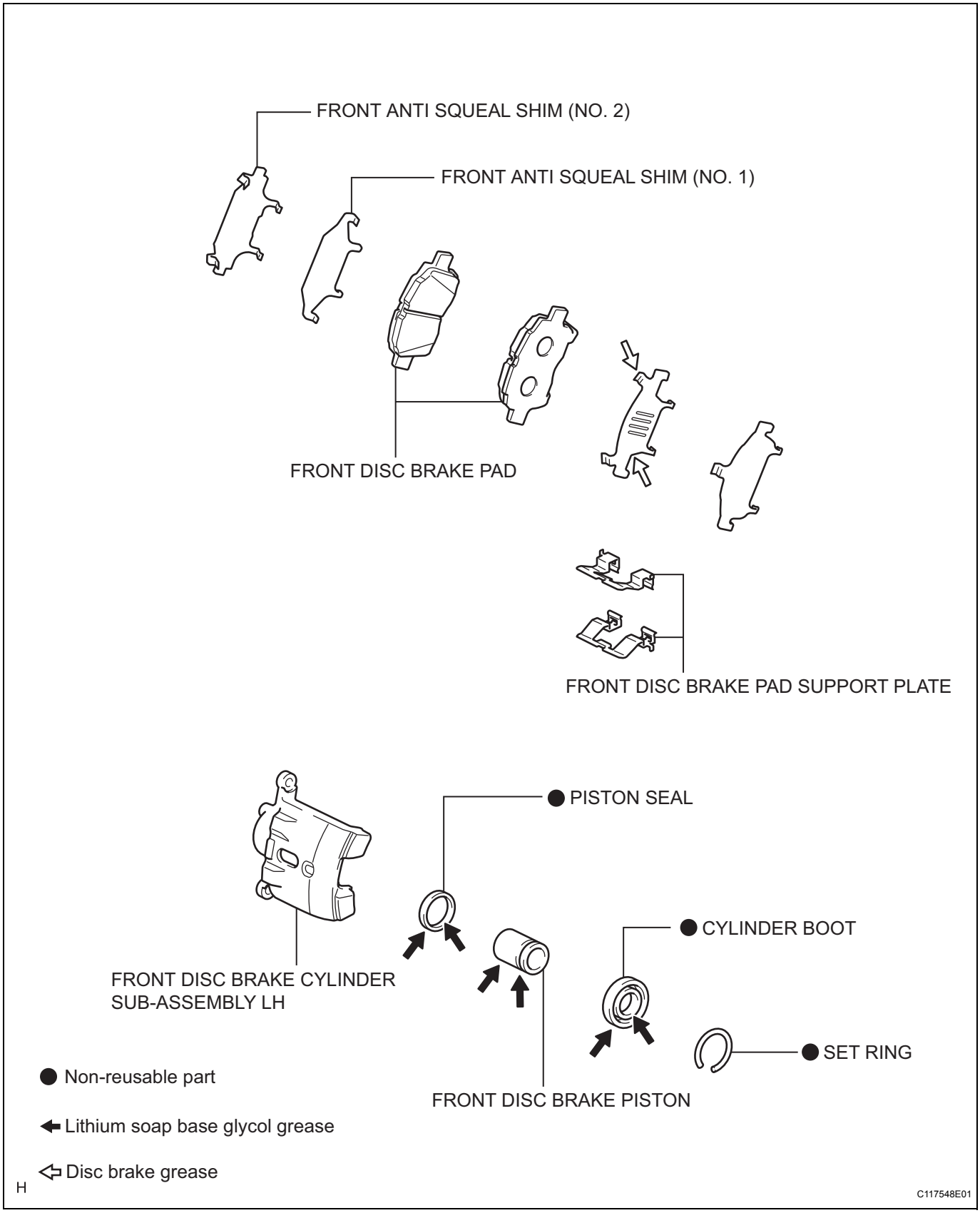
10. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-3)**
11. **BLEED AIR FROM BRAKE MASTER CYLINDER (See page BR-3)**
12. **BLEED AIR FROM BRAKE LINE (See page BR-4)**
13. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-6)**
14. **CHECK FOR BRAKE FLUID LEAKAGE**
15. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

FRONT BRAKE

COMPONENTS



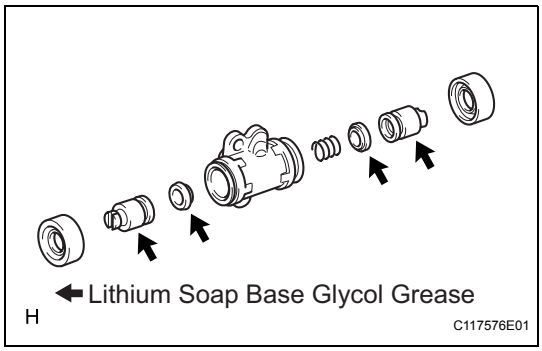
BR


FRONT ANTI SQUEAL SHIM (NO. 2)
FRONT ANTI SQUEAL SHIM (NO. 1)
FRONT DISC BRAKE PAD
FRONT DISC BRAKE PAD SUPPORT PLATE
PISTON SEAL
CYLINDER BOOT
FRONT DISC BRAKE CYLINDER SUB-ASSEMBLY LH
SET RING
FRONT DISC BRAKE PISTON
● Non-reusable part
Lithium soap base glycol grease
Disc brake grease
H
C117548E01

BR

REASSEMBLY

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

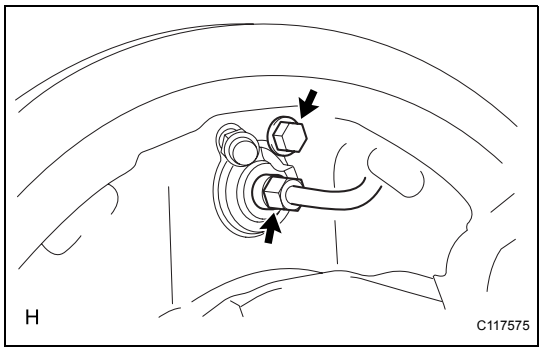


1. INSTALL REAR WHEEL CYLINDER CUP KIT

(a) Apply lithium soap base glycol grease to 2 new wheel cylinder cups and the 2 pistons.
(b) Install the 2 wheel cylinder cups on each piston.
(c) Install the compression spring and 2 pistons to the wheel brake cylinder.
(d) Install 2 new cylinder dust boots to the wheel brake cylinder.

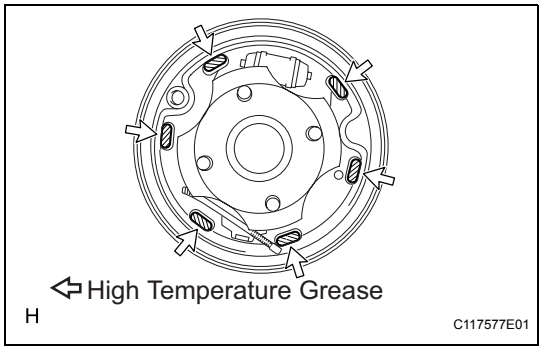
2. TEMPORARILY TIGHTEN REAR BRAKE DRUM BLEEDER PLUG

(a) Install the bleeder plug to the cylinder.
HINT:
The bleeder plug will be tightened to a torque specification in the "bleed air from brake line" procedures.
(b) Install the bleeder plug cap.



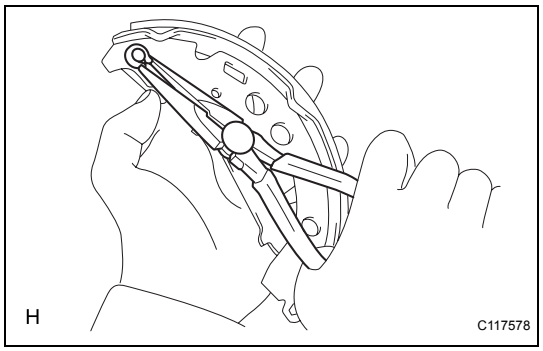
3. INSTALL REAR WHEEL BRAKE CYLINDER ASSEMBLY LH

(a) Install the wheel brake cylinder with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
(b) Using SST, connect the brake line.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf) without SST
14 N*m (143 kgf*cm, 10 ft.*lbf) with SST
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



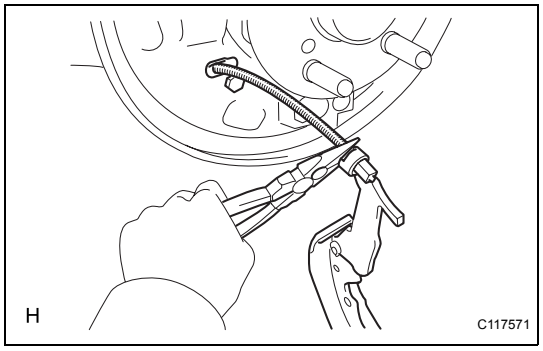
4. APPLY HIGH TEMPERATURE GREASE

(a) Apply high temperature grease to the surface of the backing plate to which the shoe is attached.



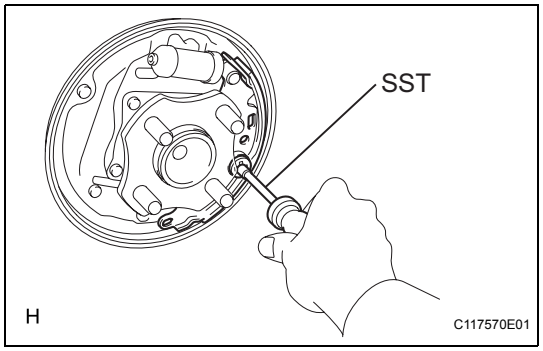
5. INSTALL REAR BRAKE PARKING BRAKE SHOE LEVER SUB-ASSEMBLY

(a) Using needle-nose pliers, install the parking brake lever with a new C-washer.

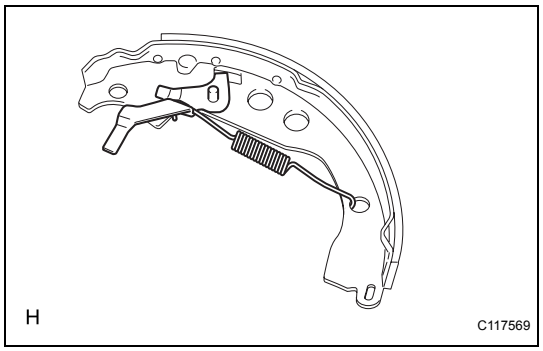


6. INSTALL REAR BRAKE SHOE

(a) Using needle-nose pliers, connect the No. 3 parking brake cable to the parking brake shoe lever.

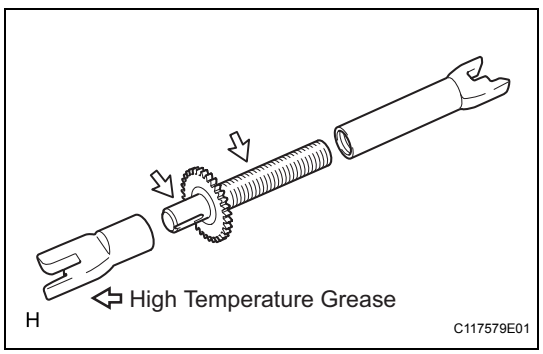


(b) Using SST, install the rear brake shoe, pin, shoe hold down spring and shoe hold down spring cup.
SST 09718-00010



7. INSTALL REAR BRAKE AUTOMATIC ADJUST LEVER LH

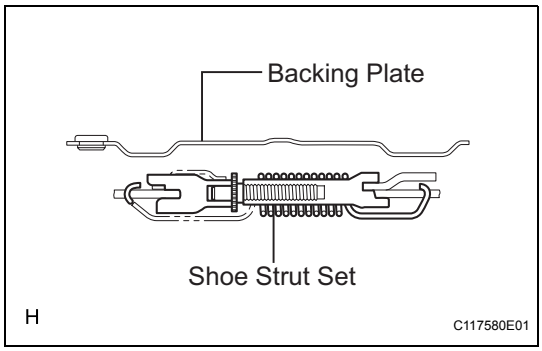
(a) Install the automatic adjust lever and automatic adjust lever tension spring to the front brake shoe.



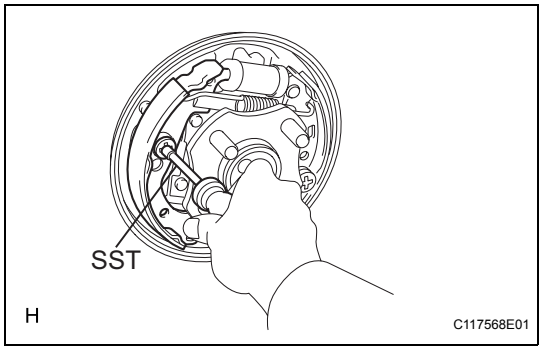
8. INSTALL PARKING BRAKE SHOE STRUT LH

(a) Disassemble the strut. Apply high temperature grease to the areas indicated by the arrows in the illustration. Then assemble the shoe strut.

(b) Install the shoe return spring to the shoe strut.



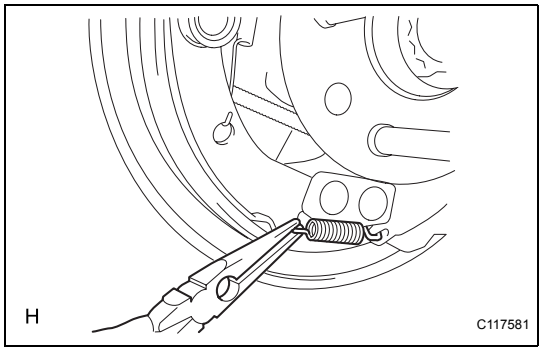
(c) Install the shoe strut as shown in the illustration.



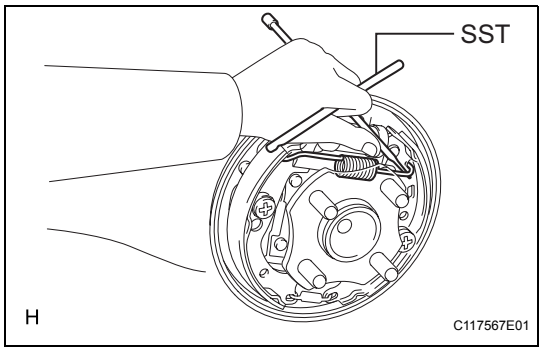
9. INSTALL FRONT BRAKE SHOE

(a) Connect the tension spring to the front brake shoe and rear brake shoe.

(b) Using SST, install the front brake shoe, pin, shoe hold down spring and shoe hold down spring cup.
SST 09718-00010



(c) Using needle-nose pliers, connect the tension spring to the front brake shoe and rear brake shoe.

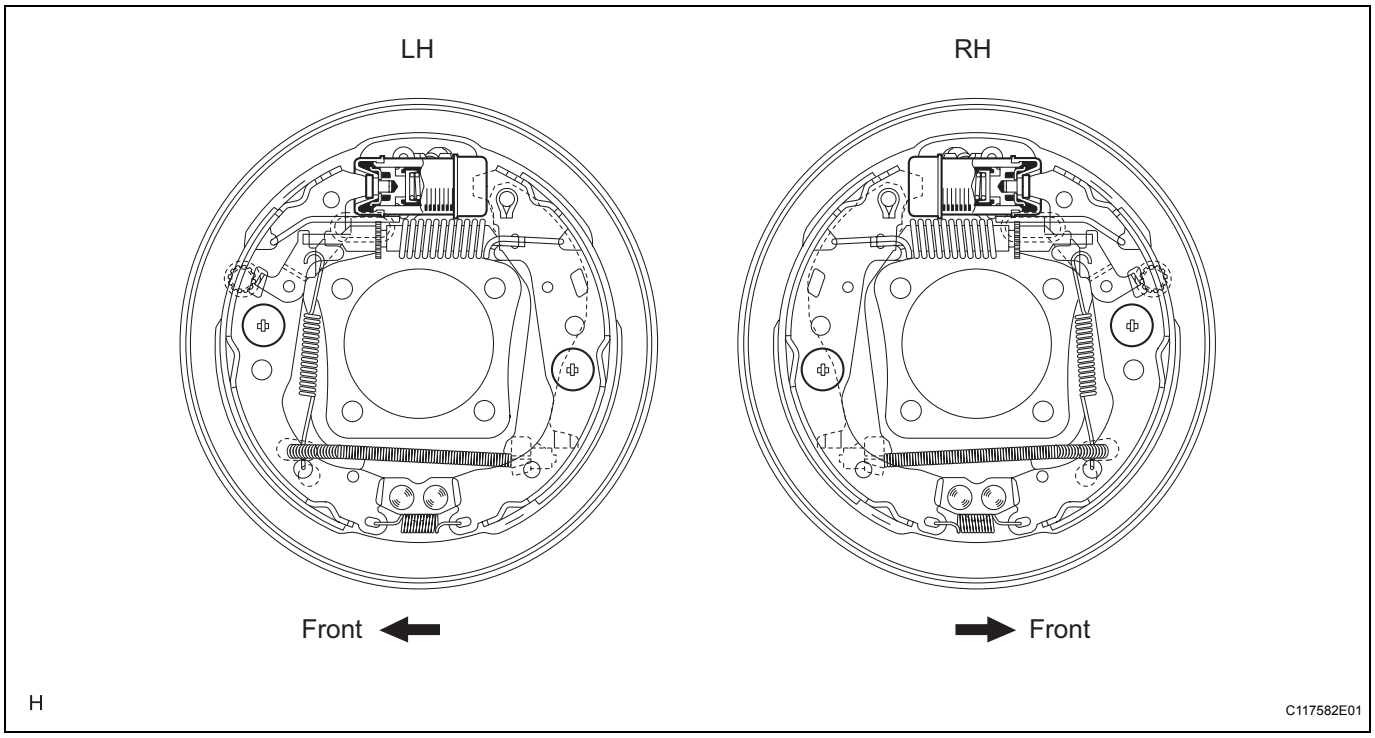


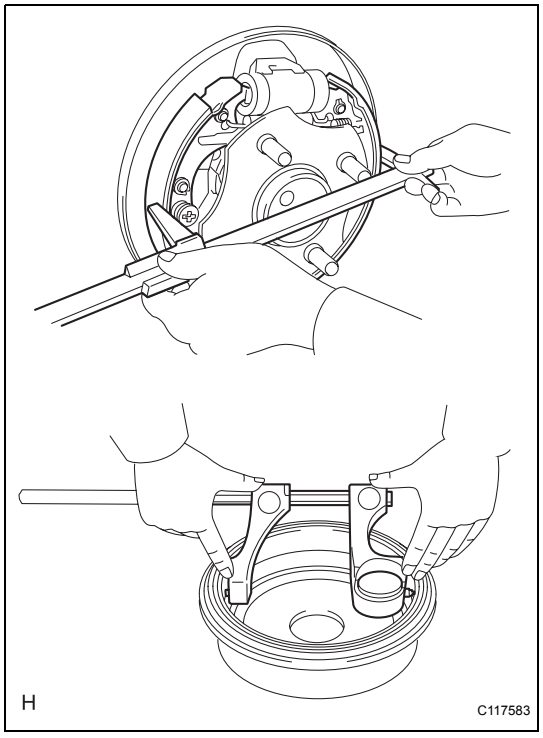
10. CONNECT PARKING BRAKE SHOE STRUT LH

(a) Using SST, connect the shoe return spring to the front brake shoe and rear brake shoe.
SST 09703-30011
NOTICE:
Be careful not to damage the wheel cylinder boot.

11. CHECK REAR BRAKE DRUM INSTALLATION

(a) Check that each part is installed properly.



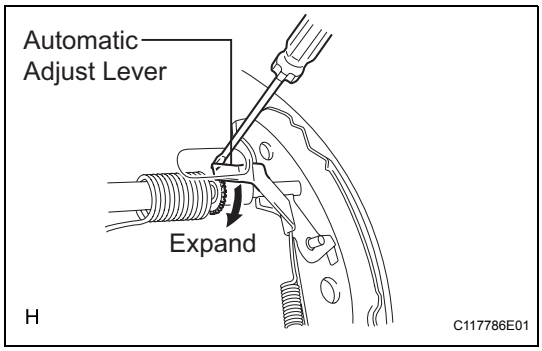


(b) Measure the inside diameter of the brake drum and diameter of the brake shoe. Check that the difference between the diameters is the correct shoe clearance.

Standard shoe clearance:
0.6 mm (0.024 in.)

NOTICE:
There should be no oil or grease on the contact surfaces of the brake shoe and brake drum.

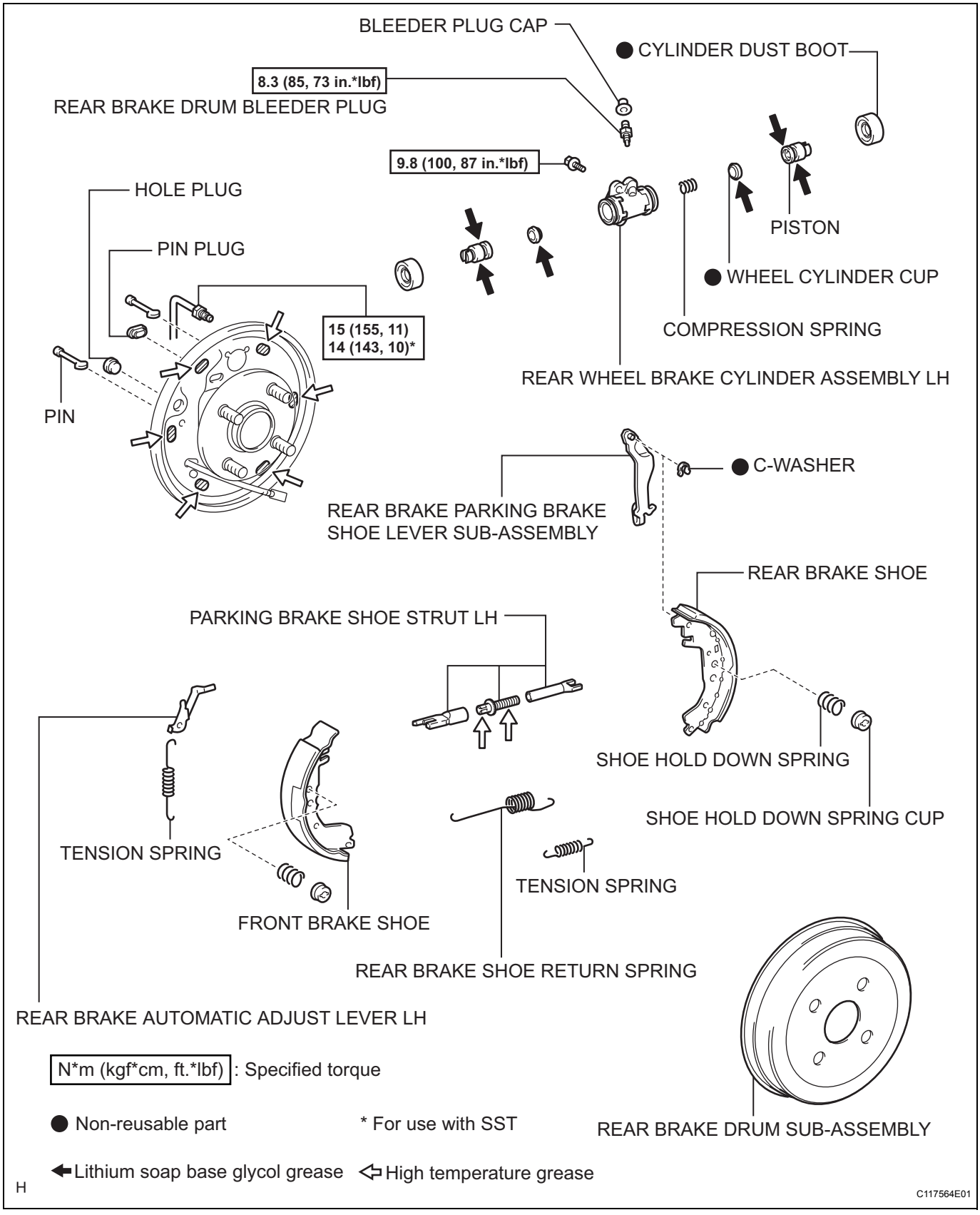
12. INSTALL REAR BRAKE DRUM SUB-ASSEMBLY



13. **ADJUST REAR BRAKE DRUM SHOE CLEARANCE**
    (a) Temporarily install the 2 hub nuts.
    (b) Remove the pin plug, and turn the adjuster to expand the shoe until the drum locks.
    (c) Rotate the adjuster backwards by 8 notches.
    (d) Install the hole plug.
    (e) Remove the 2 hub nuts.
14. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-3)**
15. **BLEED AIR FROM BRAKE MASTER CYLINDER (See page BR-3)**
16. **BLEED AIR FROM BRAKE LINE (See page BR-4)**
17. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-6)**
18. **CHECK FOR BRAKE FLUID LEAKAGE**
19. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
20. **CHECK PARKING BRAKE LEVER TRAVEL (See page PB-1)**
21. **ADJUST PARKING BRAKE LEVER TRAVEL (See page PB-1)**

REAR BRAKE

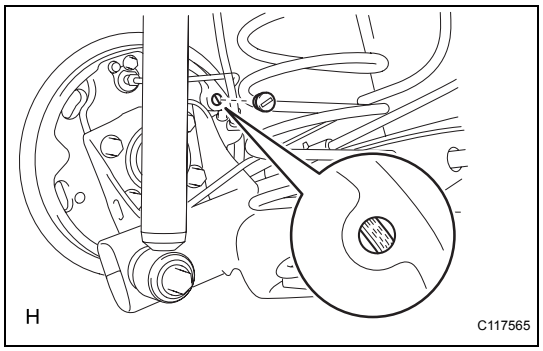
COMPONENTS



BR

DISASSEMBLY

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.



1. CHECK BRAKE SHOE LINING THICKNESS

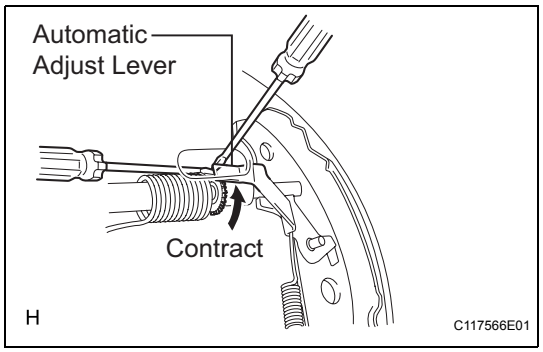
(a) Remove the hole plug, and check the shoe lining thickness through the hole.
Minimum thickness:
1.0 mm (0.039 in.)
If the lining thickness is less than the minimum, replace the brake shoe.

2. REMOVE REAR WHEEL

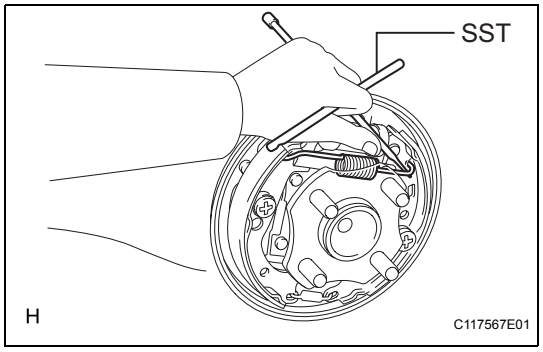
3. DRAIN BRAKE FLUID
NOTICE:
Wash off brake fluid immediately if it comes in contact with any painted surface.

4. REMOVE REAR BRAKE DRUM SUB-ASSEMBLY

(a) Release the parking brake lever, and remove the brake drum.
HINT:
If the brake drum cannot be removed easily, perform the following procedures.

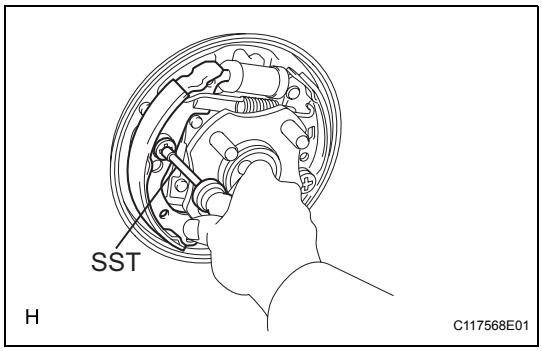


(b) Remove the pin plug, insert a screwdriver into the hole on the backing plate, and hold the automatic adjust lever away from the adjuster.
(c) Using another screwdriver, compress the brake shoe adjuster by turning the adjusting wheel.



5. DISCONNECT PARKING BRAKE SHOE STRUT LH

(a) Using SST, disconnect the shoe return spring from the front brake shoe and the rear brake shoe.
SST 09703-30011
NOTICE:
Be careful not to damage the wheel cylinder boot.



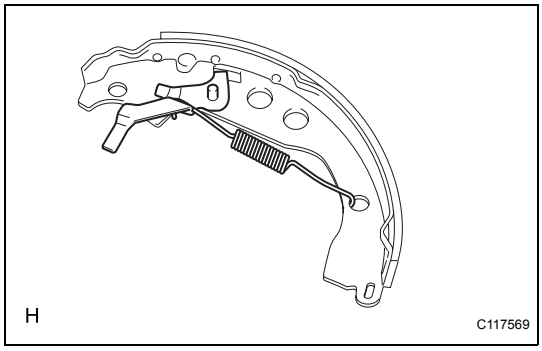
6. REMOVE FRONT BRAKE SHOE

(a) Using SST, remove the shoe hold down spring cup, shoe hold down spring and pin.
SST 09718-00010

(b) Remove the front brake shoe and tension spring.

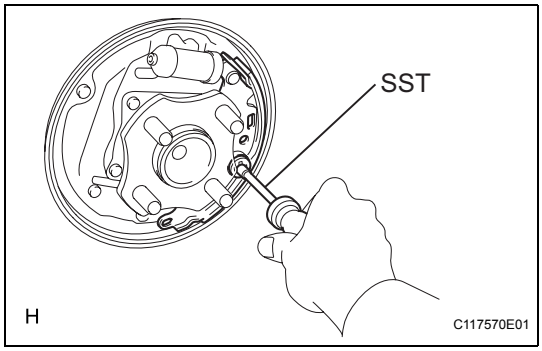
7. REMOVE PARKING BRAKE SHOE STRUT LH

(a) Remove the parking brake shoe strut from the rear brake shoe.



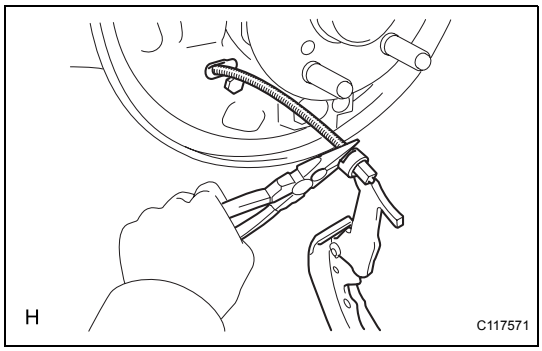
8. REMOVE REAR BRAKE AUTOMATIC ADJUST LEVER LH

(a) Remove the adjust lever tension spring and automatic adjust lever.

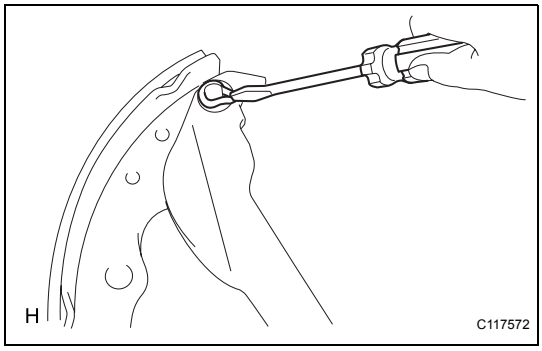


9. REMOVE REAR BRAKE SHOE

(a) Using SST, remove the shoe hold down spring cup, shoe hold down spring and pin.
SST 09718-00010

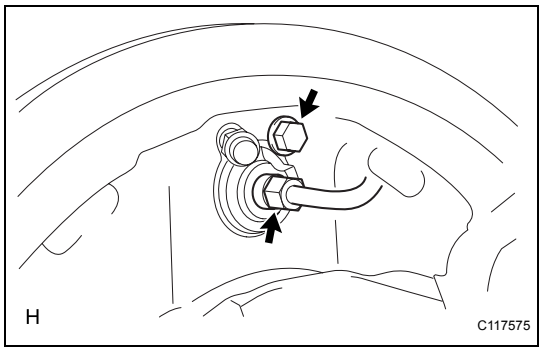


(b) Using needle-nose pliers, disconnect the No. 3 parking brake cable from the parking brake shoe lever.



10. REMOVE REAR BRAKE PARKING BRAKE SHOE LEVER SUB-ASSEMBLY

(a) Using a screwdriver, remove the C-washer and parking brake shoe lever.



11. REMOVE REAR WHEEL BRAKE CYLINDER ASSEMBLY LH

(a) Using SST, disconnect the brake line.
SST 09023-00101

(b) Remove the bolt and wheel brake cylinder.

12. REMOVE REAR WHEEL CYLINDER CUP KIT

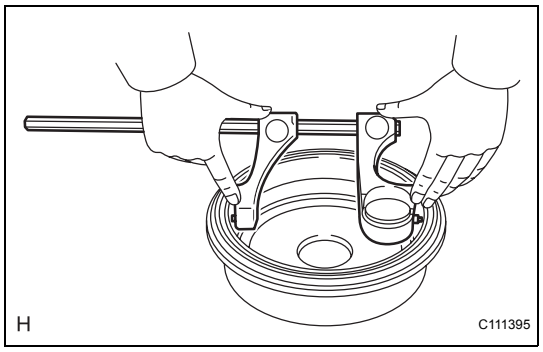
(a) Remove the 2 cylinder dust boots from the wheel brake cylinder.

(b) Remove the 2 pistons and compression spring.

(c) Remove the 2 wheel cylinder cups from each piston.

13. REMOVE REAR BRAKE DRUM BLEEDER PLUG

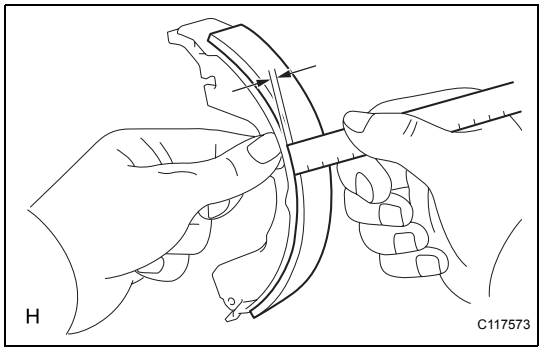
(a) Remove the bleeder plug from the wheel brake cylinder.



INSPECTION

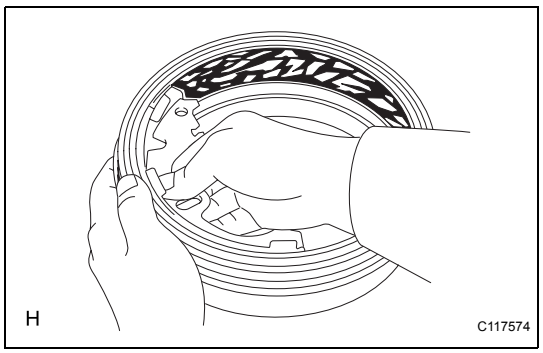
1. CHECK BRAKE DRUM INSIDE DIAMETER

(a) Using a drum gauge or equivalent, measure the inside diameter of the drum.
Standard diameter:
200.0 mm (7.874 in.)
Maximum diameter:
201.0 mm (7.913 in.)
If the inside diameter of the drum is greater than the maximum, replace the drum.



2. CHECK BRAKE SHOE LINING THICKNESS

(a) Using a ruler, measure the thickness of the shoe lining.
Standard thickness:
4.0 mm (0.157 in.)
Minimum thickness:
1.0 mm (0.039in.)
If the lining thickness is equal to or less than the minimum, or if severe or uneven wear is present, replace the brake shoe.
HINT:
If any of the brake shoes have to be replaced, replace all of the shoes in order to maintain even braking.



3. CHECK BRAKE DRUM AND BRAKE SHOE LINING FOR PROPER CONTACT

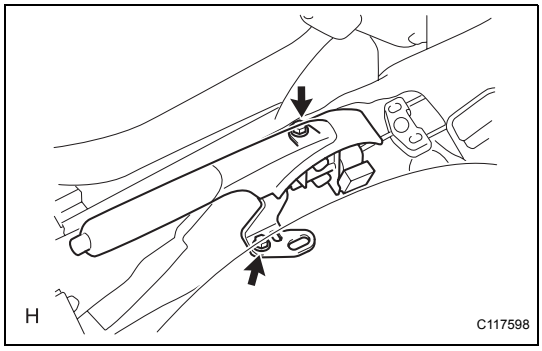
(a) Apply chalk to the inside surface of the drum. Then grind the brake shoe lining on the drum until full contact is achieved.
HINT:
If the drum and brake shoe lining do not have full contact, use a brake shoe grinder or replace the brake shoe.

(b) After the inspection, wipe chalk off of the inside surface of the drum and lining surface.

4. CHECK REAR WHEEL BRAKE CYLINDER

(a) Check the cylinder bore and piston for rust or scoring.
If necessary, replace the cylinder and piston.

INSTALLATION



1. **INSTALL PARKING BRAKE SWITCH ASSEMBLY**
   (a) Install the parking brake switch with the screw.
2. **INSTALL PARKING BRAKE LEVER SUB-ASSEMBLY**
   (a) Connect the parking brake pull rod to the lever.
   (b) Install the parking brake lever with the 2 bolts.
   Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)
   (c) Connect the parking brake switch connector.
3. **INSTALL NO. 1 WIRE ADJUSTING NUT**
   (a) Install the wire adjusting nut and lock nut.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
4. **INSTALL REAR CONSOLE BOX ASSEMBLY (See page IP-27)**
5. **INSTALL CONSOLE BOX CARPET**
6. **INSTALL REAR CONSOLE BOX COVER**
7. **INSTALL STEREO JACK ADAPTER ASSEMBLY**
8. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
9. **CHECK PARKING BRAKE LEVER TRAVEL (See page PB-1)**
10. **ADJUST PARKING BRAKE LEVER TRAVEL (See page PB-1)**

INSTALLATION

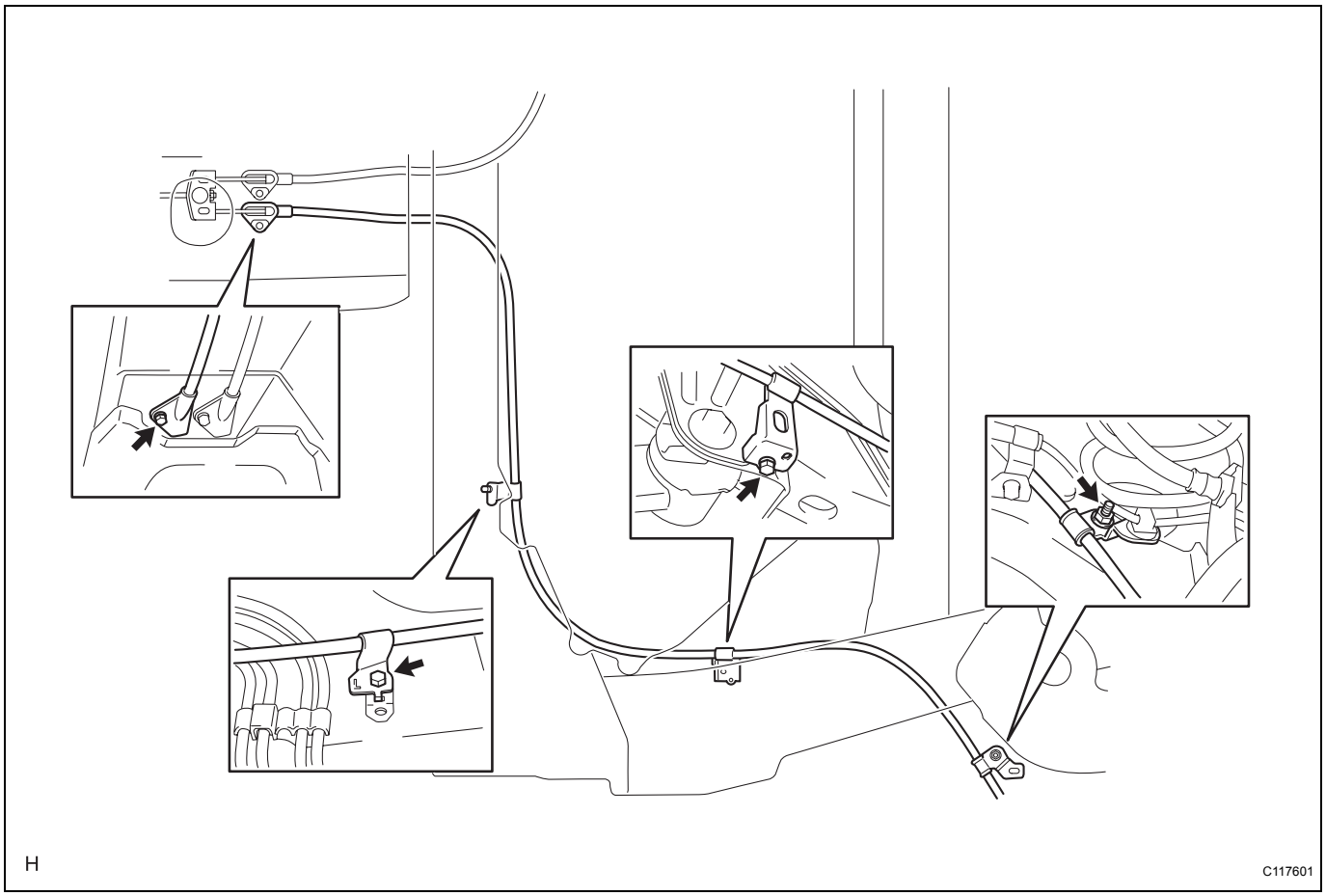
HINT:

- Use the same procedures for the No. 2 parking brake cable and No. 3 parking brake cable.
- The procedures listed below are for the No. 3 parking brake cable.

1. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the parking brake cable to the parking brake equalizer.

(b) Install the parking brake cable to the body with the nut and 3 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



2. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the parking brake cable to the backing plate with the bolt.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

3. APPLY HIGH TEMPERATURE GREASE (See page BR-34)

4. INSTALL REAR BRAKE SHOE (See page BR-35)

5. INSTALL REAR BRAKE AUTOMATIC ADJUST LEVER LH (See page BR-35)

6. INSTALL PARKING BRAKE SHOE STRUT LH (See page BR-35)

7. **INSTALL FRONT BRAKE SHOE (See page BR-36)**
8. **CONNECT REAR BRAKE SHOE RETURN SPRING (See page BR-36)**
9. **CHECK REAR BRAKE DRUM INSTALLATION (See page BR-37)**
10. **INSTALL REAR BRAKE DRUM SUB-ASSEMBLY**
11. **ADJUST REAR BRAKE DRUM SHOE CLEARANCE (See page BR-38)**
12. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
13. **INSTALL FRONT NO. 2 FLOOR HEAT INSULATOR**
    (a) Install the heat insulator with the 3 bolts.
    Torque: 5.5 N*m (55 kgf*cm, 48 in.*lbf)
14. **INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-3)**
15. **INSTALL FRONT FLOOR PANEL BRACE**
    (a) Install the floor panel brace with the 2 bolts.
16. **TEMPORARILY TIGHTEN NO. 1 WIRE ADJUSTING NUT**
    (a) Temporarily tighten the wire adjusting nut.
17. **CHECK PARKING BRAKE LEVER TRAVEL (See page PB-1)**
18. **ADJUST PARKING BRAKE LEVER TRAVEL (See page PB-1)**
19. **INSTALL REAR CONSOLE BOX ASSEMBLY (See page IP-26)**
20. **INSTALL CONSOLE BOX CARPET**
21. **INSTALL REAR CONSOLE BOX COVER**
22. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
23. **CHECK EXHAUST GAS LEAKAGE**

PARKING BRAKE SYSTEM

PROBLEM SYMPTOMS TABLE

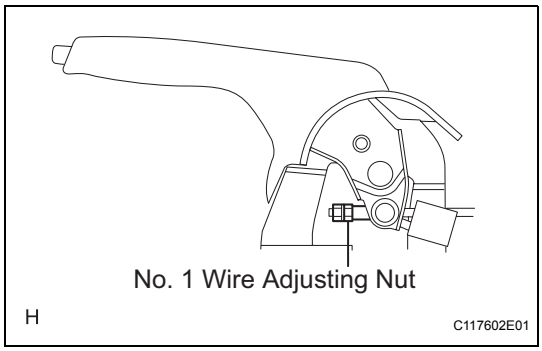
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Parking brake system

Symptom	Suspected area	See page
Parking brake drags	1. Parking brake lever travel (adjustment necessary)	PB-1
	2. Parking brake cable (stuck)	PB-4
	3. Parking brake shoe clearance (adjustment necessary)	BR-38
	4. Parking brake shoe lining (cracked or distorted)	BR-33
	5. Tension or return spring (damaged)	BR-31

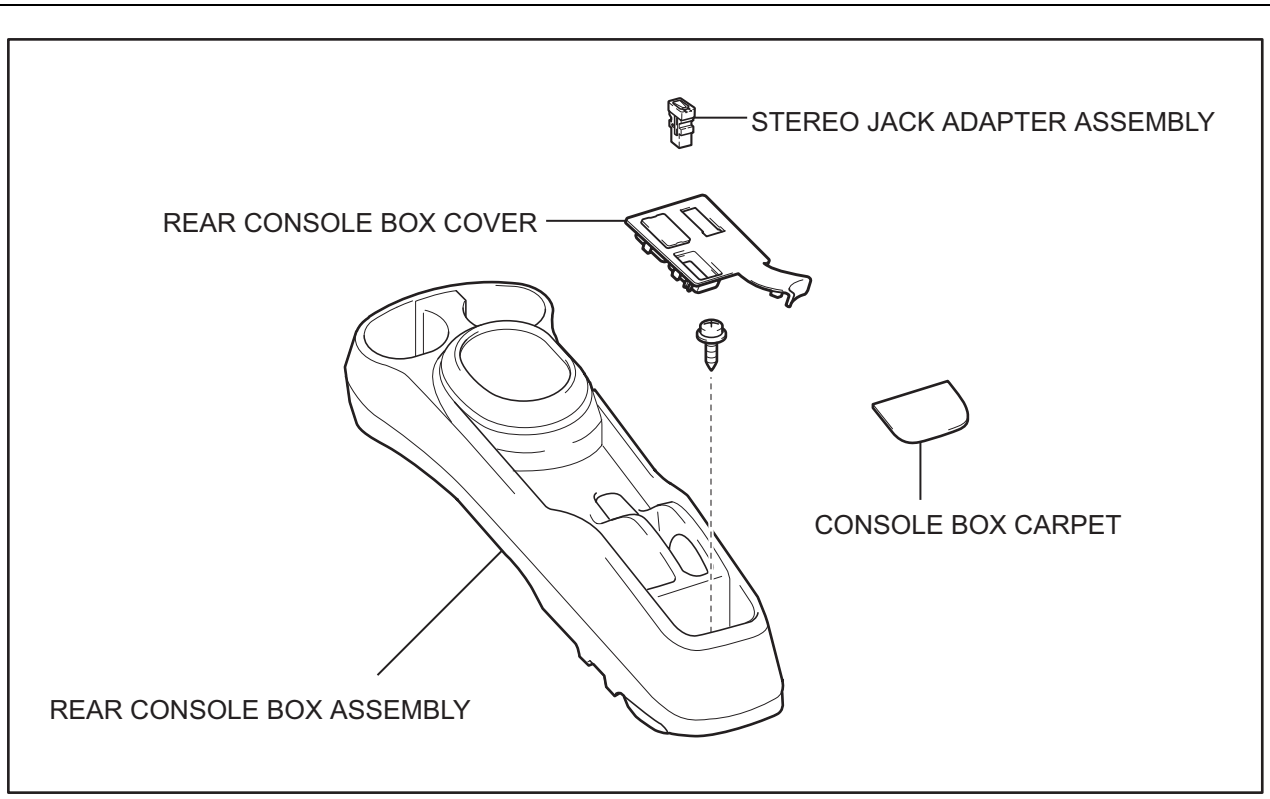
ADJUSTMENT

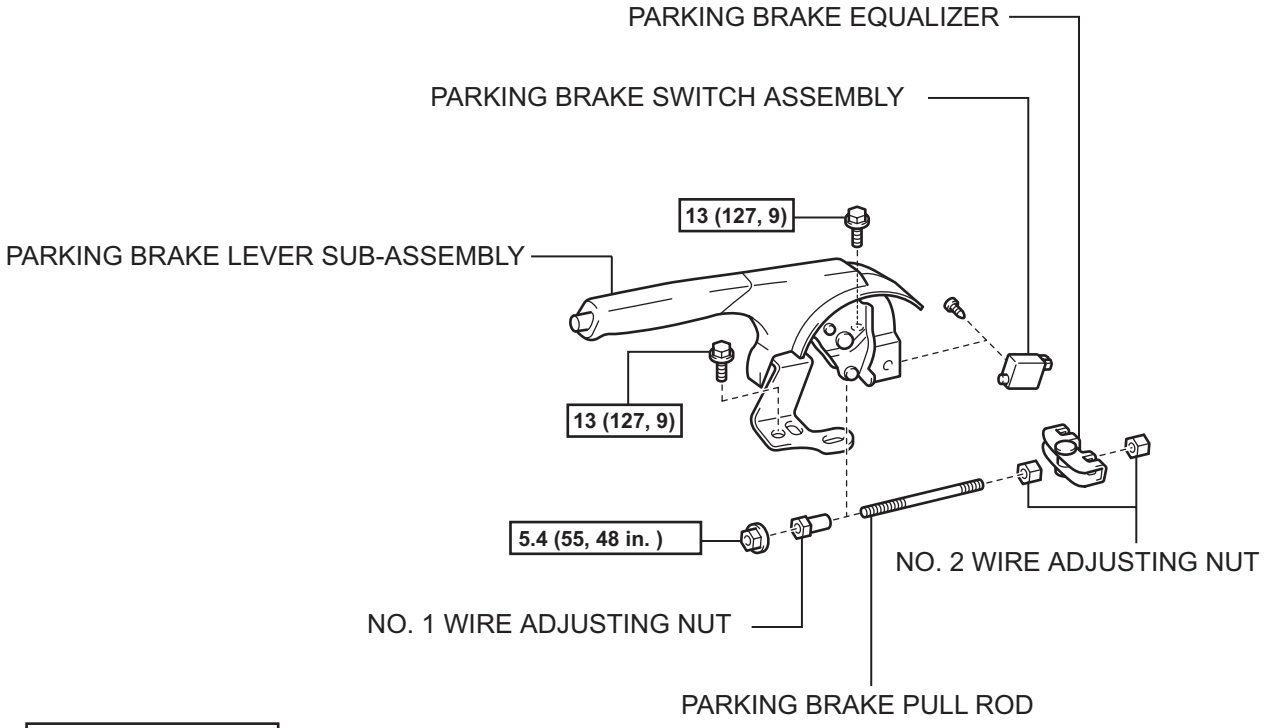
1. **REMOVE REAR WHEEL**
2. **ADJUST REAR BRAKE DRUM SHOE CLEARANCE (See page BR-38)**
3. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
4. **CHECK PARKING BRAKE LEVER TRAVEL**
   (a) Pull the lever upward with a force of approximately 196 N (20 kgf, 44.1 lbf) and count the number of clicks.
   OK:
   6 to 9 clicks
5. **REMOVE CONSOLE BOX REAR COVER**
6. **REMOVE CONSOLE BOX CARPET**
7. **REMOVE REAR CONSOLE BOX ASSEMBLY**
8. **ADJUST PARKING BRAKE LEVER TRAVEL**
   (a) Loosen the lock nut.
   (b) Turn the No. 1 wire adjusting nut until the lever travel is correct.
   (c) Tighten the lock nut.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



PARKING BRAKE LEVER

COMPONENTS





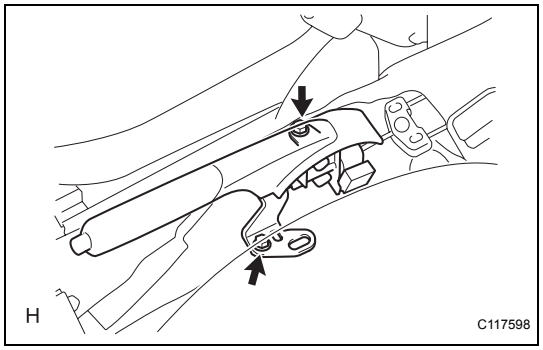
N*m (kgf*cm, ft.*lbf) : Specified torque

C122651E01

PB

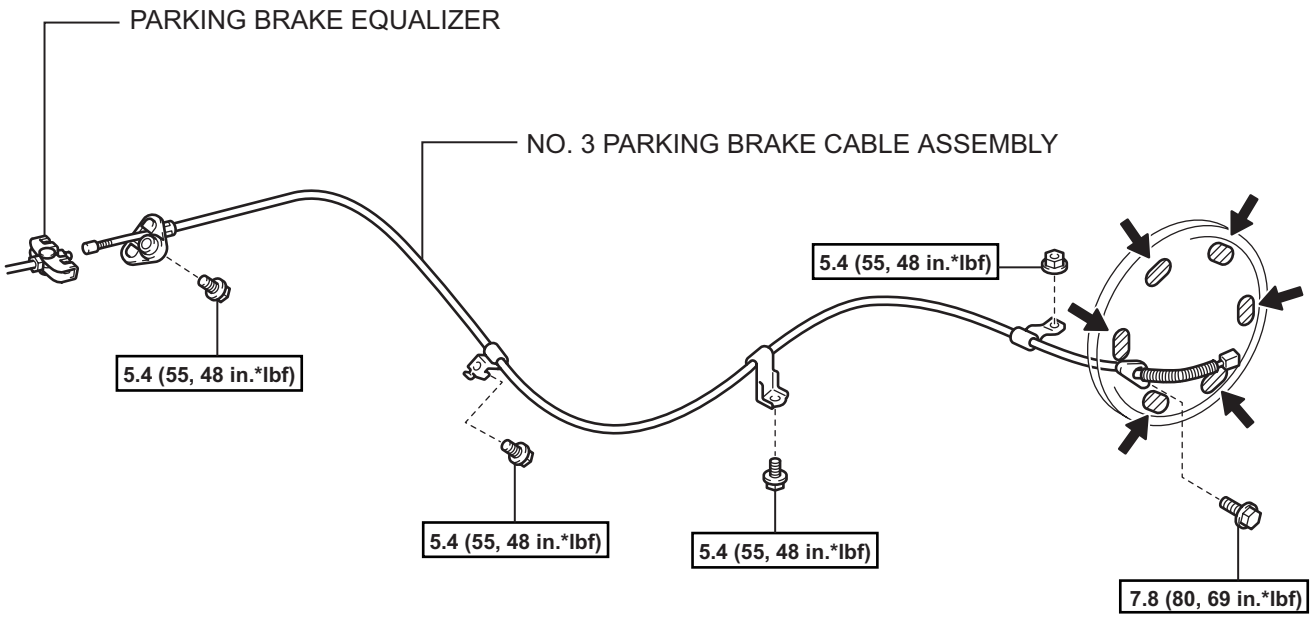
REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
2. **REMOVE STEREO JACK ADAPTER ASSEMBLY**
3. **REMOVE REAR CONSOLE BOX COVER**
4. **REMOVE CONSOLE BOX CARPET**
5. **REMOVE REAR CONSOLE BOX ASSEMBLY (See page IP-26)**
6. **REMOVE NO. 1 WIRE ADJUSTING NUT**
   (a) Remove the lock nut and wire adjusting nut.
7. **REMOVE PARKING BRAKE LEVER SUB-ASSEMBLY**
   (a) Disconnect the parking brake switch connector.
   (b) Disconnect the parking brake pull rod.
   (c) Remove the 2 bolts and parking brake lever.
8. **REMOVE PARKING BRAKE SWITCH ASSEMBLY**
   (a) Remove the screw and parking brake switch.



PARKING BRAKE CABLE

COMPONENTS

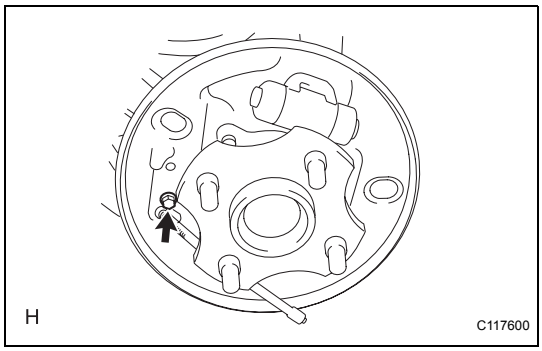


REMOVAL

HINT:

- Use the same procedures for the No. 2 parking brake cable and No. 3 parking brake cable.
- The procedures listed below are for the No. 3 parking brake cable.

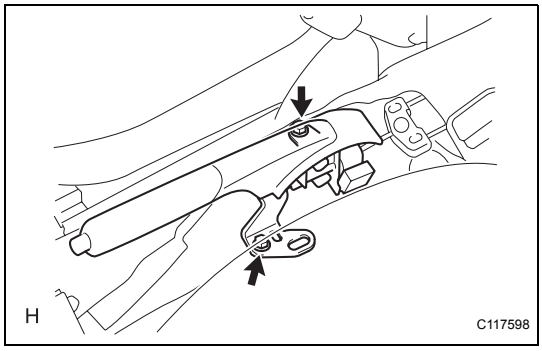
1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
2. **REMOVE REAR CONSOLE BOX COVER**
3. **REMOVE CONSOLE BOX CARPET**
4. **REMOVE REAR CONSOLE BOX ASSEMBLY (See page IP-26)**
5. **REMOVE NO. 1 WIRE ADJUSTING NUT**
   (a) Remove the No. 1 wire adjusting nut.
6. **REMOVE FRONT FLOOR PANEL BRACE**
   (a) Remove the 2 bolts and floor panel brace.
7. **REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-3)**
8. **REMOVE FRONT NO. 2 FLOOR HEAT INSULATOR**
   (a) Remove the 3 bolts and heat insulator.
9. **DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY**
   (a) Remove the nut and 3 bolts, and then disconnect the parking brake cable from the body.
   (b) Disconnect the parking brake cable from the parking brake equalizer.
10. **REMOVE REAR WHEEL**
11. **REMOVE REAR BRAKE DRUM SUB-ASSEMBLY (See page BR-31)**
12. **DISCONNECT PARKING BRAKE SHOE STRUT LH (See page BR-31)**
13. **REMOVE FRONT BRAKE SHOE (See page BR-32)**
14. **REMOVE PARKING BRAKE SHOE STRUT LH (See page BR-32)**
15. **REMOVE REAR BRAKE AUTOMATIC ADJUST LEVER LH (See page BR-32)**
16. **REMOVE REAR BRAKE SHOE (See page BR-32)**



17. REMOVE NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Remove the bolt and then disconnect the parking brake cable from the backing plate.

INSTALLATION



1. **INSTALL PARKING BRAKE SWITCH ASSEMBLY**
   (a) Install the parking brake switch with the screw.
2. **INSTALL PARKING BRAKE LEVER SUB-ASSEMBLY**
   (a) Connect the parking brake pull rod to the lever.
   (b) Install the parking brake lever with the 2 bolts.
   Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)
   (c) Connect the parking brake switch connector.
3. **INSTALL NO. 1 WIRE ADJUSTING NUT**
   (a) Install the wire adjusting nut and lock nut.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
4. **INSTALL REAR CONSOLE BOX ASSEMBLY (See page IP-27)**
5. **INSTALL CONSOLE BOX CARPET**
6. **INSTALL REAR CONSOLE BOX COVER**
7. **INSTALL STEREO JACK ADAPTER ASSEMBLY**
8. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
9. **CHECK PARKING BRAKE LEVER TRAVEL (See page PB-1)**
10. **ADJUST PARKING BRAKE LEVER TRAVEL (See page PB-1)**

INSTALLATION

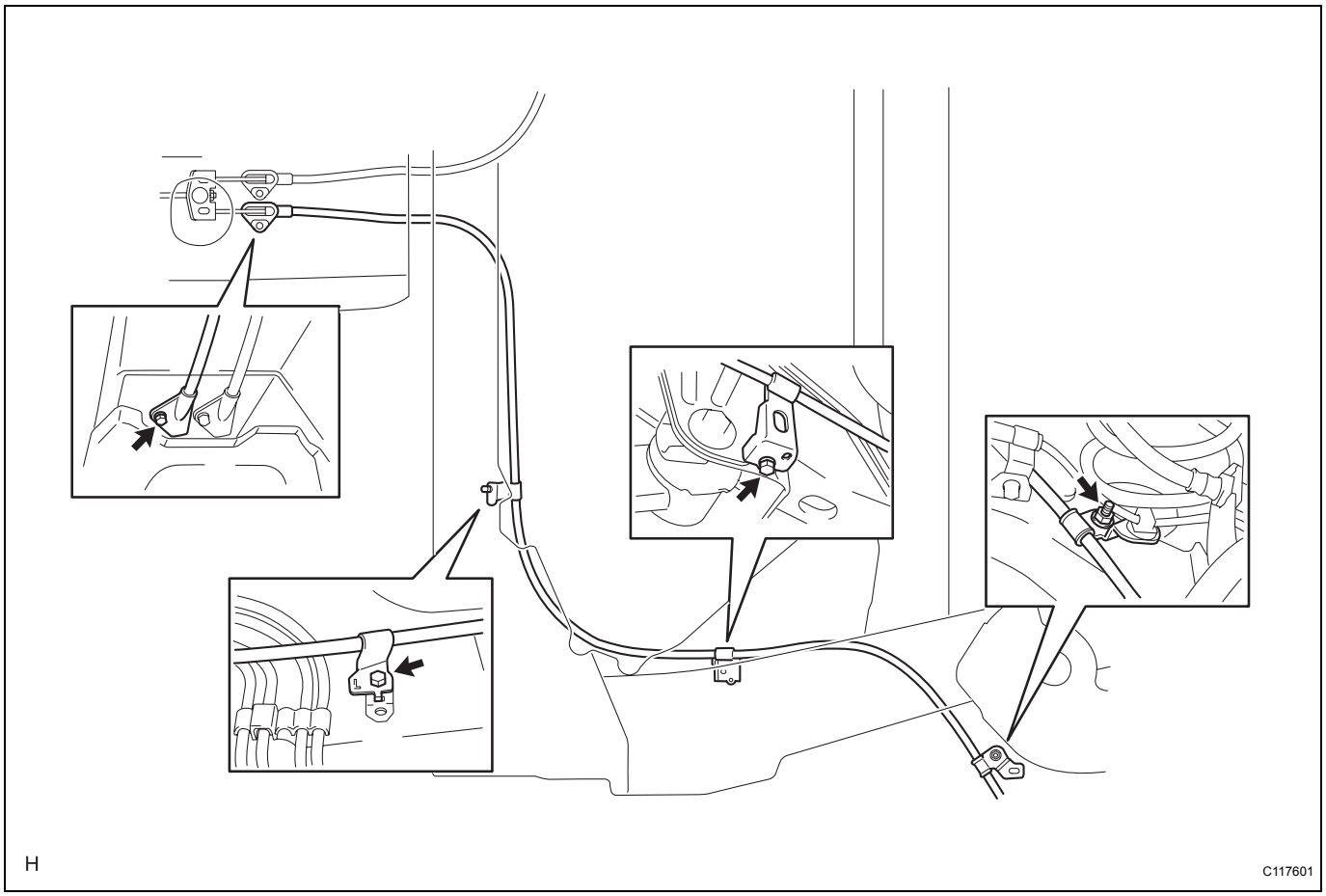
HINT:

- Use the same procedures for the No. 2 parking brake cable and No. 3 parking brake cable.
- The procedures listed below are for the No. 3 parking brake cable.

1. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the parking brake cable to the parking brake equalizer.

(b) Install the parking brake cable to the body with the nut and 3 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



2. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the parking brake cable to the backing plate with the bolt.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

3. APPLY HIGH TEMPERATURE GREASE (See page BR-34)

4. INSTALL REAR BRAKE SHOE (See page BR-35)

5. INSTALL REAR BRAKE AUTOMATIC ADJUST LEVER LH (See page BR-35)

6. INSTALL PARKING BRAKE SHOE STRUT LH (See page BR-35)

7. **INSTALL FRONT BRAKE SHOE (See page BR-36)**
8. **CONNECT REAR BRAKE SHOE RETURN SPRING (See page BR-36)**
9. **CHECK REAR BRAKE DRUM INSTALLATION (See page BR-37)**
10. **INSTALL REAR BRAKE DRUM SUB-ASSEMBLY**
11. **ADJUST REAR BRAKE DRUM SHOE CLEARANCE (See page BR-38)**
12. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
13. **INSTALL FRONT NO. 2 FLOOR HEAT INSULATOR**
    (a) Install the heat insulator with the 3 bolts.
    Torque: 5.5 N*m (55 kgf*cm, 48 in.*lbf)
14. **INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-3)**
15. **INSTALL FRONT FLOOR PANEL BRACE**
    (a) Install the floor panel brace with the 2 bolts.
16. **TEMPORARILY TIGHTEN NO. 1 WIRE ADJUSTING NUT**
    (a) Temporarily tighten the wire adjusting nut.
17. **CHECK PARKING BRAKE LEVER TRAVEL (See page PB-1)**
18. **ADJUST PARKING BRAKE LEVER TRAVEL (See page PB-1)**
19. **INSTALL REAR CONSOLE BOX ASSEMBLY (See page IP-26)**
20. **INSTALL CONSOLE BOX CARPET**
21. **INSTALL REAR CONSOLE BOX COVER**
22. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
23. **CHECK EXHAUST GAS LEAKAGE**

PARKING BRAKE SYSTEM

PROBLEM SYMPTOMS TABLE

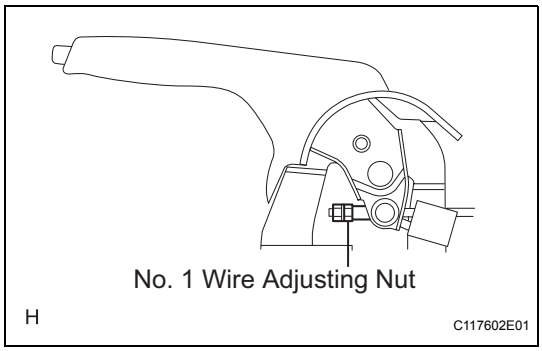
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Parking brake system

Symptom	Suspected area	See page
Parking brake drags	1. Parking brake lever travel (adjustment necessary)	PB-1
	2. Parking brake cable (stuck)	PB-4
	3. Parking brake shoe clearance (adjustment necessary)	BR-38
	4. Parking brake shoe lining (cracked or distorted)	BR-33
	5. Tension or return spring (damaged)	BR-31

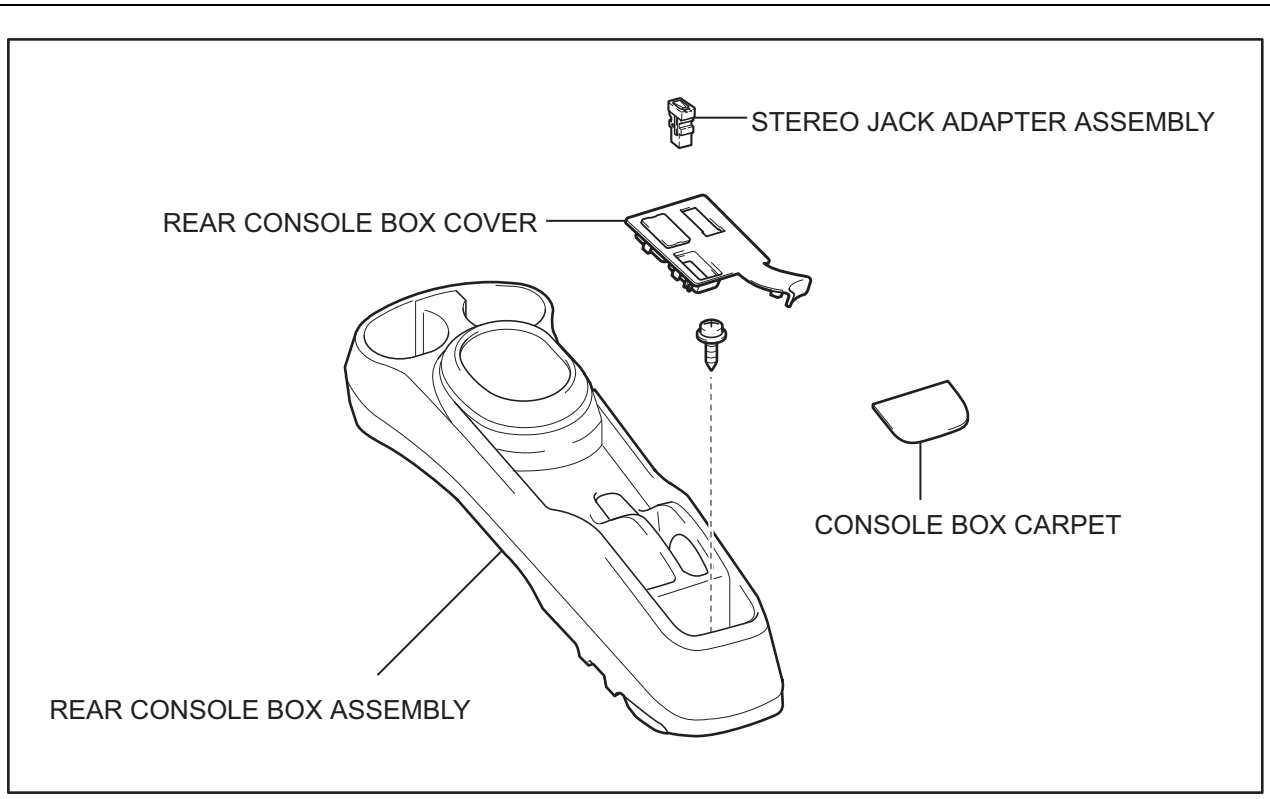
ADJUSTMENT

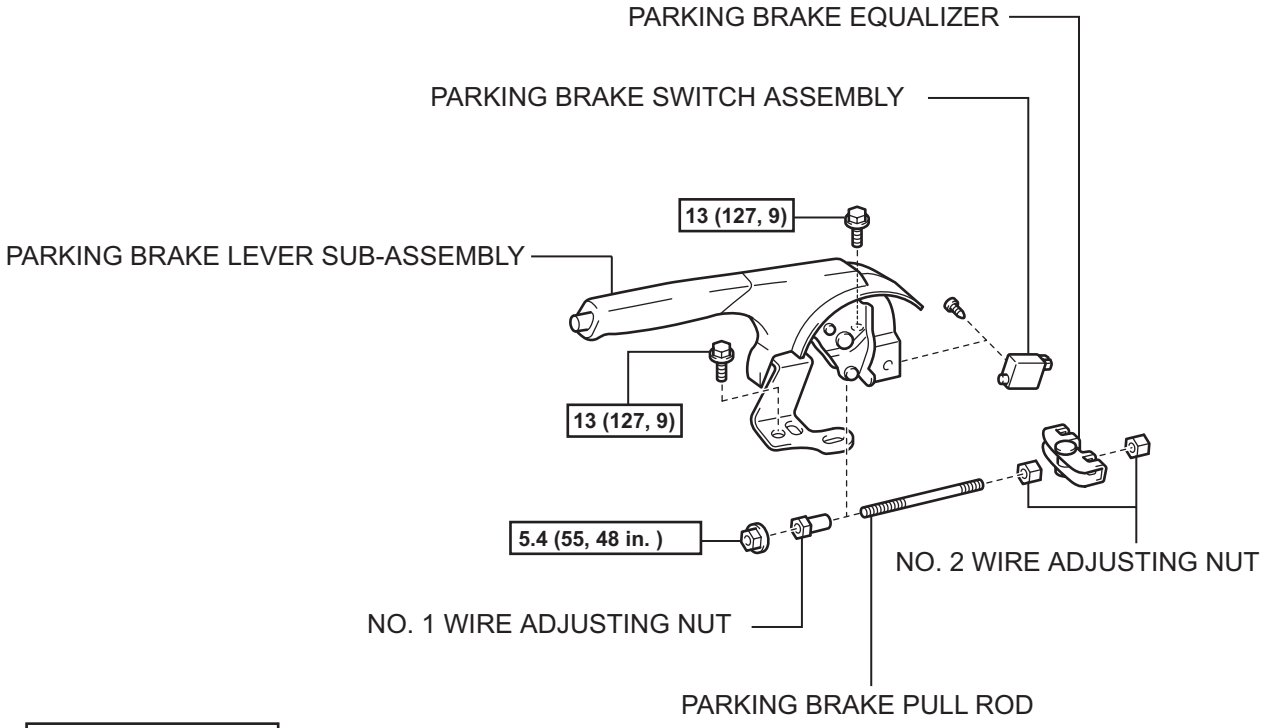
1. **REMOVE REAR WHEEL**
2. **ADJUST REAR BRAKE DRUM SHOE CLEARANCE (See page BR-38)**
3. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
4. **CHECK PARKING BRAKE LEVER TRAVEL**
   (a) Pull the lever upward with a force of approximately 196 N (20 kgf, 44.1 lbf) and count the number of clicks.
   OK:
   6 to 9 clicks
5. **REMOVE CONSOLE BOX REAR COVER**
6. **REMOVE CONSOLE BOX CARPET**
7. **REMOVE REAR CONSOLE BOX ASSEMBLY**
8. **ADJUST PARKING BRAKE LEVER TRAVEL**
   (a) Loosen the lock nut.
   (b) Turn the No. 1 wire adjusting nut until the lever travel is correct.
   (c) Tighten the lock nut.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



PARKING BRAKE LEVER

COMPONENTS





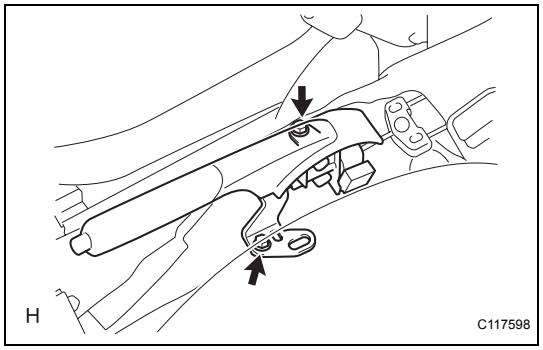
N*m (kgf*cm, ft.*lbf) : Specified torque

C122651E01

PB

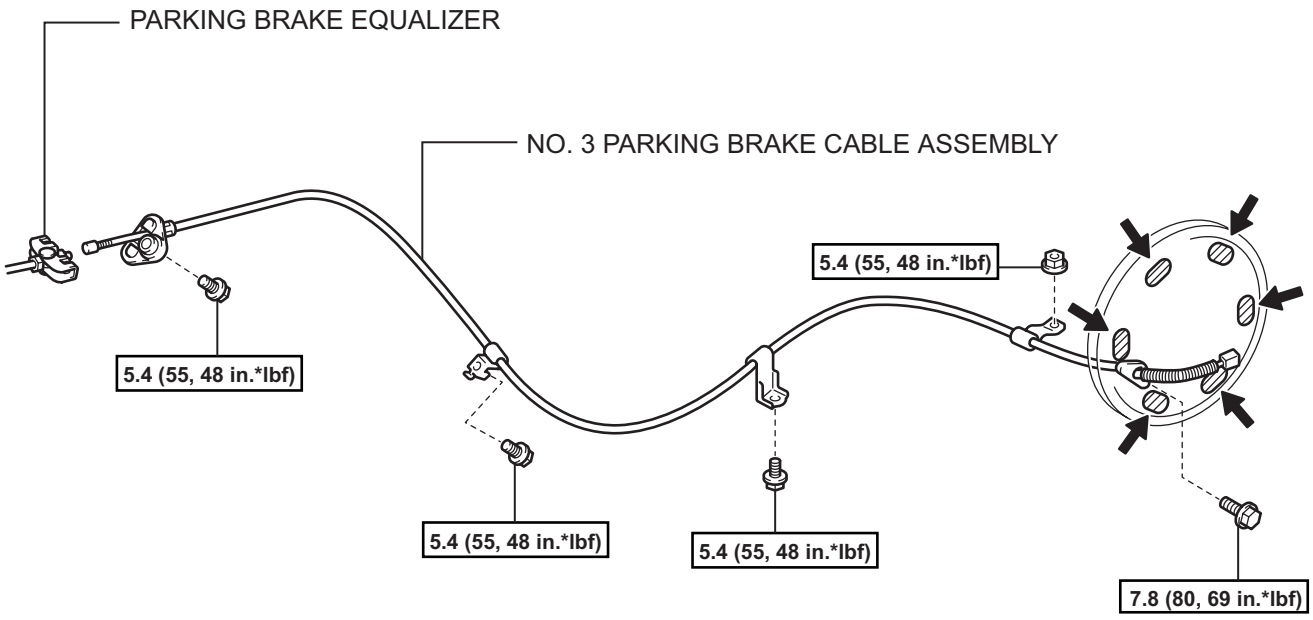
REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
2. **REMOVE STEREO JACK ADAPTER ASSEMBLY**
3. **REMOVE REAR CONSOLE BOX COVER**
4. **REMOVE CONSOLE BOX CARPET**
5. **REMOVE REAR CONSOLE BOX ASSEMBLY (See page IP-26)**
6. **REMOVE NO. 1 WIRE ADJUSTING NUT**
   (a) Remove the lock nut and wire adjusting nut.
7. **REMOVE PARKING BRAKE LEVER SUB-ASSEMBLY**
   (a) Disconnect the parking brake switch connector.
   (b) Disconnect the parking brake pull rod.
   (c) Remove the 2 bolts and parking brake lever.
8. **REMOVE PARKING BRAKE SWITCH ASSEMBLY**
   (a) Remove the screw and parking brake switch.



PARKING BRAKE CABLE

COMPONENTS

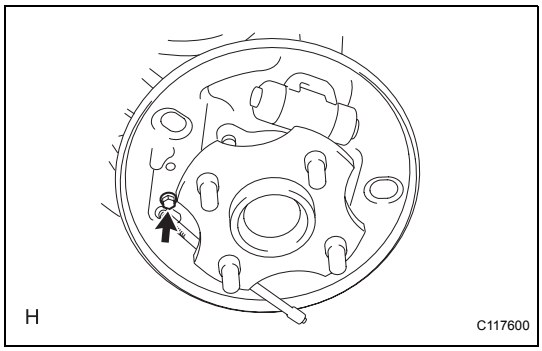


REMOVAL

HINT:

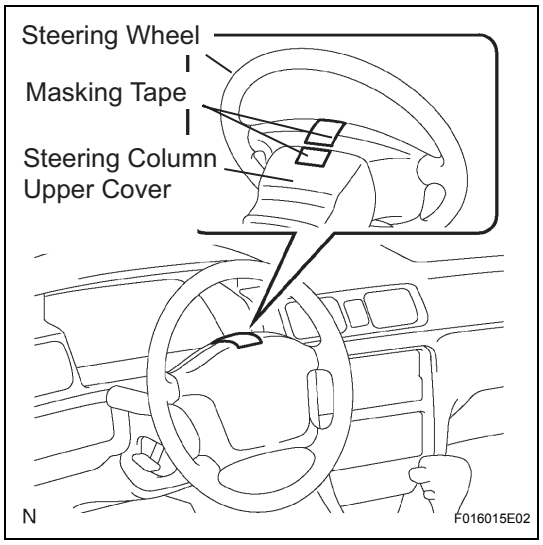
- Use the same procedures for the No. 2 parking brake cable and No. 3 parking brake cable.
- The procedures listed below are for the No. 3 parking brake cable.

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**
2. **REMOVE REAR CONSOLE BOX COVER**
3. **REMOVE CONSOLE BOX CARPET**
4. **REMOVE REAR CONSOLE BOX ASSEMBLY (See page IP-26)**
5. **REMOVE NO. 1 WIRE ADJUSTING NUT**
   (a) Remove the No. 1 wire adjusting nut.
6. **REMOVE FRONT FLOOR PANEL BRACE**
   (a) Remove the 2 bolts and floor panel brace.
7. **REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-3)**
8. **REMOVE FRONT NO. 2 FLOOR HEAT INSULATOR**
   (a) Remove the 3 bolts and heat insulator.
9. **DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY**
   (a) Remove the nut and 3 bolts, and then disconnect the parking brake cable from the body.
   (b) Disconnect the parking brake cable from the parking brake equalizer.
10. **REMOVE REAR WHEEL**
11. **REMOVE REAR BRAKE DRUM SUB-ASSEMBLY (See page BR-31)**
12. **DISCONNECT PARKING BRAKE SHOE STRUT LH (See page BR-31)**
13. **REMOVE FRONT BRAKE SHOE (See page BR-32)**
14. **REMOVE PARKING BRAKE SHOE STRUT LH (See page BR-32)**
15. **REMOVE REAR BRAKE AUTOMATIC ADJUST LEVER LH (See page BR-32)**
16. **REMOVE REAR BRAKE SHOE (See page BR-32)**



17. REMOVE NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Remove the bolt and then disconnect the parking brake cable from the backing plate.

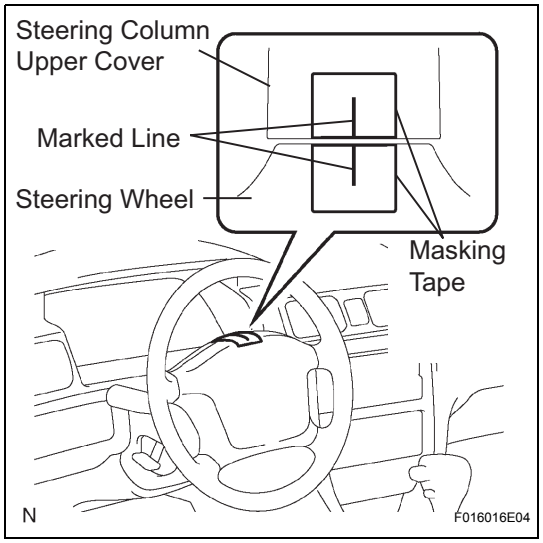


REPAIR

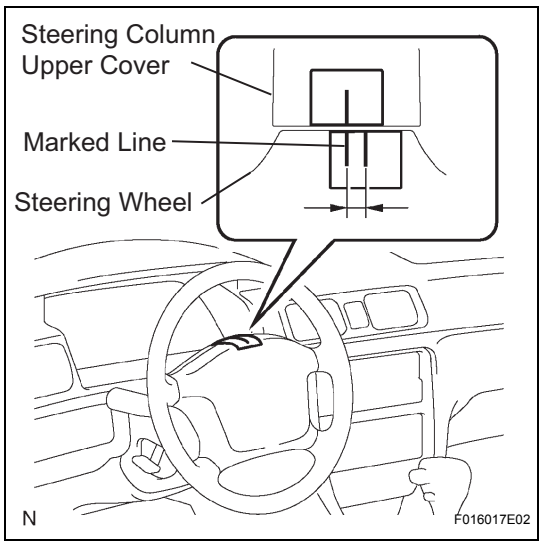
1. INSPECT STEERING POSITION

(a) Apply masking tape on the top center of the steering wheel and steering column cover upper.

(b) Drive the vehicle in a straight line for 100 m (3.28 ft.) at a constant speed of 56 km/h (35 mph), and hold the steering wheel to maintain the course.



(c) Draw a line on the masking tape as shown in the illustration.

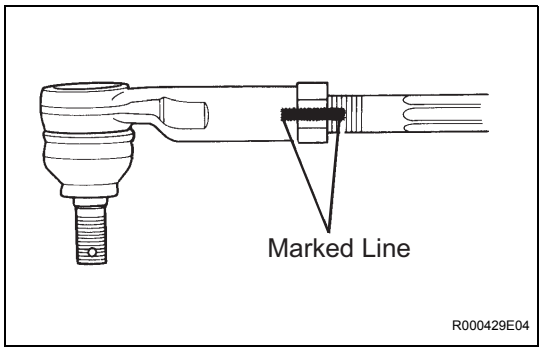


(d) Rotate the steering wheel to the center position.
HINT:
Locate the center position by looking at: 1) the upper surface of the steering wheel, 2) the cover upper, and 3) the horizontal line of the "SRS Airbag" symbol imprinted on the steering pad.

(e) Draw a new line on the masking tape of the steering wheel as shown in the illustration.

(f) Measure the distance between the 2 lines on the masking tape of the steering wheel.

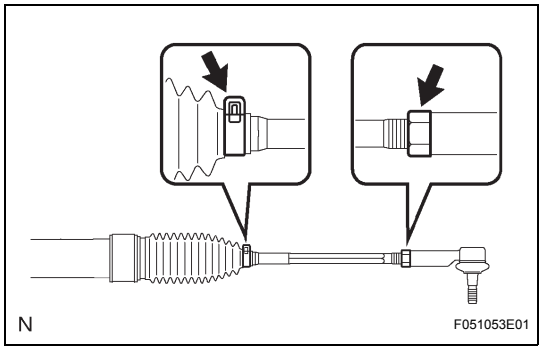
(g) Calculate the measured distance in terms of steering angle.
Reference:
1 mm (0.004 in.) = 1°
HINT:
Make a note of the steering angle.



2. ADJUST STEERING ANGLE

(a) Draw a line on the RH and LH tie rod and rack ends respectively, where it can be easily seen.

(b) Using a paper gauge, measure the distance from the RH and LH tie rod ends to the rack end screws.
HINT:
- Measure both the RH and LH sides.
- Make a note of the measured values.



(c) Remove the RH and LH boot clips from the rack boots.

(d) Loosen the RH and LH lock nuts.

(e) Turn the RH and LH rack ends equally in different directions according to the steering angle.
Reference:
One 360° turn of rack end (1.5 mm (0.059 in.) horizontal movement) is equal to 12° of steering angle.

(f) Tighten the RH and LH lock nuts.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
NOTICE:
Make sure that the difference in length between the RH and LH tie rod ends and rack end screws is within 1.5 mm (0.059 in.).

(g) Install the RH and LH boot clips.

REMOVAL

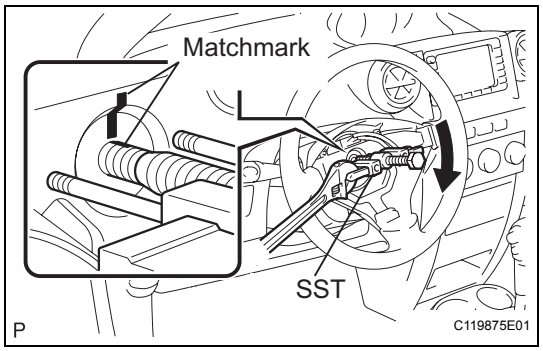
1. **PRECAUTION**
   (a) Precaution (see page RS-1).

2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

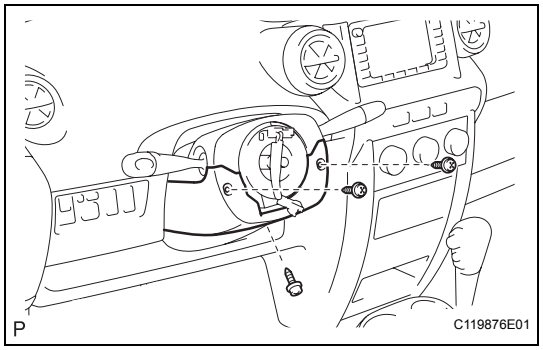
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**

4. **REMOVE STEERING PAD ASSEMBLY (See page RS-288)**

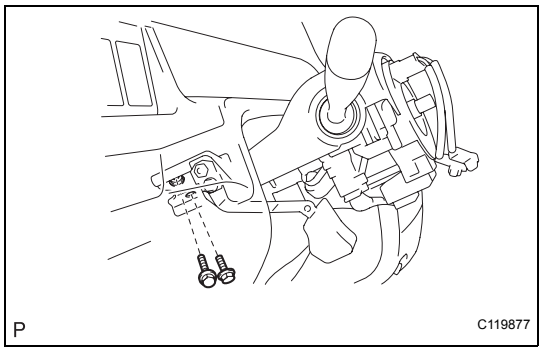
5. **REMOVE STEERING WHEEL ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the steering wheel set nut.
   (c) Put matchmarks on the steering wheel and main shaft.
   (d) Using SST, remove the steering wheel.
   SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

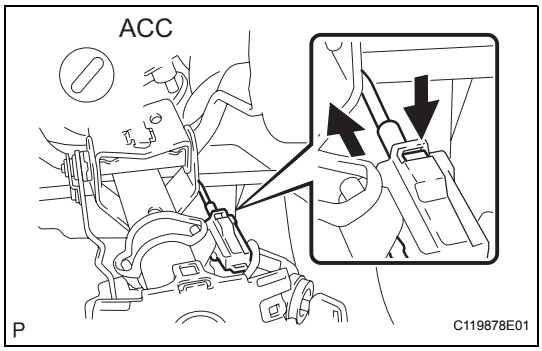


6. **REMOVE STEERING COLUMN COVER**
   (a) Remove the 3 screws and column cover lower.



   (b) Remove the 2 bolts and column cover upper.





7. DISCONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY (for Automatic Transaxle)

(a) With the key in the ACC position, detach the claw and pull out the floor shift parking lock cable.

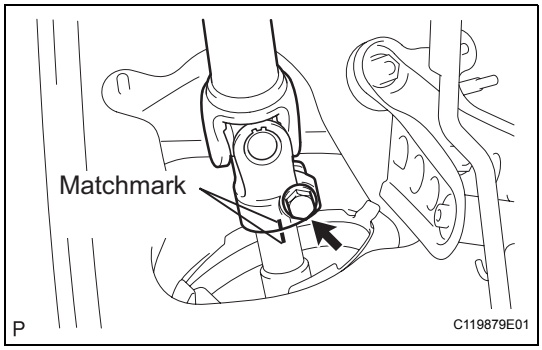
8. REMOVE SPIRAL CABLE SUB-ASSEMBLY (See page RS-298)

9. REMOVE HEADLIGHT DIMMER SWITCH ASSEMBLY (See page LI-31)

10. REMOVE WINDSHIELD WIPER SWITCH ASSEMBLY (See page WW-21)

11. REMOVE STEERING COLUMN HOLE COVER PLATE

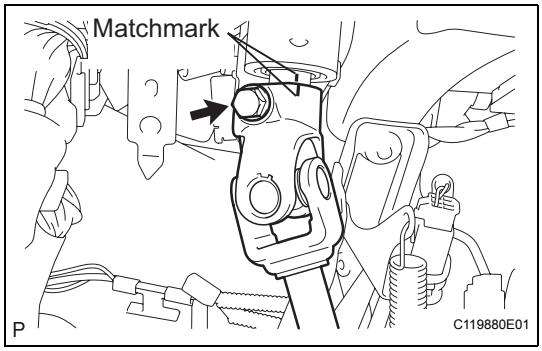
(a) Remove the clip and column hole cover plate.



12. DISCONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Put matchmarks on the intermediate shaft and intermediate shaft.

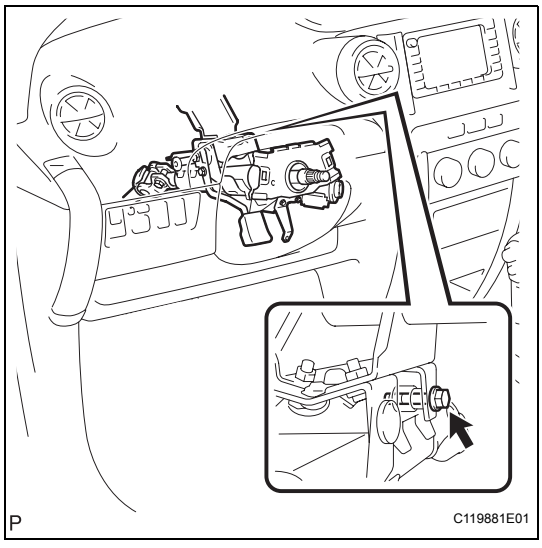
(b) Remove the bolt and intermediate shaft.



13. REMOVE STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Put matchmarks on the main shaft and intermediate shaft.

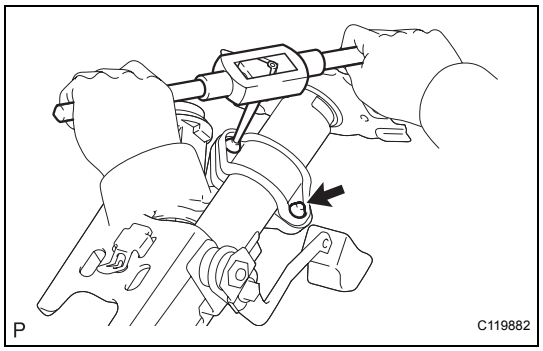
(b) Remove the bolt and intermediate shaft.



14. REMOVE STEERING COLUMN ASSEMBLY

(a) Disconnect the connectors and wire harness clamps from the steering column.

(b) Remove the bolt and steering column.



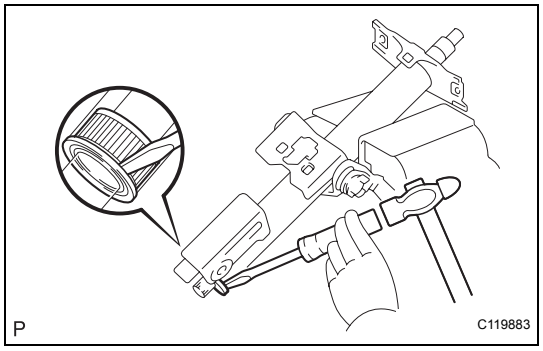
DISASSEMBLY

1. REMOVE STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY

(a) Using a centering punch, mark the center of the 2 tapered-head bolts.

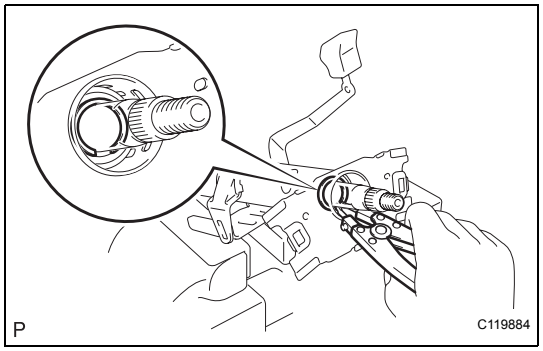
(b) Using a 3 to 4 mm (0.12 to 0.16 in.) drill, drill a hole in the 2 bolt heads.

(c) Using a screw extractor, remove the 2 bolts, steering column clamp and steering column upper with switch bracket.



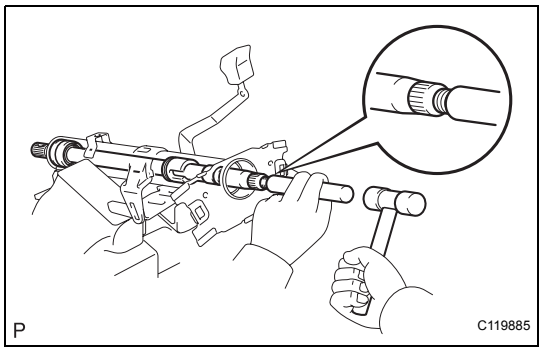
2. REMOVE STEERING MAIN SHAFT BUSH

Using a screwdriver and hammer, tap out the steering main shaft bush.

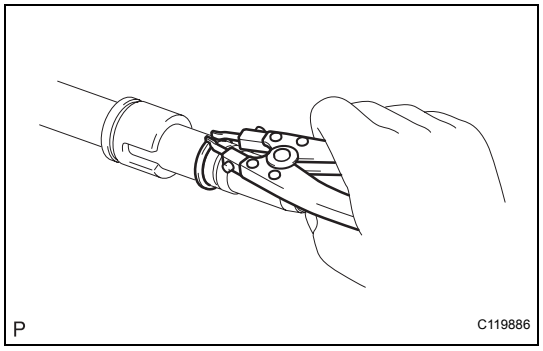


3. REMOVE STEERING MAIN SHAFT ASSEMBLY

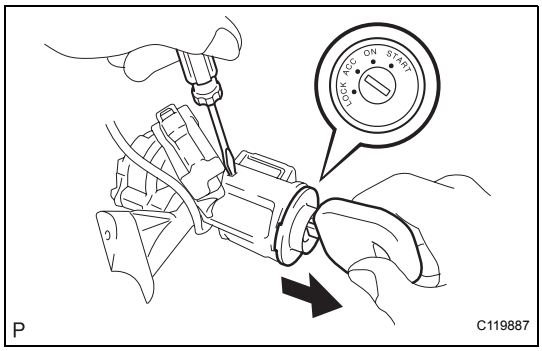
(a) Using a snap ring expander, remove the snap ring on the upper side.



(b) Using an extension bar and hammer, tap out the steering main shaft.



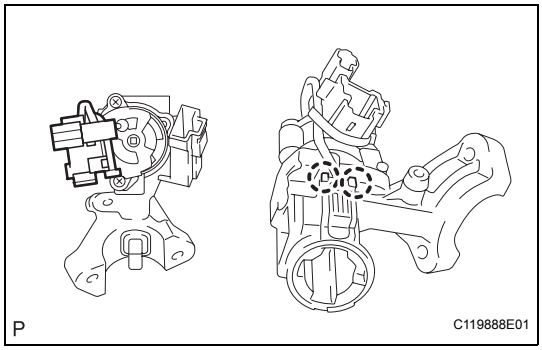
(c) Using a snap ring expander, remove the snap ring on the lower side.



4. REMOVE IGNITION SWITCH LOCK CYLINDER ASSEMBLY

(a) Place the ignition switch lock cylinder in the ACC position.

(b) Push down the stop pin with a screwdriver, and pull out the cylinder.



5. REMOVE UNLOCK WARNING SWITCH ASSEMBLY

(a) Disconnect the unlock warning switch connector from the ignition switch.

(b) Remove the unlock warning switch.

6. REMOVE IGNITION SWITCH ASSEMBLY

(a) Remove the 2 screws and ignition or starter switch from the steering column bracket.

STEERING SYSTEM

PRECAUTION

1. HANDLING PRECAUTIONS FOR STEERING SYSTEM

(a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in a driving hazard.

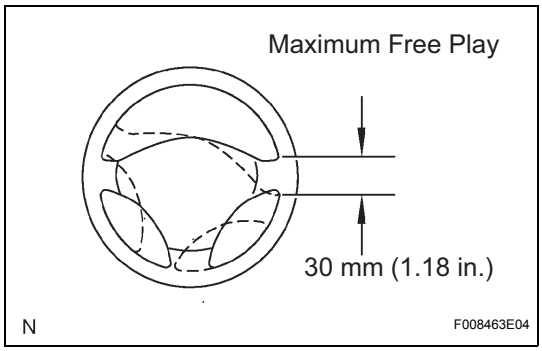
2. HANDLING PRECAUTIONS FOR SRS

(a) The vehicle is equipped with a Supplemental Restraint System (SRS) which includes a driver side airbag. Failure to carry out service procedures in the correct sequence may unexpectedly deploy the SRS and cause serious injuries. Furthermore, if a mistake is made in servicing the SRS, it may fail to operate when required.
Before servicing (including installation, removal, inspection or replacement of parts), read the SRS section's "Precaution" (see page RS-1).

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Symptom	Suspected area	See page
Hard steering	1. Tires (improperly inflated)	TW-3
	2. Power steering fluid level (low)	PS-2
	3. Drive belt (loose)	EM-6
	4. Front wheel alignment (incorrect)	SP-2
	5. Steering system joints (worn)	-
	6. Suspension arm ball joints (worn) ATM	SP-17
	7. Suspension arm ball joints (worn) MTM	SP-21
	8. Steering column (binding)	-
	9. Power steering vane pump	PS-10
	10. Power steering gear	PS-25
Poor return	1. Tires (improperly inflated)	TW-3
	2. Front wheel alignment (incorrect)	SP-2
	3. Steering column (binding)	-
	4. Power steering gear	PS-25
Excessive play	1. Steering system joints (worn)	-
	2. Suspension arm ball joints (worn) ATM	SP-17
	3. Suspension arm ball joints (worn) MTM	SP-21
	4. Front wheel bearing (worn)	AH-6
	5. Power steering gear	PS-25
Abnormal noise	1. Power steering fluid level (low)	PS-2
	2. Steering system joints	-
	3. Power steering vane pump	PS-10
	4. Power steering gear	PS-25



ON-VEHICLE INSPECTION

1. CHECK STEERING WHEEL FREE PLAY

(a) Stop the vehicle with the tires pointing straight ahead. Position the steering wheel in the center position

(b) Turn the steering wheel gently right and left, and check the steering wheel free play.

Maximum free play:

30 mm (1.18 in.)

REASSEMBLY

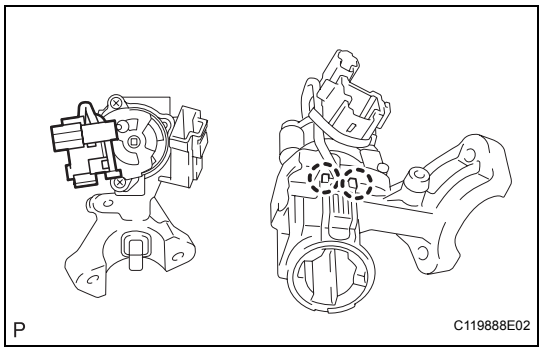
1. INSTALL IGNITION SWITCH ASSEMBLY

(a) Install the ignition switch to the steering column bracket with the 2 screws.

2. INSTALL UNLOCK WARNING SWITCH ASSEMBLY

(a) Install the unlock warning switch.

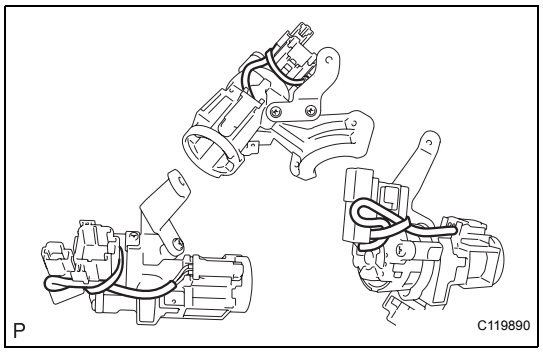
(b) Connect the unlock warning switch connector to the ignition switch.



(c) Using a new clamp, fix the wire harness of the unlock warning switch to the steering column bracket upper as shown in the illustration.

NOTICE:

When fixing the wire harness, do not tighten the clamp too hard. It could damage the wire harness inside.



3. INSTALL IGNITION SWITCH LOCK CYLINDER ASSEMBLY

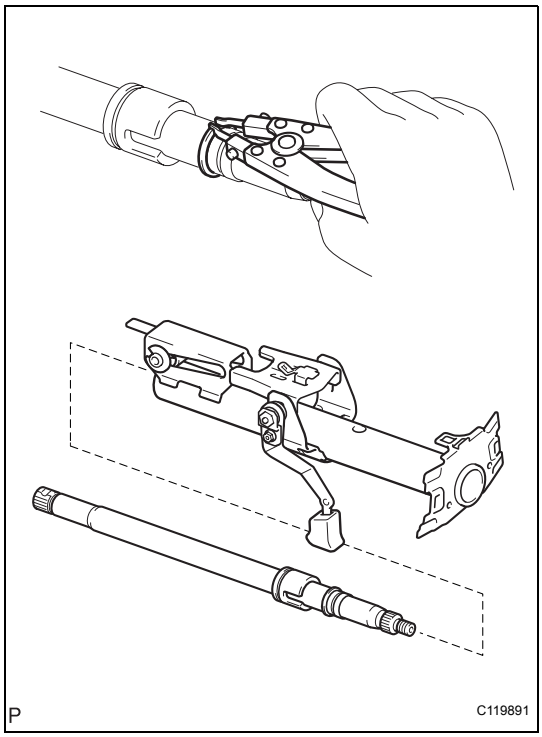
(a) Make sure that the ignition switch lock cylinder is in the ACC position.

(b) Install the ignition switch lock cylinder.

4. INSPECT STEERING LOCK OPERATION

(a) Check that the steering lock mechanism is activated when the key is removed.

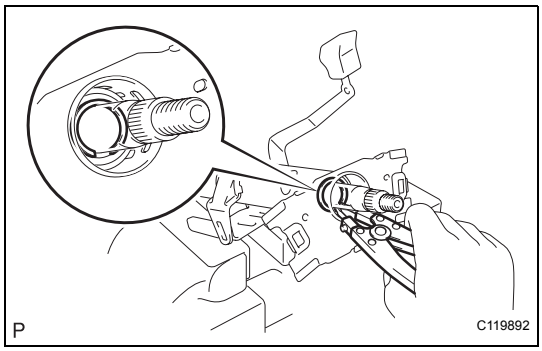
(b) Check that the steering lock mechanism is deactivated when the key is inserted and turned to the ACC position.



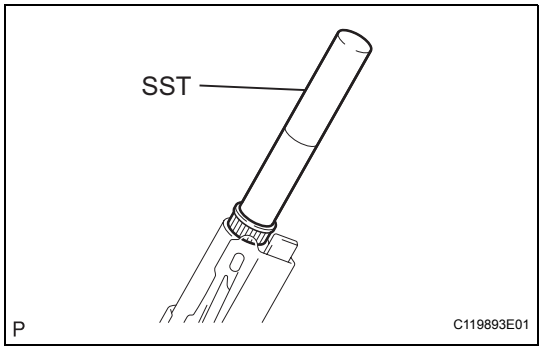
5. INSTALL STEERING MAIN SHAFT ASSEMBLY

(a) Using a snap ring expander, install a new snap ring to the lower side.

(b) Install the steering main shaft.



(c) Using a snap ring expander, install a new snap ring to the upper side.

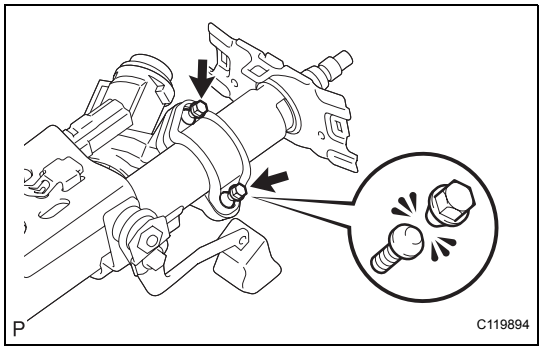


6. INSTALL STEERING MAIN SHAFT BUSH

(a) Coat a new steering main shaft bush with molybdenum disulfide lithium base grease.

(b) Using SST and a hammer, tap in the steering main shaft bush.

SST 09612-22011



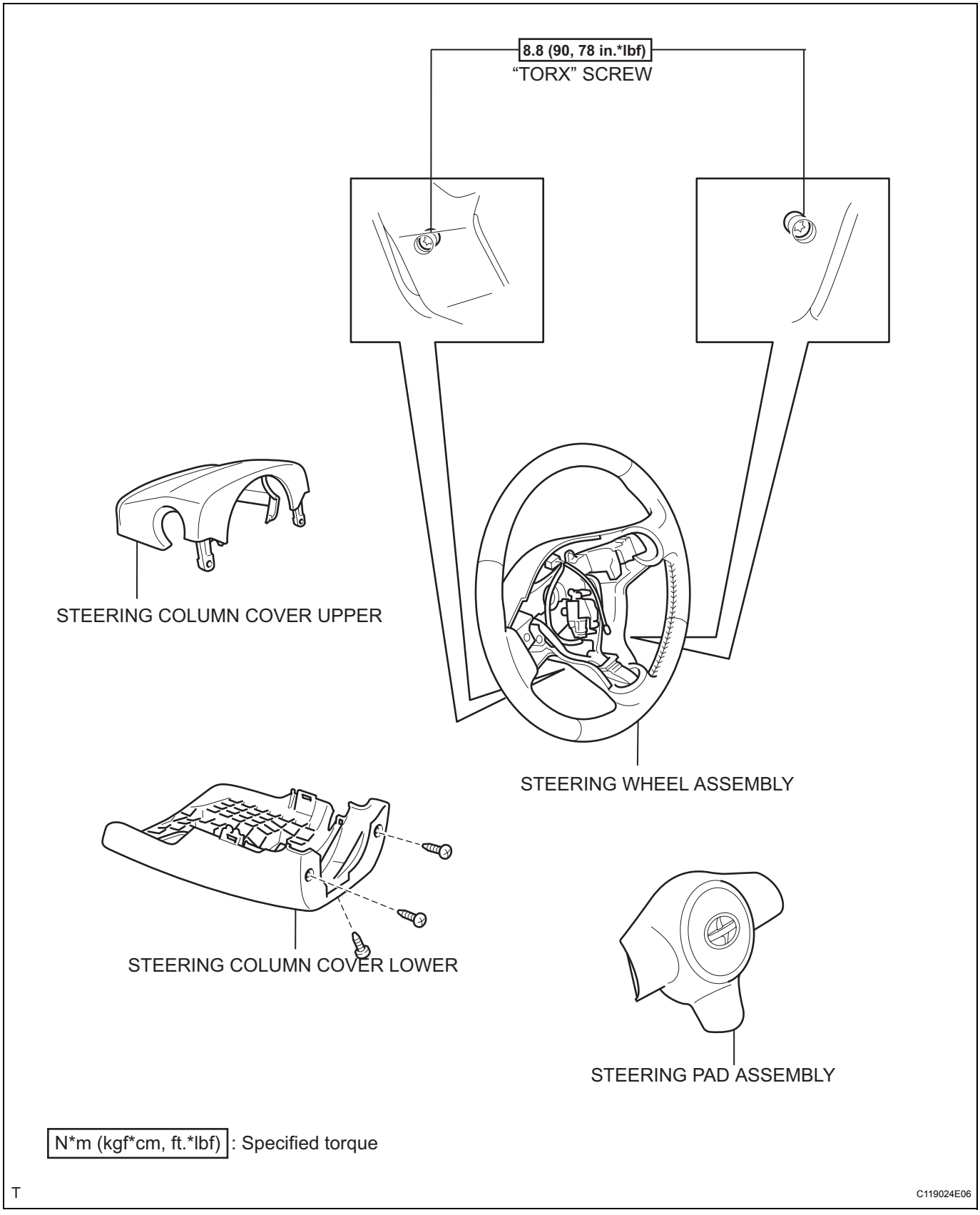
7. INSTALL STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY

(a) Temporarily install the steering column upper with switch bracket and steering column clamp upper with 2 new steering lock set bolts.

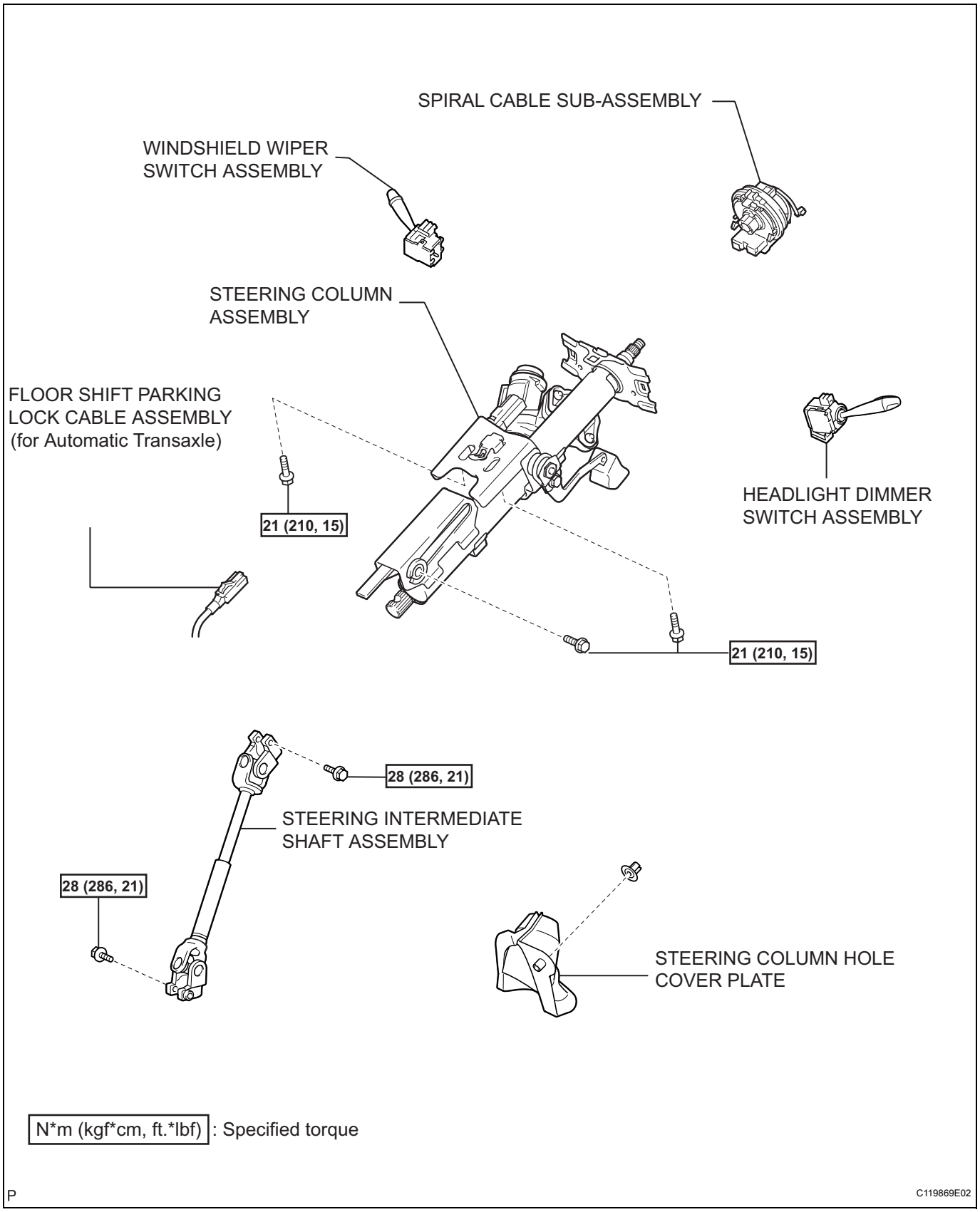
(b) Tighten the 2 steering lock set bolts until the bolt heads break off.

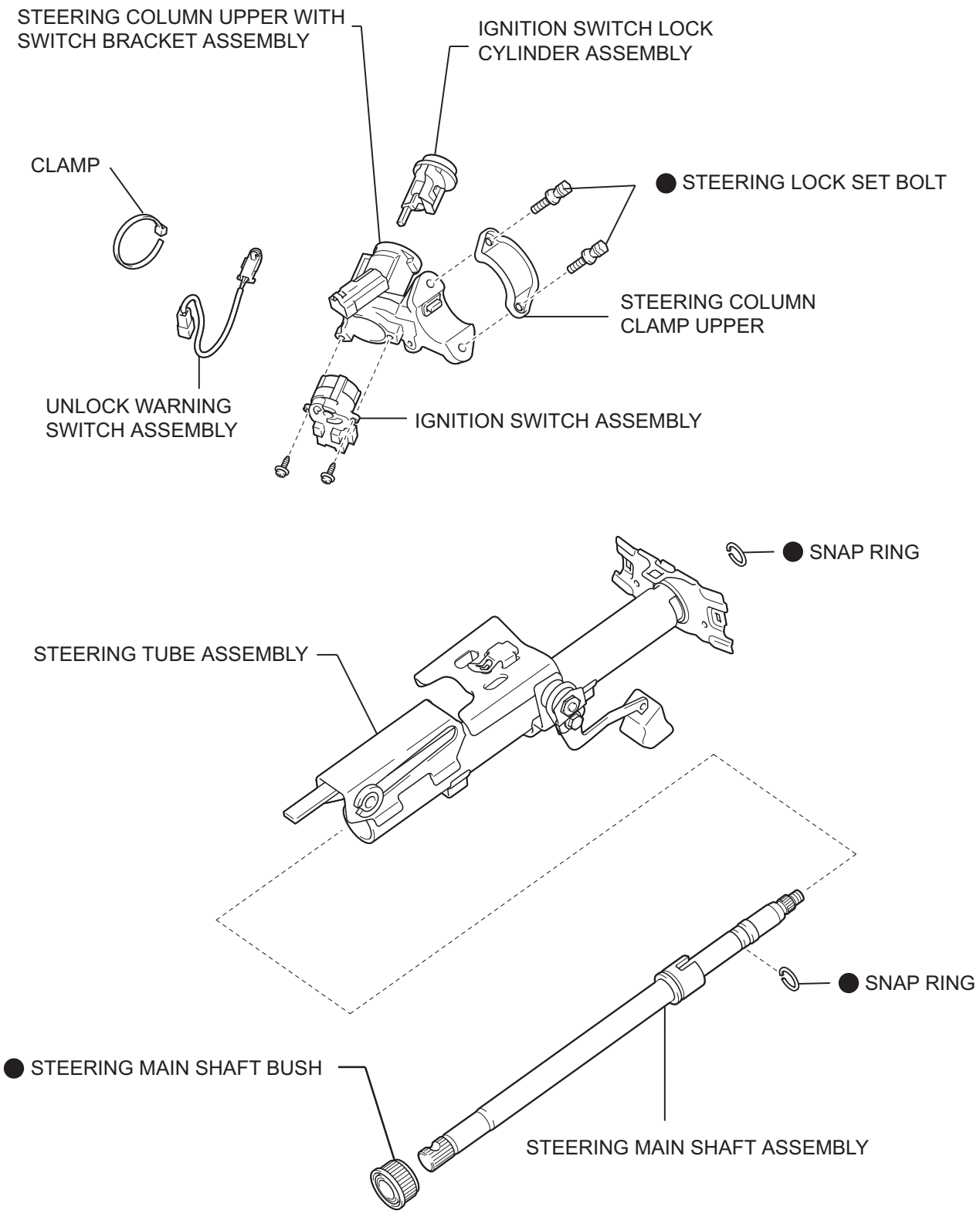
STEERING COLUMN ASSEMBLY

COMPONENTS



SR


SPIRAL CABLE SUB-ASSEMBLY
WINDSHIELD WIPER SWITCH ASSEMBLY
STEERING COLUMN ASSEMBLY
FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY (for Automatic Transaxle)
21 (210, 15)
HEADLIGHT DIMMER SWITCH ASSEMBLY
21 (210, 15)
28 (286, 21)
STEERING INTERMEDIATE SHAFT ASSEMBLY
28 (286, 21)
STEERING COLUMN HOLE COVER PLATE
N*m (kgf*cm, ft.*lbf) : Specified torque
P
C119869E02

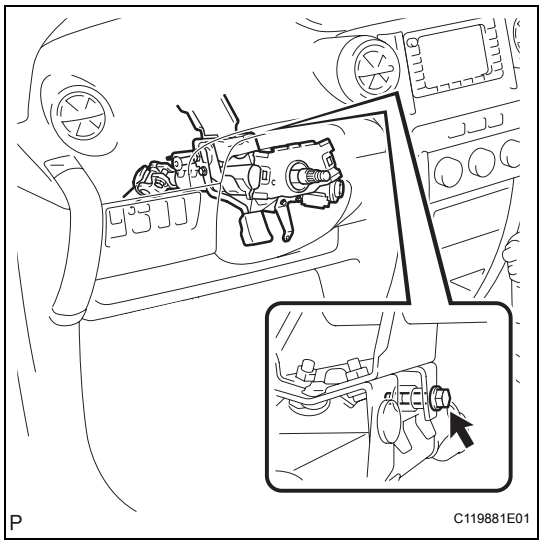


SR

● Non-reusable part

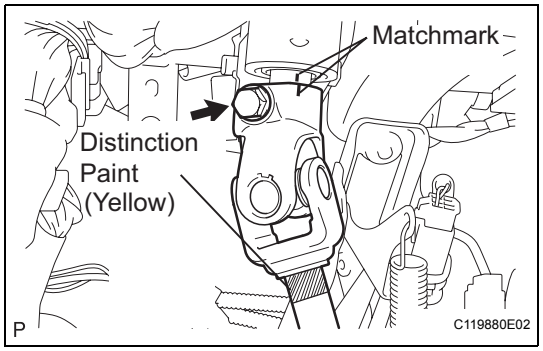
P

C119870E01

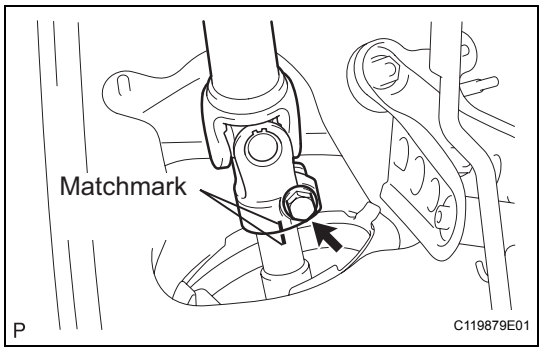


INSTALLATION

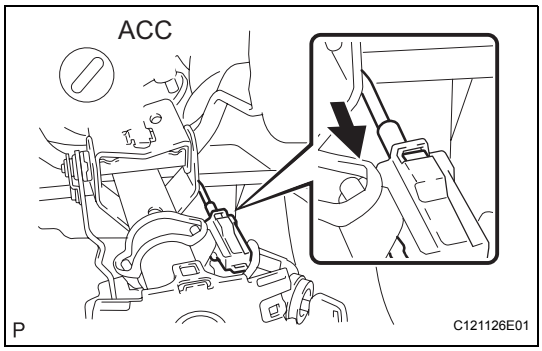
1. **INSTALL STEERING COLUMN ASSEMBLY**
   (a) Install the steering column from the front side, and install the steering column clamp to the instrumental reinforcement.
   (b) Install the steering column with the bolt.
   Torque: 21 N*m (210 kgf*cm, 15 ft.*lbf)
   (c) Connect the connectors and wire harness clamps.



2. **INSTALL STEERING INTERMEDIATE SHAFT ASSEMBLY**
   (a) Align the matchmarks on the main shaft and steering intermediate shaft.
   (b) Install the steering intermediate shaft with the bolt.
   NOTICE:
   Install the intermediate shaft with the distinction paint facing the steering column side.

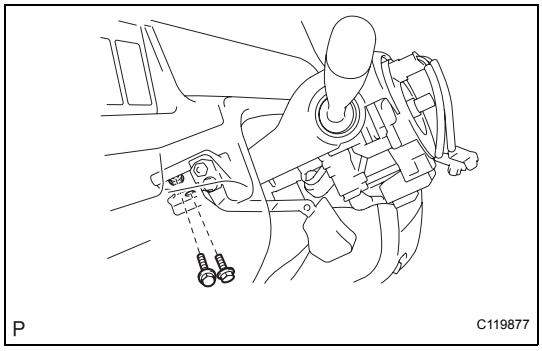


3. **CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY**
   (a) Align the matchmarks on the intermediate and intermediate shaft.
   (b) Connect the intermediate shaft with the bolt.
   Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)
4. **INSTALL STEERING COLUMN HOLE COVER PLATE**
   (a) Install the column hole cover plate with the clip.
5. **INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY (See page WW-22)**
6. **INSTALL HEADLIGHT DIMMER SWITCH ASSEMBLY (See page LI-32)**
7. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
8. **INSTALL SPIRAL CABLE SUB-ASSEMBLY (See page RS-298)**

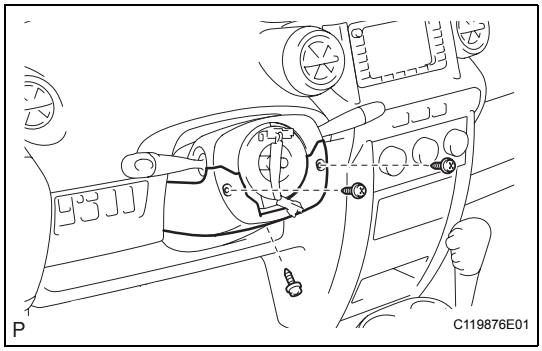


9. **CONNECT FLOOR SHIFT PARKING LOCK CABLE ASSEMBLY (for Automatic Transaxle)**
   (a) With the key in the ACC position, connect the floor shift parking lock cable.

10. **CHECK KEY INTERLOCK OPERATION**



11. **INSTALL STEERING COLUMN COVER**
   (a) Install the column cover upper.
   (b) Install the 2 bolts.
   Torque: 21 N*m (210 kgf*cm, 15 ft.*lbf)



   (c) Install the column cover lower with the 3 screws.

12. **INSTALL SPIRAL CABLE SUB-ASSEMBLY (See page RS-298)**

13. **INSTALL STEERING WHEEL ASSEMBLY**
   (a) Align the matchmarks on the steering wheel and steering main shaft.
   (b) Install the steering wheel with the set nut.
   Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
   (c) Connect the connector.

14. **INSTALL STEERING PAD ASSEMBLY (See page RS-288)**

15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

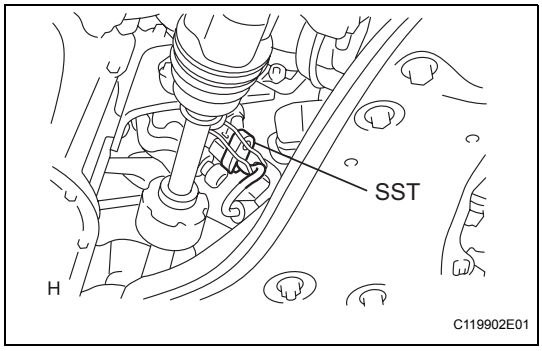
16. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).

17. **INSPECT STEERING PAD ASSEMBLY**
   (a) Inspect the steering pad (see page RS-287).

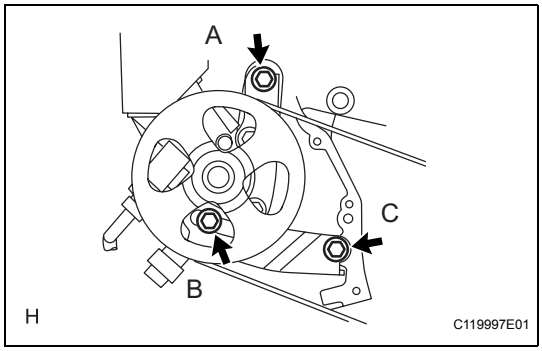
18. **INSPECT SRS WARNING LIGHT**
   (a) Inspect the SRS warning light (see page RS-28).

REMOVAL

1. **REMOVE FRONT WIPER ARM LH (See page WW-7)**
2. **REMOVE FRONT WIPER ARM RH (See page WW-7)**
3. **REMOVE HOOD TO COWL TOP SEAL (See page WW-7)**
4. **REMOVE COWL TOP VENTILATOR LOUVER LH (See page WW-7)**
5. **REMOVE COWL TOP VENTILATOR LOUVER RH (See page WW-7)**
6. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY (See page WW-8)**
7. **REMOVE COWL PANEL SUB-ASSEMBLY**
8. **REMOVE VANE PUMP OIL RESERVOIR COVER**
9. **DRAIN POWER STEERING FLUID**
10. **REMOVE FRONT WHEEL RH**
11. **REMOVE ENGINE UNDER COVER RH**
12. **DISCONNECT PRESSURE FEED TUBE ASSEMBLY**
    (a) Using SST, disconnect the pressure feed tube from the vane pump.
    SST 09023-12701
    (b) Remove the clip and disconnect the return hose.
    NOTICE:
    Take care not to spill fluid on the V belt.
    (c) Disconnect the oil pressure sensor connector.

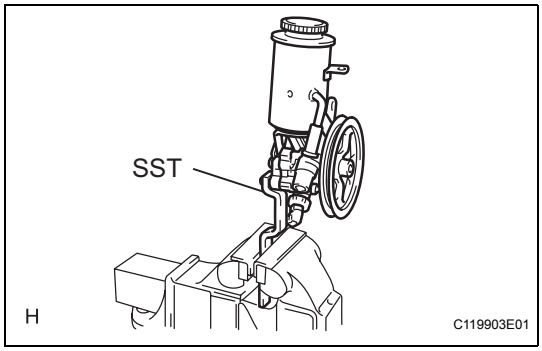


13. **REMOVE REAR VANE PUMP STAY**
    (a) Remove the bolt, stay and heat insulator.
14. **REMOVE VANE PUMP ASSEMBLY**
    (a) Remove bolts B and C, and the adjusting strut.
    (b) Loosen bolt A sufficiently so that the vane pump can be removed.
    HINT:
    Bolt A cannot be removed.



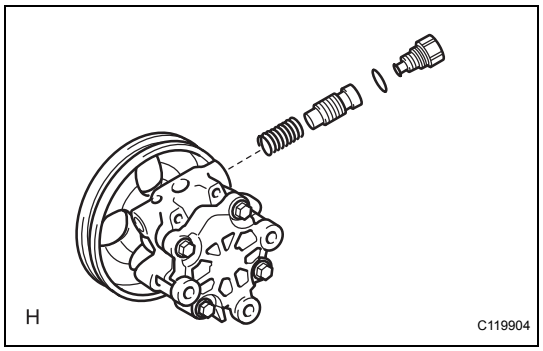
DISASSEMBLY

1. **FIX VANE PUMP ASSEMBLY**
    (a) Using SST, secure the vane pump in a vise.
    SST 09630-00014 (09631-00132)
2. **REMOVE VANE PUMP OIL RESERVOIR CAP SUB-ASSEMBLY**
3. **REMOVE VANE PUMP OIL RESERVOIR ASSEMBLY**
    (a) Remove the 3 bolts and oil reservoir.
    (b) Remove the O-ring from the oil reservoir.



4. REMOVE FRONT PUMP BRACKET

(a) Remove the 2 bolts, front bracket and rear bracket.

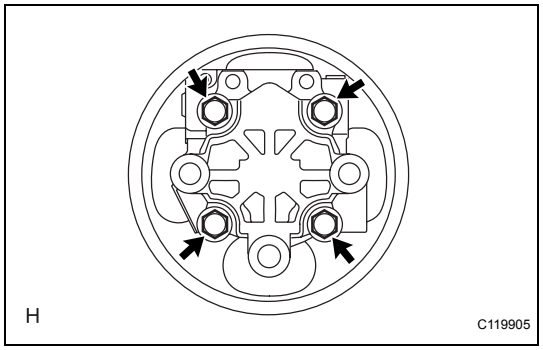


5. REMOVE FLOW CONTROL VALVE

(a) Remove the pressure port union.
(b) Remove the O-ring from the pressure port union.
(c) Remove the flow control valve and compression spring.

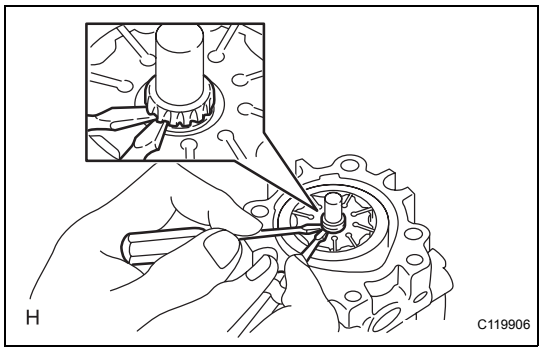
6. REMOVE POWER STEERING OIL PRESSURE SENSOR

(a) Remove the oil pressure sensor from the front housing.



7. REMOVE REAR VANE PUMP HOUSING

(a) Remove the 4 bolts and rear housing from the front housing.
(b) Remove the O-ring from the rear housing.



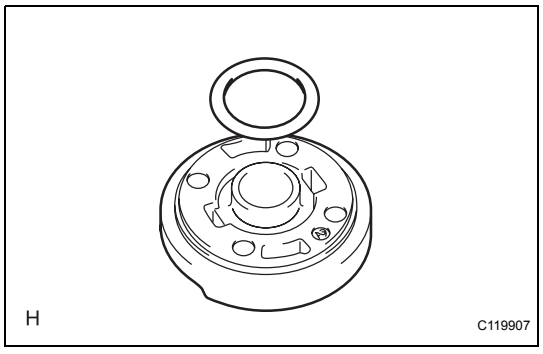
8. REMOVE SHAFT SUB-ASSEMBLY WITH PULLEY

(a) Using 2 screwdrivers, remove the snap ring from the shaft.
(b) Remove the shaft.

9. REMOVE VANE PUMP ROTOR

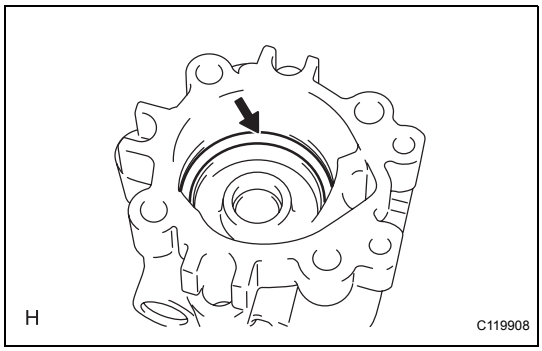
(a) Remove the 10 vane pump plates.
(b) Remove the vane pump rotor.

10. REMOVE VANE PUMP CAM RING

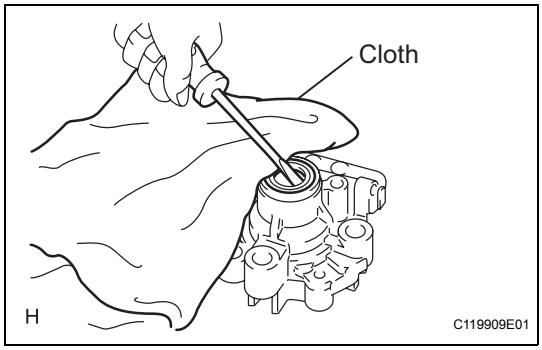


11. REMOVE FRONT VANE PUMP SIDE PLATE

(a) Remove the side plate from the front housing.
(b) Remove the O-ring from the side plate.



(c) Remove the O-ring from the front housing.



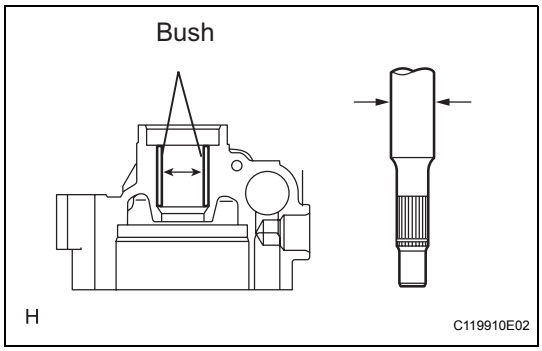
12. REMOVE VANE PUMP HOUSING OIL SEAL

(a) Using a screwdriver and cloth, remove the housing oil seal.

NOTICE:

Be careful not to damage the housing front.

INSPECTION



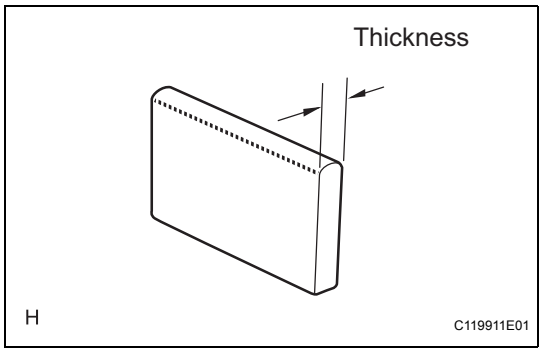
1. INSPECT FRONT VANE PUMP SHAFT AND BUSH IN HOUSING

(a) Using a micrometer and caliper gauge, measure the oil clearance.

Maximum clearance:

0.07 mm (0.0028 in.) or less

If the clearance is greater than the maximum, replace the vane pump.

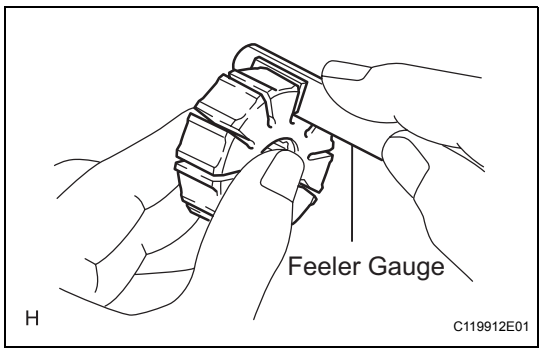


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATES

(a) Using a micrometer, measure the thickness of the vane pump plates.

Standard thickness:

1.405 to 1.411 mm (0.05531 to 0.05555 in.)

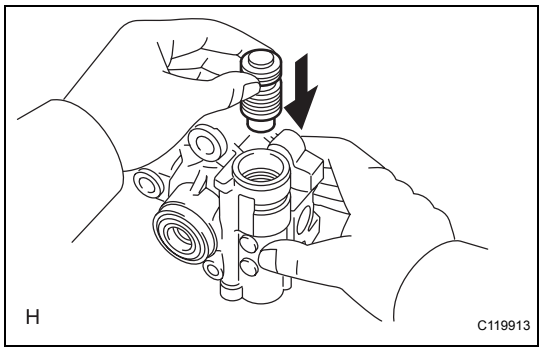


(b) Using a feeler gauge, measure the clearance between a side face of the vane pump rotor groove and vane plates.

Maximum clearance:

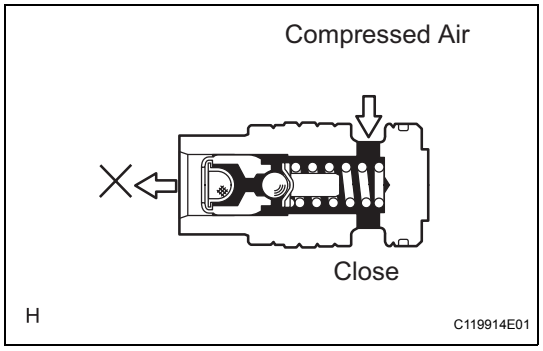
0.03 mm (0.0012 in.)

If the clearance exceeds the maximum, replace the vane pump.

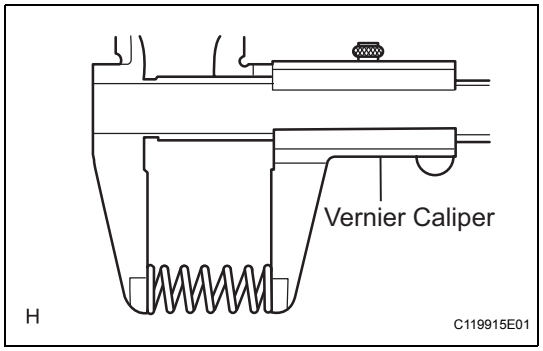


3. INSPECT FLOW CONTROL VALVE

(a) Coat the flow control valve with power steering fluid and check that it falls smoothly into the flow control valve hole under its own weight.
If necessary, replace the vane pump.



(b) Check the flow control valve for leakage. Close one of the holes and apply compressed air of 392 to 490 kPa (4 to 5kgf/cm^2, 57 to 71 psi) into the opposite side hole, and confirm that air does not come out from the end holes.
If necessary, replace the vane pump.

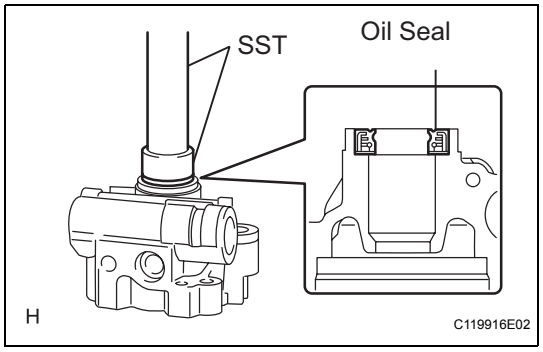


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the compression spring.
Minimum free length:
29.2 mm (1.150 in.)
If the length is less than the minimum, replace the vane pump.

5. INSPECT PRESSURE PORT UNION

If the union seat in the pressure port union is severely damaged, it may cause fluid leakage. In that case, replace the vane pump assembly.

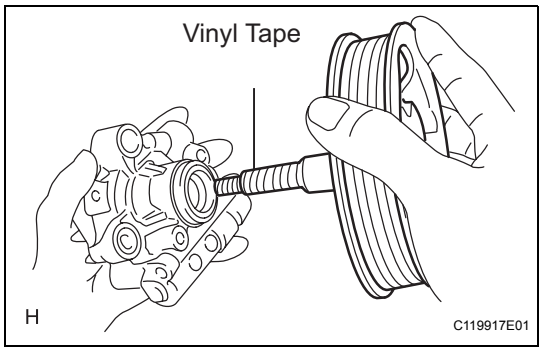


REASSEMBLY

1. INSTALL VANE PUMP HOUSING OIL SEAL

(a) Coat a new housing oil seal lip with power steering fluid.

(b) Using SST and a press, press in a new housing oil seal.
SST 09950-60010 (09951-00280), 09950-70010 (09951-07100)
NOTICE:
Make sure that the oil seal is installed correctly.



2. INSTALL SHAFT SUB-ASSEMBLY WITH PULLEY

(a) Coat the inside bushing surface of the front housing with power steering fluid.

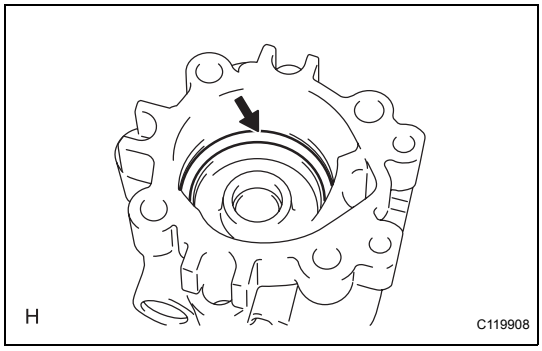
(b) Gradually insert the shaft with pulley.

NOTICE:

Be careful not to damage the oil seal lip.

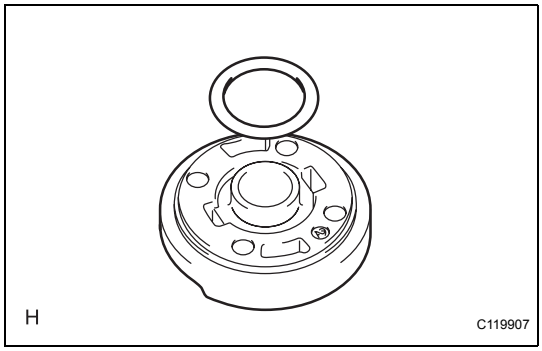
HINT:

Wrap the shaft with vinyl tape before inserting.

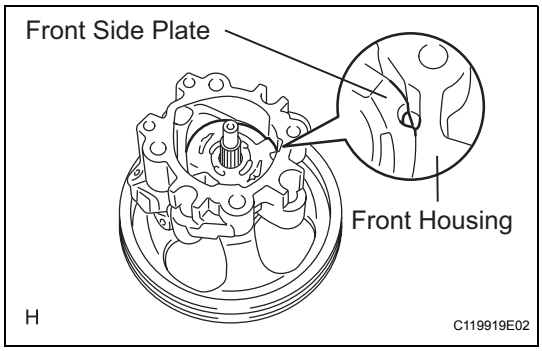


3. INSTALL FRONT VANE PUMP SIDE PLATE

(a) Coat a new O-ring with power steering fluid and install it to the front housing.



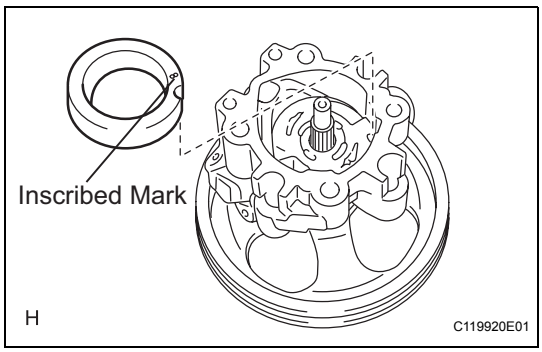
(b) Coat a new O-ring with power steering fluid and install it to the front side plate.



(c) Align the dent of the front side plate with that of the front housing and install them.

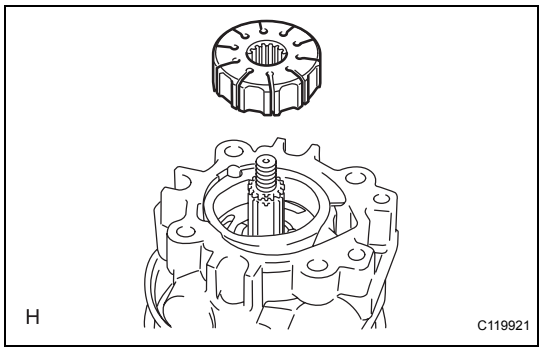
NOTICE:

Make sure that the front side plate is installed correctly.



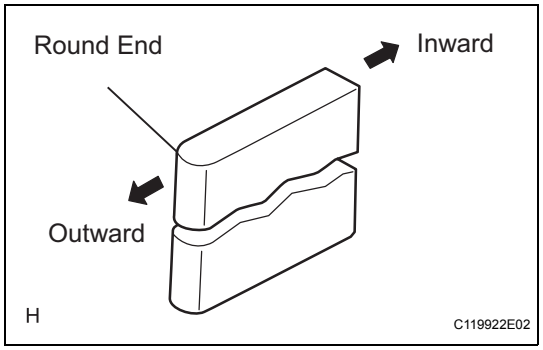
4. INSTALL VANE PUMP CAM RING

(a) Align the dent of the cam ring with that of the front side plate, and install the cam ring with the inscribed mark facing upward.



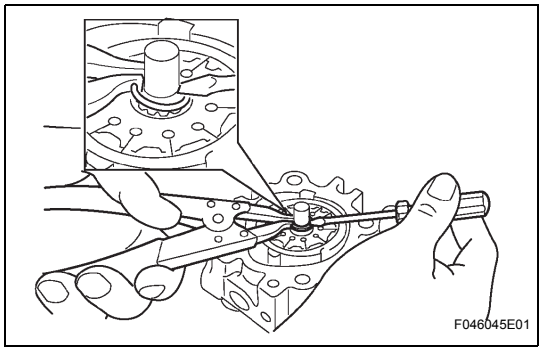
5. INSTALL VANE PUMP ROTOR

(a) Install the vane pump rotor.



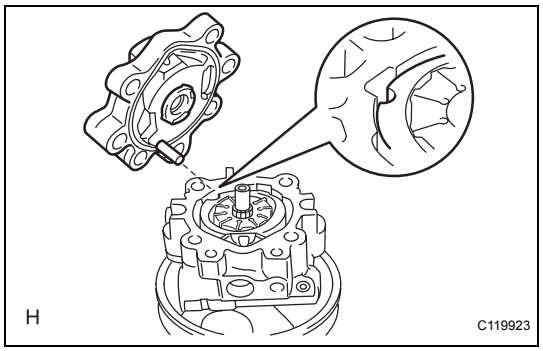
(b) Apply power steering fluid to the 10 vane pump plates.

(c) Install the vane pump plates with the round end facing outward.



6. INSTALL VANE PUMP SHAFT SNAP RING

(a) Using a screwdriver and snap ring expander, install a new snap ring to the shaft.

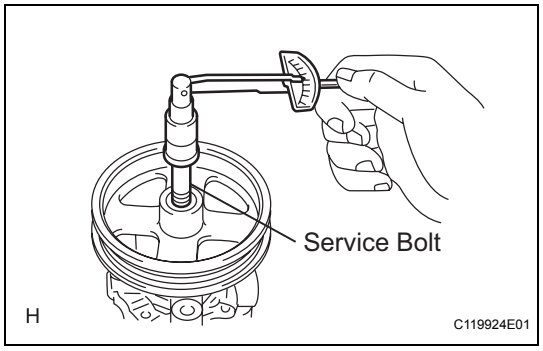


7. INSTALL REAR VANE PUMP HOUSING

(a) Apply power steering fluid to a new O-ring and install it to the rear housing.

(b) Align the straight pin of the rear housing with the dents of the cam ring, the front side plate and the front housing, and install the rear housing with the 4 bolts.

Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)



8. INSPECT PRELOAD

(a) Check that the pump rotates smoothly without abnormal noise.

(b) Temporarily install the service bolt.

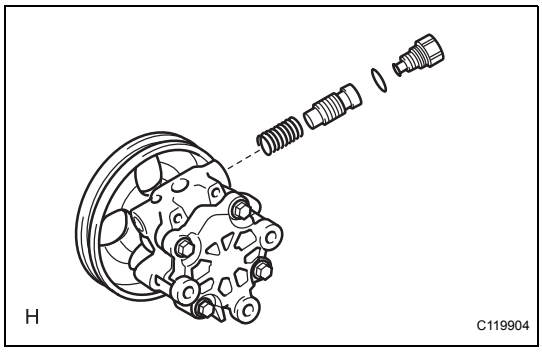
Recommended service bolt:

Thread diameter:
10 mm (0.39 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

(c) Using a torque wrench, check the pump rotating torque.
Standard rotating torque:
0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf) or less
If the rotating torque is not as specified, check installation of the housing oil seal.

9. INSTALL POWER STEERING OIL PRESSURE SENSOR

(a) Apply power steering fluid to a new O-ring and install it to the oil pressure sensor.
(b) Install the oil pressure sensor to the front housing.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)



10. INSTALL FLOW CONTROL VALVE

(a) Apply power steering fluid to the compression spring and flow control valve.
(b) Install the compression spring and the flow control valve.
(c) Apply power steering fluid to a new O-ring and install it to the pressure port union.
(d) Install the pressure port union.
Torque: 69 N*m (704 kgf*cm, 51 ft.*lbf)

11. INSTALL FRONT PUMP BRACKET

(a) Install the front bracket and rear bracket with the 2 bolts.

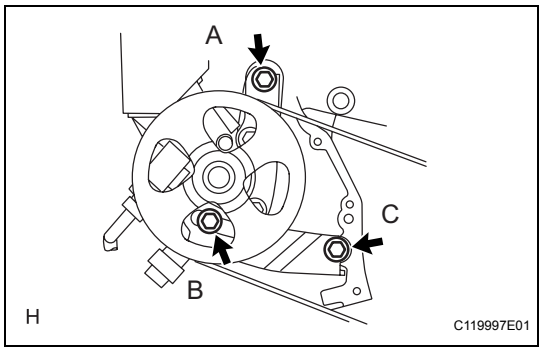
12. INSTALL VANE PUMP OIL RESERVOIR ASSEMBLY

(a) Apply power steering fluid to a new O-ring and install it to the oil reservoir.
(b) Install the oil reservoir with the 3 bolts to the front housing.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

13. INSTALL VANE PUMP OIL RESERVOIR CAP SUB-ASSEMBLY

INSTALLATION

NOTICE:
When installing, coat the parts indicated by arrows with power steering fluid (see page PS-6).

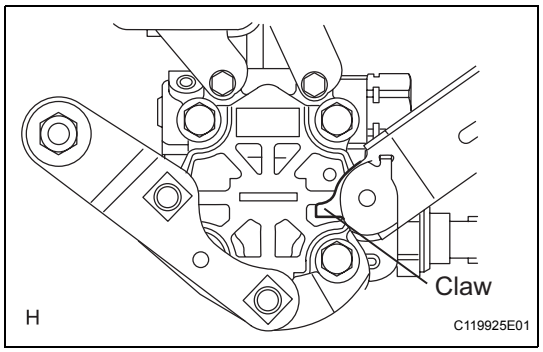


1. INSTALL VANE PUMP ASSEMBLY

(a) Temporarily install the vane pump with bolt A.
HINT:
After adjusting the V belt tension, torque the bolt.

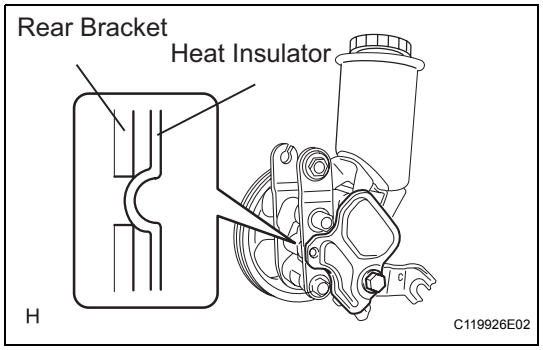
(b) Install the adjusting strut with bolt B.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)

(c) Temporarily install bolt C.
HINT:
After adjusting the V belt tension, torque the bolt.

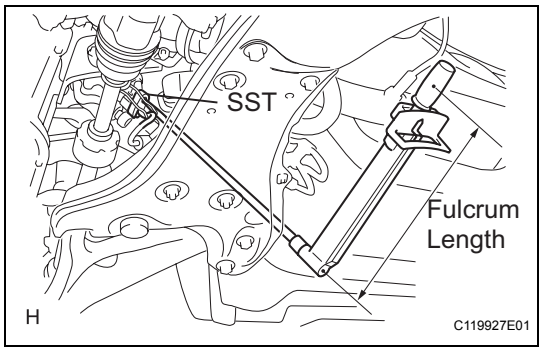


2. INSTALL REAR VANE PUMP STAY

(a) Install the rear stay to the rear housing, as shown in the illustration.

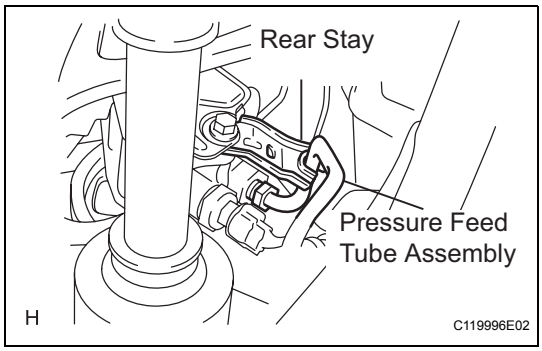


(b) Install the heat insulator and rear stay with the bolt.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)
NOTICE:
Install the heat insulator by pressing its projection into a hole in the rear bracket, as shown in the illustration.



3. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Using SST, connect the pressure feed tube.
Torque: 41 N*m (414 kgf*cm, 30 ft.*lbf)
SST 09023-12701
HINT:
- Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).
- This torque value is effective when SST is parallel to a torque wrench.

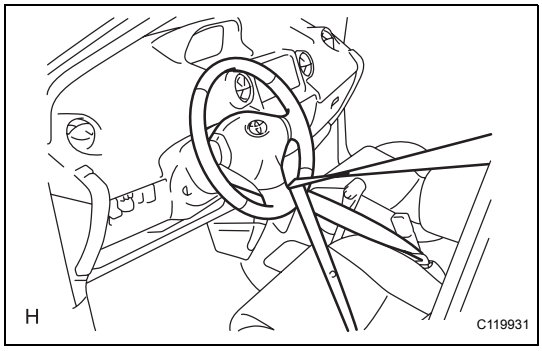


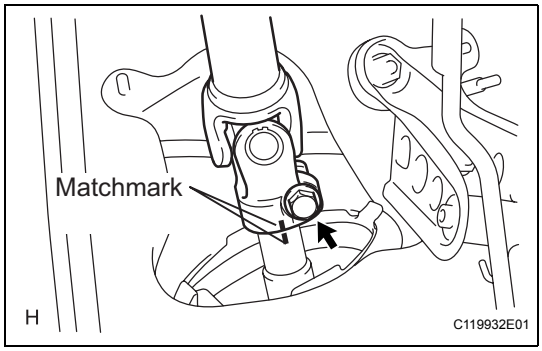
(b) Check that the pressure feed tube is properly installed to the rear stay.
(c) Connect the return hose with the clip.
NOTICE:
Take care not to spill fluid on the V belt.
(d) Connect the oil pressure sensor connector.

4. **ADJUST VANE PUMP V BELT (See page EM-7)**
5. **INSPECT DRIVE BELT DEFLECTION AND TENSION (See page EM-6)**
6. **ADD POWER STEERING FLUID**
   (a) Add power steering fluid (see page SR-2).
7. **BLEED AIR FROM POWER STEERING SYSTEM**
   (a) Bleed air from the power steering system (see page PS-2).
8. **INSPECT POWER STEERING FLUID LEAK**
9. **INSTALL ENGINE UNDER COVER RH**
10. **INSTALL FRONT WHEEL RH**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
11. **CHECK POWER STEERING FLUID LEVEL IN RESERVOIR (See page PS-3)**
12. **INSTALL VANE PUMP OIL RESERVOIR COVER**
13. **INSTALL COWL PANEL SUB-ASSEMBLY**
14. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY (See page WW-10)**
15. **INSTALL COWL TOP VENTILATOR LOUVER LH (See page WW-10)**
16. **INSTALL COWL TOP VENTILATOR LOUVER RH (See page WW-10)**
17. **INSTALL HOOD TO COWL TOP SEAL (See page WW-10)**
18. **INSTALL FRONT WIPER ARM LH (See page WW-11)**
19. **INSTALL FRONT WIPER ARM RH (See page WW-11)**

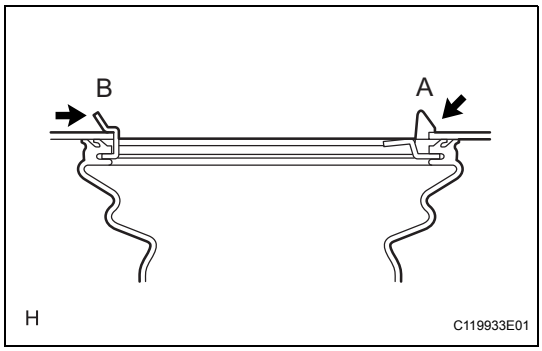
REMOVAL

1. **REMOVE FRONT WIPER ARM RH (See page WW-7)**
2. **REMOVE FRONT WIPER ARM LH (See page WW-7)**
3. **REMOVE HOOD TO COWL TOP SEAL (See page WW-7)**
4. **REMOVE COWL TOP VENTILATOR LOUVER RH (See page WW-7)**
5. **REMOVE COWL TOP VENTILATOR LOUVER LH (See page WW-7)**
6. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-8)**
7. **REMOVE COWL PANEL SUB-ASSEMBLY**
8. **INSPECT FRONT WHEELS FACING STRAIGHT AHEAD**
9. **REMOVE STEERING COLUMN HOLE COVER PLATE (See page SR-8)**
10. **REMOVE STEERING SLIDING YOKE SUB-ASSEMBLY**
    (a) Fix the steering wheel with the seat belt in order to prevent rotation.
    HINT:
    This operation is also useful to prevent damaging the spiral cable.





    (b) Put matchmarks on the sliding yoke and intermediate shaft.
    (c) Loosen the bolt, and then disconnect the sliding yoke from the intermediate shaft.



11. **DISCONNECT NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY**
    (a) Detach clip A and disconnect the hole cover.
    NOTICE:
    Be careful not to damage clip B.
12. **REMOVE HOOD SUB-ASSEMBLY**
13. **DRAIN POWER STEERING FLUID**
14. **REMOVE FRONT WHEELS**
15. **DISCONNECT TIE ROD END SUB-ASSEMBLY LH (See page DS-5)**

16. DISCONNECT TIE ROD END SUB-ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

17. REMOVE ENGINE UNDER COVER LH

18. REMOVE ENGINE UNDER COVER RH

19. DISCONNECT PRESSURE FEED TUBE ASSEMBLY

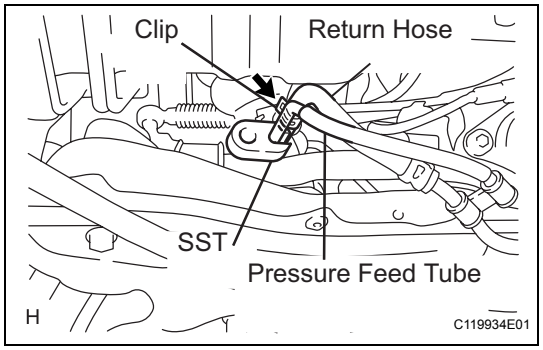
(a) Remove the clip and disconnect the return hose.

(b) Using SST, disconnect the pressure feed tube.

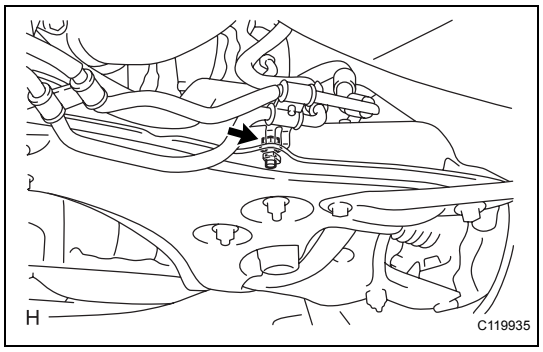
SST 09023-12701

(c) Using SST, remove the return tube.

SST 09023-12701



(d) Remove the bolt and disconnect the tube clamp.



20. DISCONNECT NO. 1 FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER LH (See page DS-5)

21. DISCONNECT NO. 1 FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER RH

HINT:

Use the same procedures described for the LH side.

22. SUSPEND ENGINE ASSEMBLY

(a) Install the 2 No. 1 engine hangers with the bolts in the correct direction.

Parts No.:

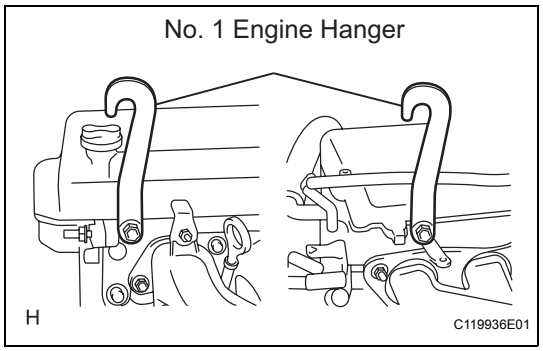
No. 1 engine hanger:

12281-21010

Bolt:

91642-81025

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)



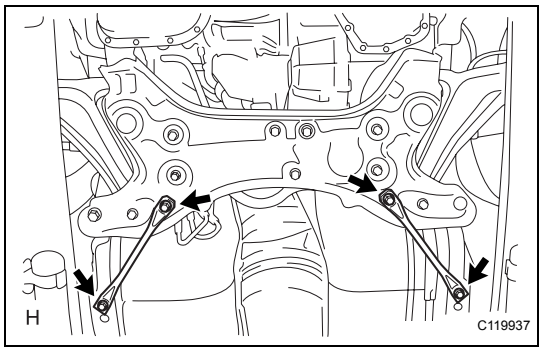
(b) Hold the engine with the sling device and chain hoist.

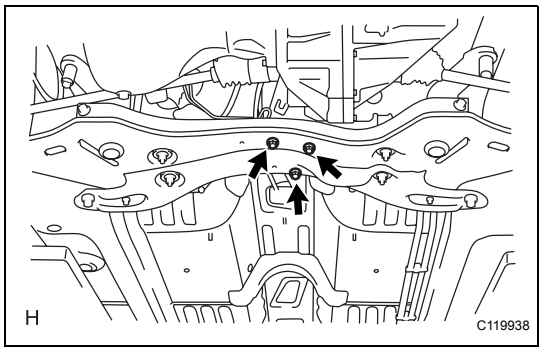
NOTICE:

Do not hang the engine by hooking the chain to any other parts.

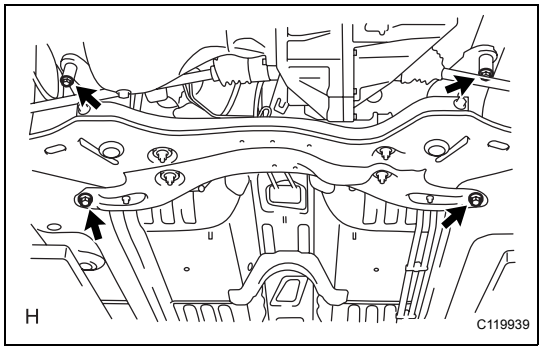
23. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Remove the 4 bolts and 2 reinforcements.





(b) Remove the bolt and 2 nuts, and disconnect the engine mounting insulator rear.
(c) Using a transmission jack, support the crossmember.

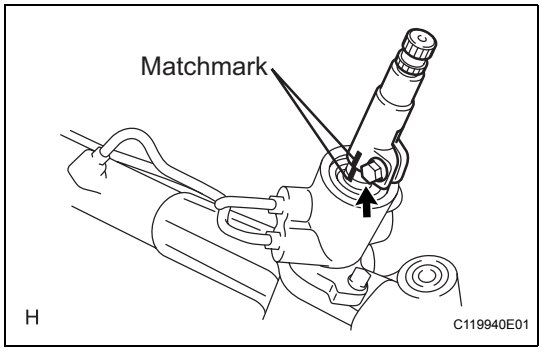


(d) Remove the 4 bolts and crossmember.

24. REMOVE POWER STEERING RACK HOUSING HEAT INSULATOR

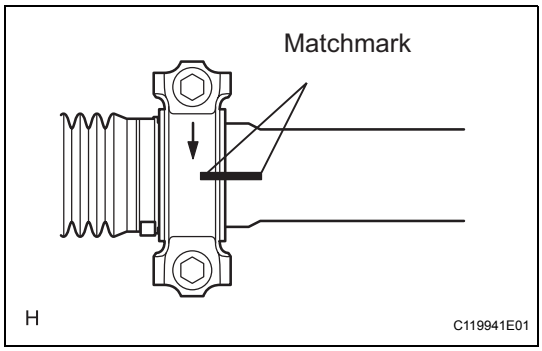
(a) Remove the 2 bolts and heat insulator.

25. REMOVE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY



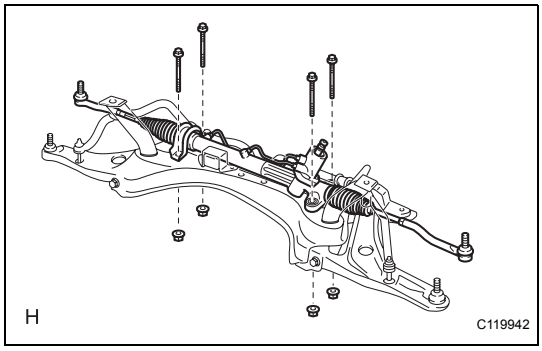
26. REMOVE STEERING INTERMEDIATE SHAFT

(a) Put matchmarks on the steering link and intermediate shaft.
(b) Remove the bolt and intermediate shaft.

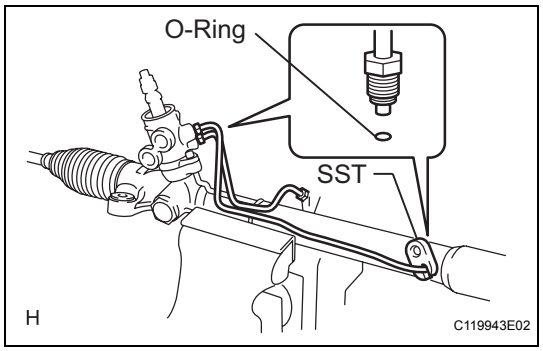


27. REMOVE POWER STEERING LINK ASSEMBLY

(a) Put matchmarks on the steering link and No. 2 bracket.



(b) Remove the 4 bolts, nuts, No. 2 bracket, No. 2 grommet and steering link.
NOTICE:
- **Torque the bolt with the nut fixed as the nut has its own stopper.**
- **Do not turn the nut.**



28. REMOVE STEERING TURN PRESSURE TUBE RH

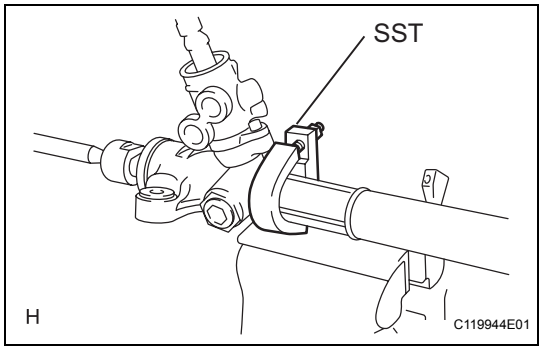
(a) Using SST, remove the turn pressure tube.
SST 09023-38201

(b) Remove the 2 O-rings from the right turn pressure tube.

29. REMOVE STEERING TURN PRESSURE TUBE LH

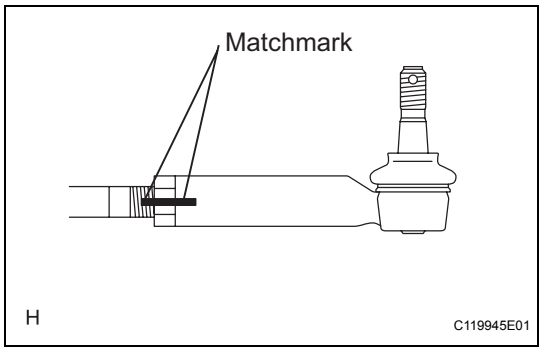
HINT:
Use the same procedures described for the RH side.

DISASSEMBLY



1. FIX POWER STEERING LINK ASSEMBLY

(a) Using SST, secure the steering link.
SST 09612-00012
HINT:
Wrap the SST with vinyl tape before use.



2. REMOVE TIE ROD END SUB-ASSEMBLY LH

(a) Put matchmarks on the tie rod end LH and rack end.

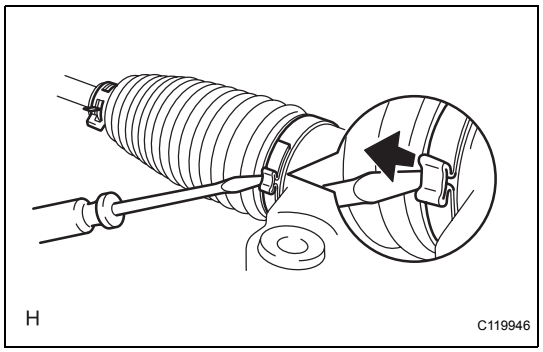
(b) Loosen the lock nut and remove the tie rod end and lock nut.

3. REMOVE TIE ROD END SUB-ASSEMBLY RH

HINT:
Use the same procedures described for the LH side.

4. REMOVE STEERING RACK BOOT CLIP

(a) Remove the 2 boot clips.



5. REMOVE NO. 2 STEERING RACK BOOT CLAMP

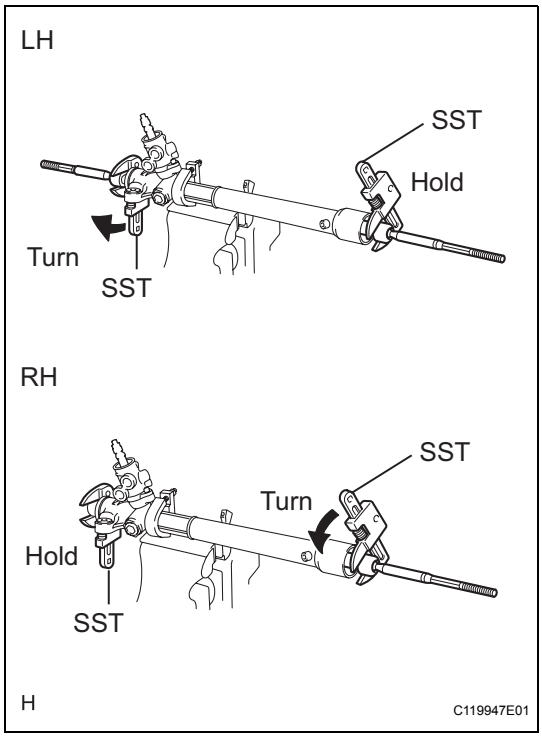
(a) Using a screwdriver, remove the rack boot clamp.
NOTICE:
Be careful not to damage the boot.

6. REMOVE NO. 1 STEERING RACK BOOT CLAMP

HINT:
Use the same procedures described for the No. 2 side.

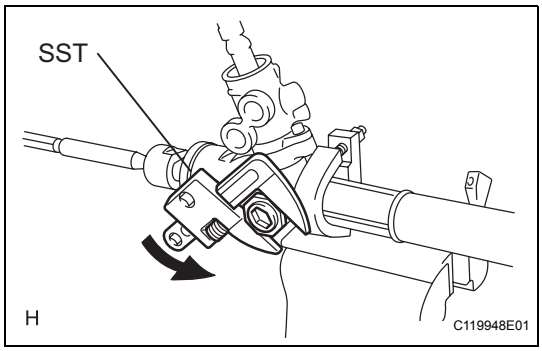
7. REMOVE NO. 2 STEERING RACK BOOT

8. REMOVE NO. 1 STEERING RACK BOOT



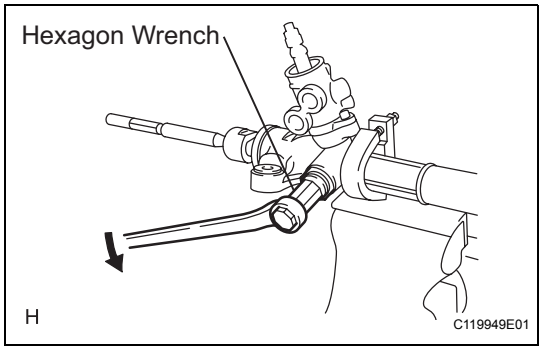
9. REMOVE STEERING RACK END SUB-ASSEMBLY

(a) Using SST, remove the 2 rack ends.
SST 09922-10010
NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.

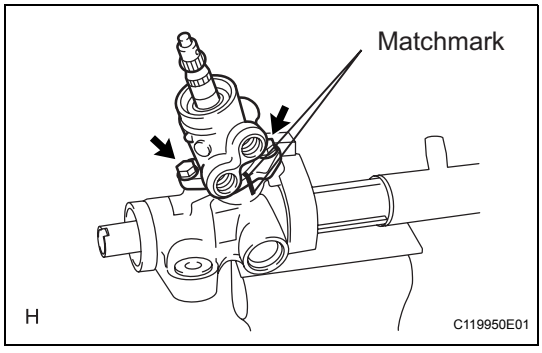


10. REMOVE RACK GUIDE

(a) Using SST, remove the spring cap lock nut.
SST 09922-10010
NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.



(b) Using a 19 mm hexagon wrench, remove the rack guide spring cap.
(c) Remove the rack guide spring, rack guide spring spacer and rack guide.

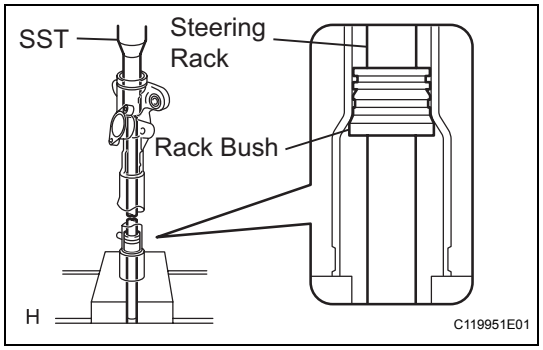


11. REMOVE POWER STEERING CONTROL VALVE

(a) Put matchmarks on the control valve and rack housing.
(b) Remove the 2 bolts and control valve.
(c) Remove the gasket.

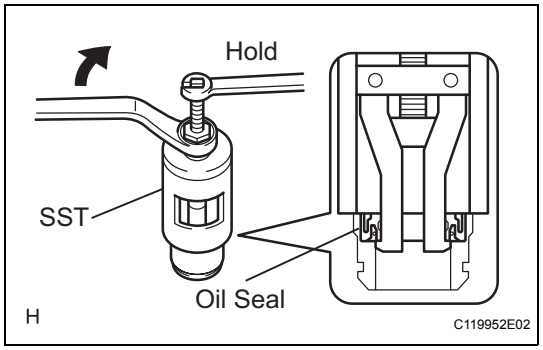
12. REMOVE CYLINDER END STOPPER

(a) Using needle nose pliers, remove the hole snap ring.
(b) Pull out the cylinder end stopper.



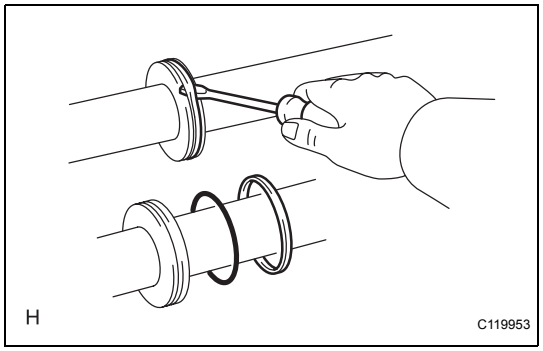
13. REMOVE POWER STEERING RACK

(a) Using SST and a press, press out the steering rack with rack bush.
SST 09950-70010 (09951-07200)



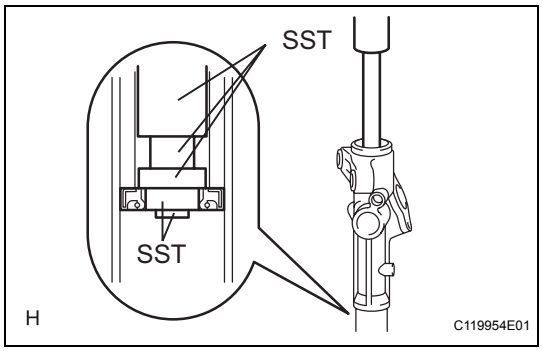
14. REMOVE POWER STEERING RACK BUSH

(a) Remove the rack bush from the steering rack.
(b) Using SST, remove the rack bush oil seal.
SST 09612-24014 (09613-22011)
(c) Using a screwdriver, remove the O-ring from the rack bush.



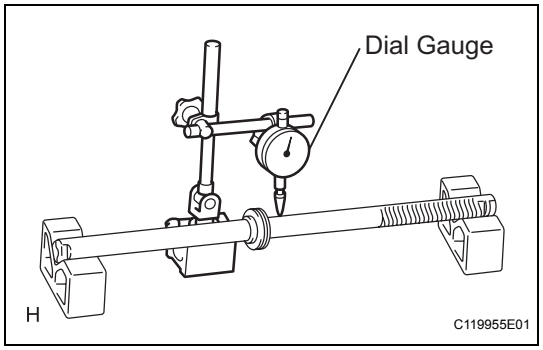
15. REMOVE RACK STEERING PISTON RING

(a) Using a screwdriver, remove the piston ring and O-ring.
NOTICE:
Be careful not to damage the grooves for the piston ring and O-ring.



16. REMOVE POWER STEERING RACK HOUSING OIL SEAL

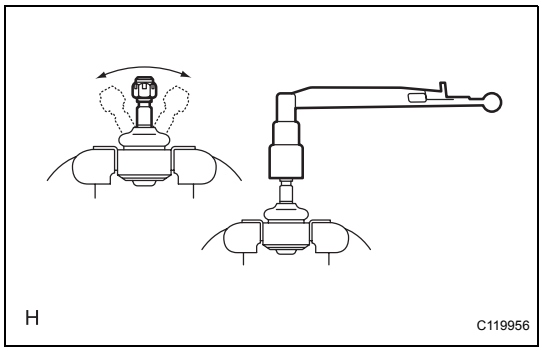
(a) Using SST and a press, press out the housing oil seal.
SST 09950-60010 (09951-00200, 09951-00240, 09952-06010), 09950-70010 (09951-07360)
NOTICE:
Be careful not to damage the rack housing.



INSPECTION

1. INSPECT POWER STEERING RACK

(a) Using a dial gauge, check the steering rack for runout, teeth wear and damage.
Maximum runout:
0.1 mm (0.004 in.)
If the runout is greater than the maximum, replace the power steering rack.
(b) Check the rack surface of the steering rack for wear and damage.



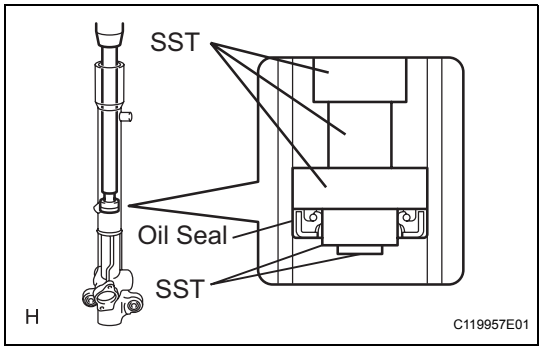
2. INSPECT TIE ROD END SUB-ASSEMBLY

(a) Secure the tie rod end in a vise.
(b) Install the nut to the stud bolt.
(c) Flip the ball joint stud back and forth 5 times.
(d) Using a "torx" wrench, turn the nut continuously at a rate of 2 to 4 seconds per turn and take the torque reading on the 5th turn.
Standard turning torque:
0.8 to 3.4 N*m (8.2 to 34.7 kgf*cm, 7.1 to 30.1 in.*lbf)

REASSEMBLY

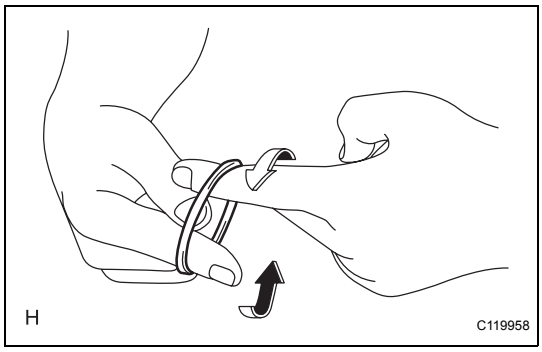
1. INSTALL POWER STEERING RACK HOUSING OIL SEAL

(a) Coat a new oil seal lip with power steering fluid.
(b) Using SST and a press, press in the housing oil seal.
SST 09950-60010 (09951-00210, 09951-00370, 09952-06010), 09950-70010 (09951-07360)
NOTICE:
Make sure that the oil seal is installed correctly.



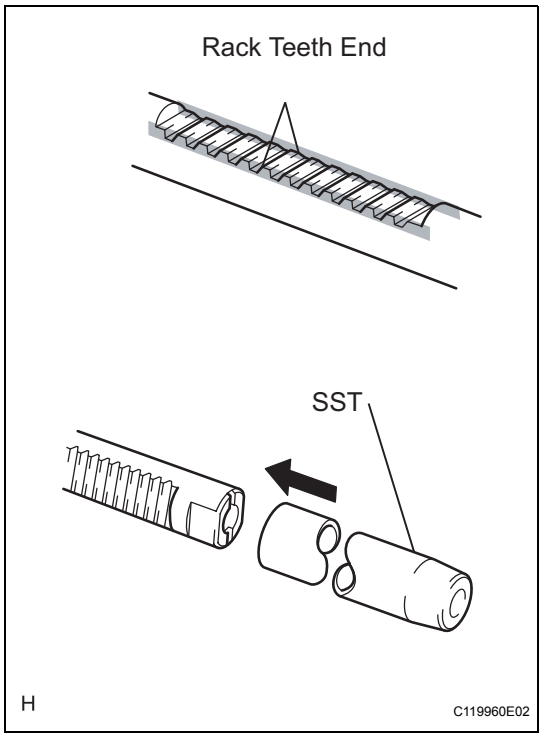
2. INSTALL RACK STEERING PISTON RING

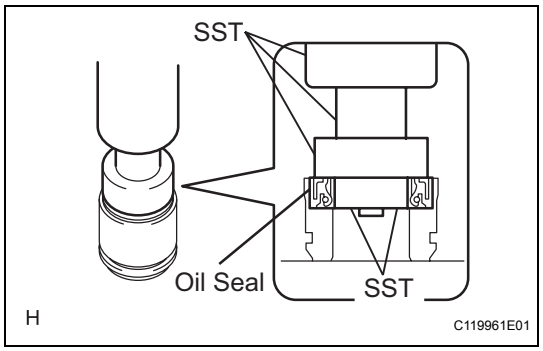
(a) Apply power steering fluid to a new O-ring and install it to the steering rack.
(b) Expand a new piston ring with your fingers.
NOTICE:
Be careful not to overly expand the piston ring.
(c) Apply power steering fluid to the piston ring.
(d) Install the piston ring to the steering rack, and adjust with your fingers.



3. INSTALL POWER STEERING RACK

(a) Install SST to the steering rack.
SST 09631-10041
HINT:
If necessary, scrape the burrs off the steering rack teeth end and burnish.
(b) Apply power steering fluid to the SST.
(c) Install the steering rack to the rack housing.
(d) Remove SST.





4. INSTALL POWER STEERING RACK BUSH

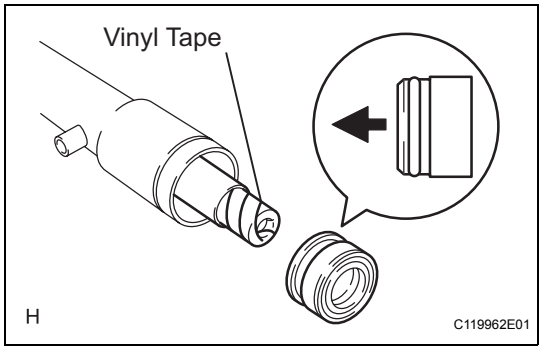
(a) Using SST and a press, press in the rack bush oil seal to the rack bush.

SST 09950-60010 (09951-00210, 09951-00340, 09952-06010), 09950-70010 (09951-07100)

NOTICE:

Make sure that the oil seal is installed correctly.

(b) Apply power steering fluid to a new O-ring and install it to the rack bush.



(c) Wrap vinyl tape around the steering rack end to prevent damaging the rack bush oil seal lip, and apply power steering fluid to the rack bush oil seal.

(d) Install the rack bush into the rack housing.

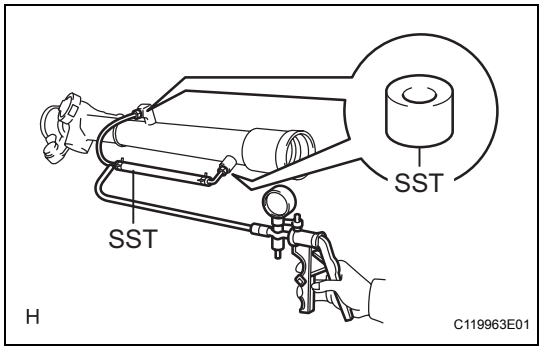
NOTICE:

- **Make sure that the rack bush is installed correctly.**
- **Be careful not to damage the oil seal lip.**

5. INSTALL CYLINDER END STOPPER

(a) Push into the cylinder end stopper.

(b) Using needle nose pliers, install the hole snap ring.



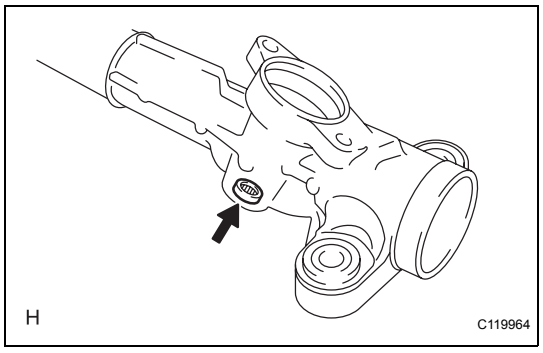
6. CHECK AIR TIGHTNESS

(a) Install SST onto the rack housing.

SST 09631-12071 (09633-00010)

(b) Apply vacuum of 53 kPa (400 mmHg, 15.75 in.Hg) for approximately 30 seconds.

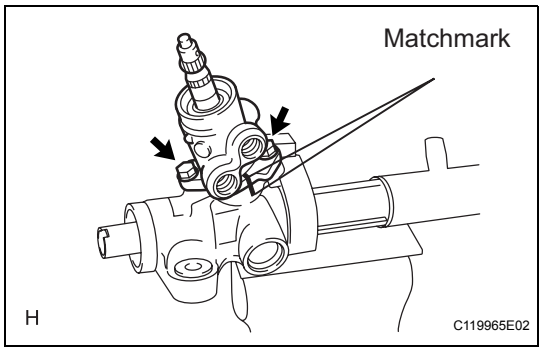
(c) Check that there is no change in the vacuum.
If there is a change in the vacuum pressure, check the installation of the oil seals.



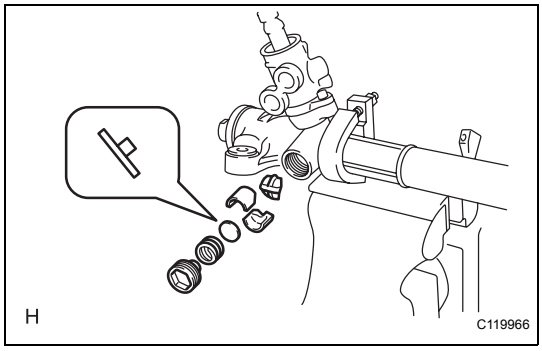
7. INSTALL POWER STEERING CONTROL VALVE

(a) Apply grease to the needle roller bearing.

(b) Install a new gasket to the control valve.



(c) Align the matchmarks and install the control valve to the rack housing with the 2 bolts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

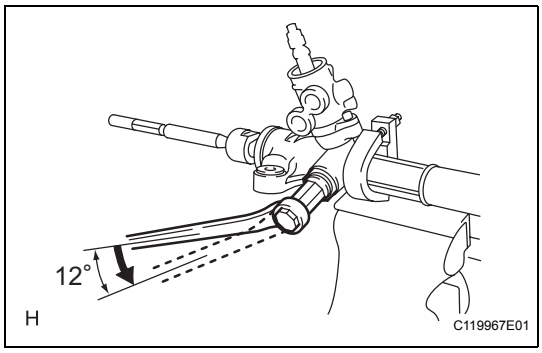


8. INSTALL RACK GUIDE

(a) Install the rack guide, rack guide spring spacer and rack guide spring.
NOTICE:
Make sure that the rack guide spring spacer is installed correctly

(b) Apply sealant to 2 or 3 threads of the rack guide spring cap.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Temporarily install the rack guide spring cap.

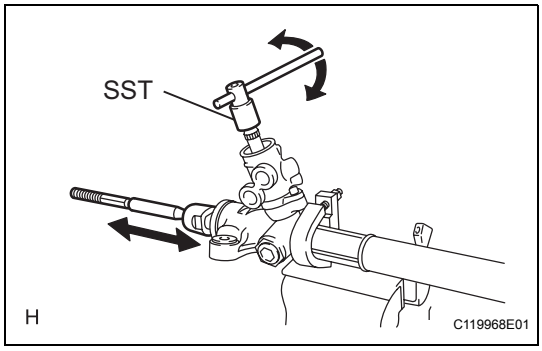


9. ADJUST TOTAL PRELOAD

(a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.

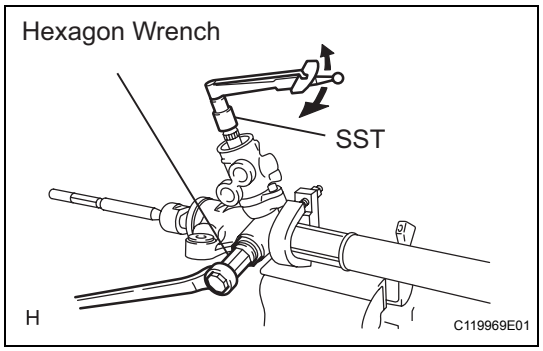
(b) Using a 19 mm hexagon wrench, torque the rack guide spring cap.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

(c) Using a 19 mm hexagon wrench, return the rack guide spring cap approximately 12°.



(d) Using SST, turn the control valve to the right and left once or twice.
SST 09616-00011

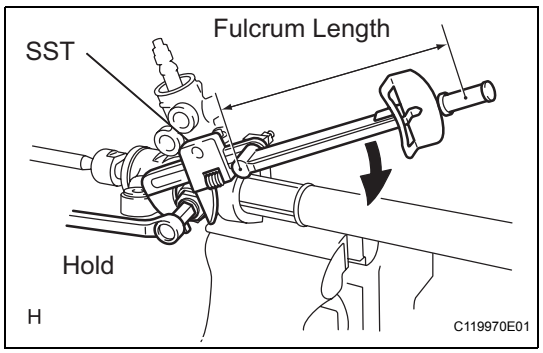
(e) Using a 19 mm hexagon wrench, loosen the rack guide spring cap until the rack guide spring stops functioning.



(f) Using SST, a torque wrench and 19 mm hexagon wrench, tighten the rack guide spring cap until the preload is within the specification.
SST 09616-00011
Standard preload (turning):
1.2 to 1.5 N*m (12 to 15 kgf*cm, 10.6 to 13.3 in.*lbf)

(g) Apply sealant to 2 or 3 threads of the spring cap lock nut.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(h) Temporarily install the spring cap lock nut.



(i) Hold the rack guide spring cap by using a 19 mm hexagon wrench, and using SST, torque the spring cap lock nut.
Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)
NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.
HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

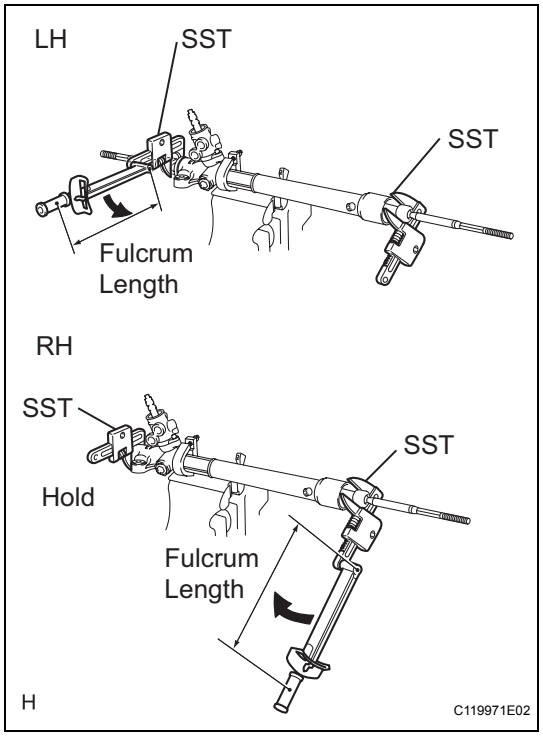
(j) Recheck the total preload.
Standard total preload (turning):
1.2 to 1.5 N*m (12 to 15 kgf*cm, 10.6 to 13.3 in.*lbf)

(k) Remove the RH and LH rack ends.

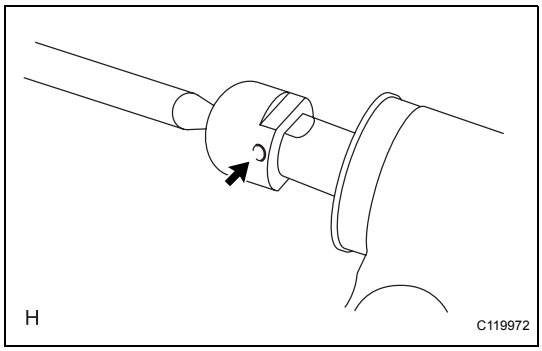
10. INSTALL STEERING RACK END SUB-ASSEMBLY

(a) Temporarily install the 2 rack ends.

(b) Using SST, torque the 2 rack ends.
SST 09922-10010
Torque: 60 N*m (614 kgf*cm, 44 ft.*lbf)
NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.
HINT:
- Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).
- Using SST, hold the rack and install the rack end.

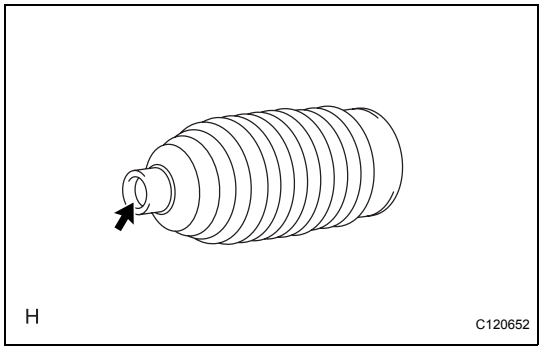


PS



11. INSPECT STEERING RACK END HOLE

(a) Ensure that the hole of the rack end is not clogged with grease.
HINT:
If the hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.

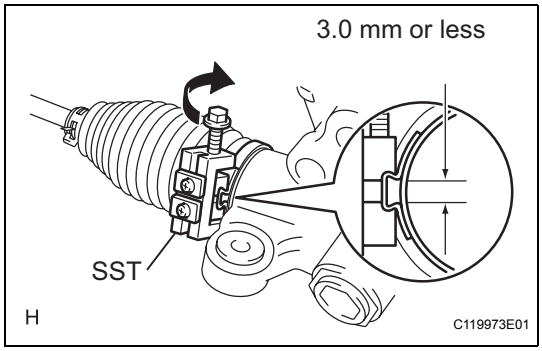


12. INSTALL NO. 2 STEERING RACK BOOT

(a) Apply silicon grease to the inside small caliber of No. 2 rack boot.
(b) Install the No. 2 rack boot onto the groove on the rack housing.
NOTICE:
Be careful not to damage or twist the boot.

13. INSTALL NO. 1 STEERING RACK BOOT

HINT:
Use the same procedures described for the No. 2 side.



14. INSTALL NO. 2 STEERING RACK BOOT CLAMP

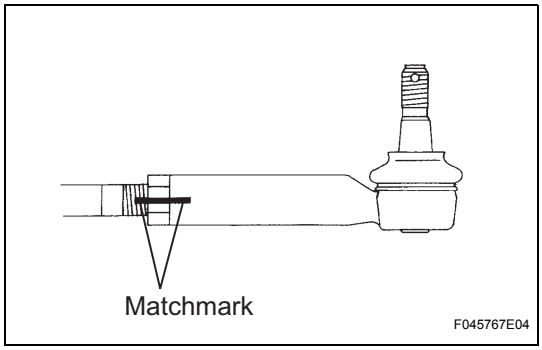
(a) Using SST, tighten the No. 2 rack boot clamp, as shown in the illustration.
SST 09240-00020, 09521-24010
Standard clearance:
3.0 mm (0.118 in.) or less
NOTICE:
Be careful not to damage the boot.

15. INSTALL NO. 1 STEERING RACK BOOT CLAMP

HINT:
Use the same procedures described for the No. 2 side.

16. INSTALL STEERING RACK BOOT CLIP

(a) Using pliers, install the 2 rack boot clips.

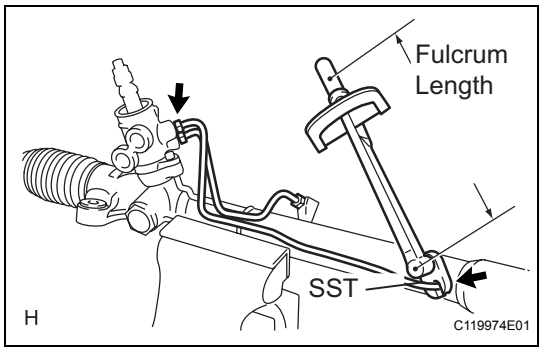


17. INSTALL TIE ROD END SUB-ASSEMBLY LH

(a) Screw the lock nut and tie rod end on the rack end until the matchmarks are aligned.
Torque: 74 N*m (750 kgf*cm, 54 ft.*lbf)
HINT:
After adjusting toe-in, torque the lock nut (See page SP-2).

18. INSTALL TIE ROD END SUB-ASSEMBLY RH

HINT:
Use the same procedures described for the LH side.



19. INSTALL STEERING TURN PRESSURE TUBE RH

(a) Apply power steering fluid to 2 new O-rings and install them to the turn pressure tube.

(b) Using SST, install the turn pressure tube to the steering link.

SST 09023-38201

Torque: 12 N*m (118 kgf*cm, 9 ft.*lbf)

HINT:

- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when SST is parallel to a torque wrench.

20. INSTALL STEERING TURN PRESSURE TUBE LH

HINT:

Use the same procedures described for the RH side.

POWER STEERING SYSTEM

PRECAUTION

1. HANDLING PRECAUTIONS FOR STEERING SYSTEM

(a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in a driving hazard.

2. HANDLING PRECAUTIONS FOR SRS

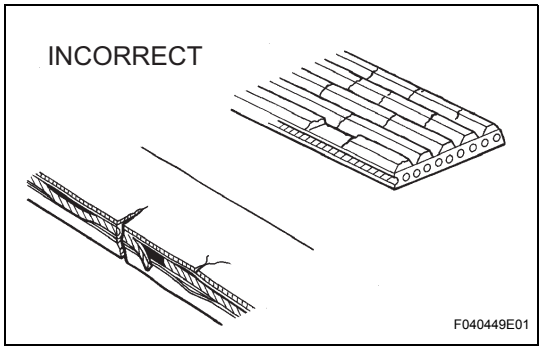
(a) The vehicle is equipped with a Supplemental Restraint System (SRS) which includes a driver side airbag. Failure to carry out service procedures in the correct sequence may unexpectedly deploy the SRS and cause serious injuries. Furthermore, if a mistake is made in servicing the SRS, it may fail to operate when required.
Before servicing (including installation, removal, inspection or replacement of parts), read the SRS section's "Precaution" (see page RS-1).

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Power steering system

Symptom	Suspected area	See page
Hard steering	1. Tires (improperly inflated)	TW-3
	2. Power steering fluid level (low)	PS-2
	3. Drive belt	EM-6
	4. Front wheel alignment (incorrect)	SP-2
	5. Steering system joints (worn)	-
	6. Suspension arm ball joints (worn) ATM	SP-17
	7. Suspension arm ball joints (worn) MTM	SP-21
	8. Steering column (binding)	-
	9. Vane pump assembly	PS-10
	10. Power steering link assembly	PS-25
Poor return	1. Tires (improperly inflated)	TW-3
	2. Front wheel alignment (incorrect)	SP-2
	3. Steering column (binding)	-
	4. Power steering link assembly	PS-25
Excessive play	1. Steering system joints (worn)	-
	2. Suspension arm ball joints (worn) ATM	SP-17
	3. Suspension arm ball joints (worn) MTM	SP-21
	4. Front wheel bearing (worn)	AH-6
	5. Power steering link assembly	PS-25
Abnormal noise	1. Power steering fluid level (low)	PS-2
	2. Steering system joints (worn)	-
	3. Vane pump assembly	PS-10
	4. Power steering link assembly	PS-25



ON-VEHICLE INSPECTION

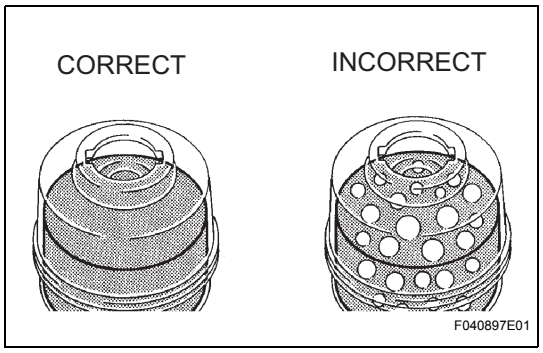
1. INSPECT DRIVE BELT

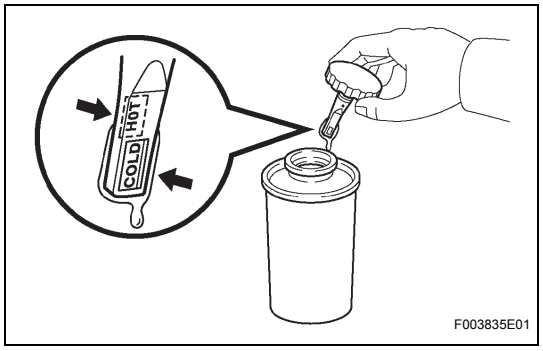
(a) Visually check the belt for excessive wear, frayed cords, etc. If any defect is found, replace the drive belt.
HINT:
Cracks on the rib side of the belt are considered acceptable. Replace the belt if there are any missing ribs.

2. BLEED AIR FROM POWER STEERING SYSTEM

(a) Check the fluid level.
(b) Jack up the front of the vehicle and support it with stands.
(c) Turn the steering wheel.
(1) With the engine stopped, turn the steering wheel slowly from lock to lock several times.
(d) Lower the vehicle.

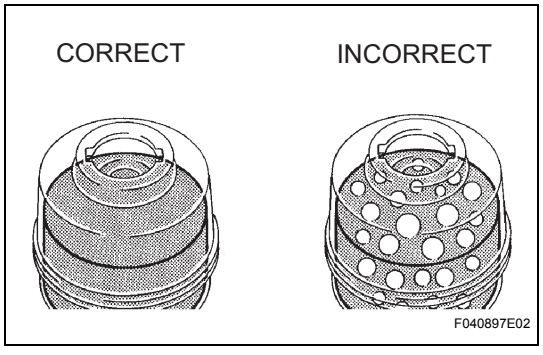
(e) Start the engine. Run the engine at idle for a few minutes.
(f) Turn the steering wheel.
  (1) With the engine idling, turn the steering wheel to the left or right full lock position and hold it there for 2 to 3 seconds. Then turn the steering wheel to the opposite full lock position and hold it there for 2 to 3 seconds.
  (2) Repeat the step above several times.
(g) Stop the engine.
(h) Check for foaming or emulsification. If the system has to be bled twice because of forming or emulsification, check for fluid leaks in the system.
(i) Check the fluid level.

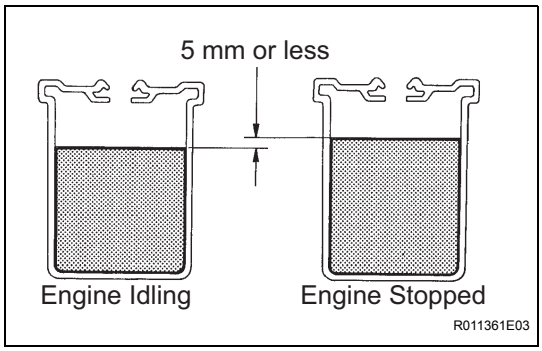




3. CHECK FLUID LEVEL

(a) Keep the vehicle level.
(b) With the engine stopped, check the power steering fluid level in the oil reservoir. If necessary, add power steering fluid.
Power steering fluid:
ATF "DEXRON" II or III
HINT:
If the fluid is hot, check that the fluid level is within the HOT range on the oil reservoir. If the fluid is cold, check that the fluid level is within the COLD range.
(c) Start the engine and run it at idle.
(d) Turn the steering wheel to the left or right full lock position, and then the wheel to the opposite full lock position. Repeat this several times to raise fluid temperature.
Standard fluid temperature:
80°C (176°F)
(e) Check for foaming or emulsification. If foaming or emulsification is identified, bleed air from the power steering system.

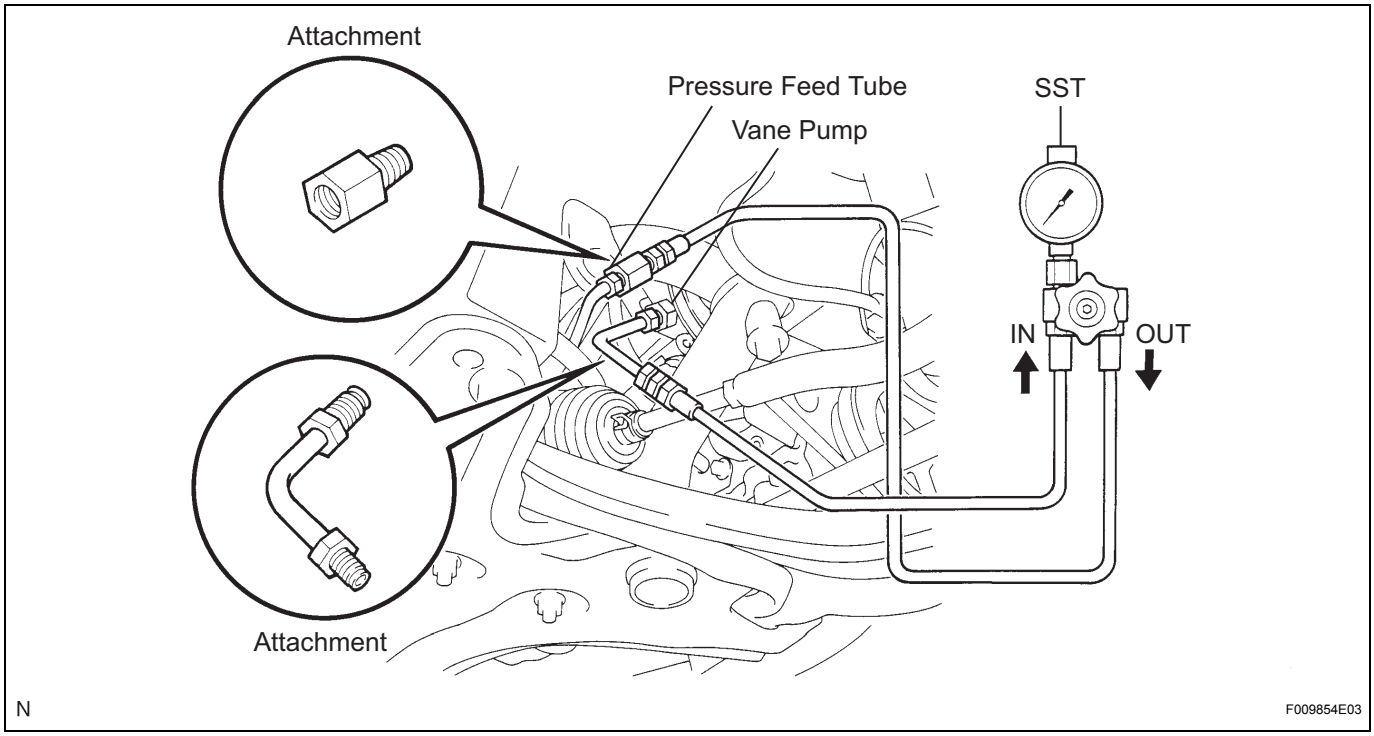


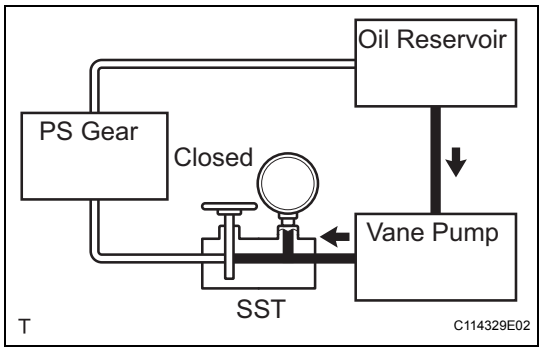


(f) With the engine idling, measure the fluid level in the oil reservoir.
(g) Stop the engine.
(h) Wait a few minutes and remeasure the fluid level in the oil reservoir.
Maximum fluid level increase:
5 mm (0.20 in.)
If a problem is found, bleed air from the power steering system.
(i) Check the fluid level.

4. CHECK STEERING FLUID PRESSURE

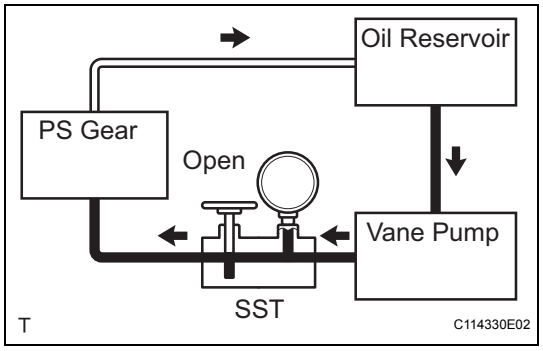
(a) Disconnect the pressure feed tube (see page PS-8).
(b) Connect SST as shown in the illustration below.
SST 09640-10010 (09641-01010, 09641-01030, 09641-01060)
NOTICE:
Check that the value of SST is in the open position.
(c) Bleed air from the power steering system.
(d) Start the engine and run it at idle.
(e) Turn the steering wheel to the left or right full lock position. Then turn the wheel to the opposite full lock position. Repeat this several times to raise fluid temperature.
Standard fluid temperature:
75 to 80°C (167 to 176°F)



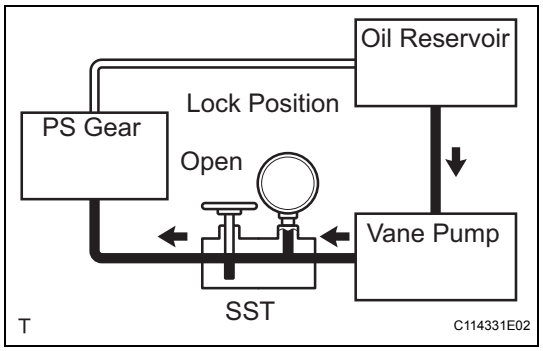


(f) With the engine idling, close the valve of SST and observe the reading on SST.
Minimum fluid pressure:
5,900 kPa (60 kgf/cm^2, 852 psi)
NOTICE:
- **Do not keep the valve closed for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**

If the pressure is not within the specified range, check for fluid leaks and replace parts as necessary.

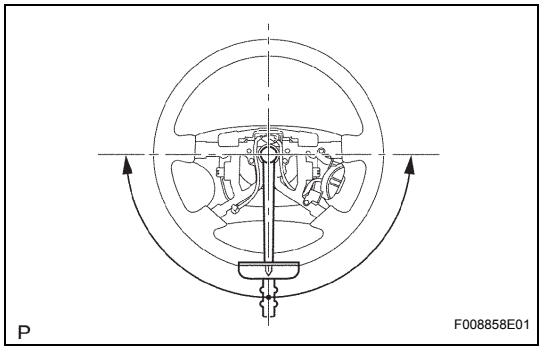


(g) With the engine idling, fully open the valve.
(h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.
Standard fluid pressure difference:
490 kPa (5 kgf/cm^2, 71 psi) or less
NOTICE:
Do not turn the steering wheel.
If the pressure is not within the specified range, check for fluid leaks and replace parts as necessary.



(i) With the engine idling and the valve fully opened, turn the steering wheel to the full lock position.
Minimum fluid pressure:
5,900 kPa (60 kgf/cm^2, 852 psi)
NOTICE:
- **Do not maintain the lock position for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**

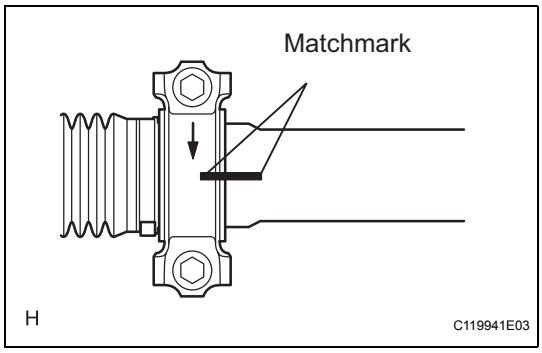
If the pressure is not within the specified range, check for fluid leaks and replace parts as necessary.
(j) Disconnect SST.
SST 09640-10010 (09641-01010, 09641-01030, 09641-01060)
(k) Connect the pressure feed tube (see page PS-14).
(l) Bleed air from the power steering system.



5. CHECK STEERING RESISTANCE
(a) Center the steering wheel.
(b) Remove the steering pad (see page RS-287).
(c) Start the engine and run it at idle.
(d) Measure the steering resistance in both directions.
Standard steering resistance (Reference):
6 N*m (60 kgf*cm, 53 in.*lbf)
HINT:
Tire type, tire pressure and type of surface beneath the vehicle should be taken into consideration before making your diagnosis.
(e) Tighten the steering wheel set nut.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
(f) Install the steering pad (see page RS-288).

INSTALLATION

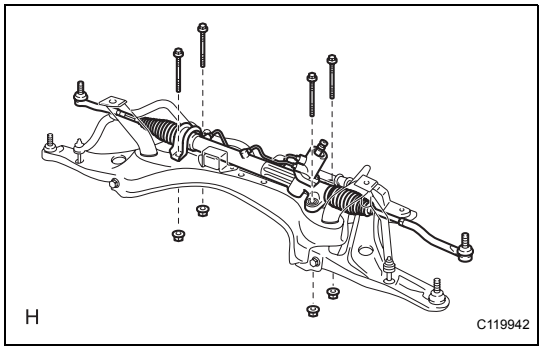
NOTICE:
When installing, apply power steering fluid or molybdenum disulfide lithium base grease to the parts indicated by arrows (see page PS-17).



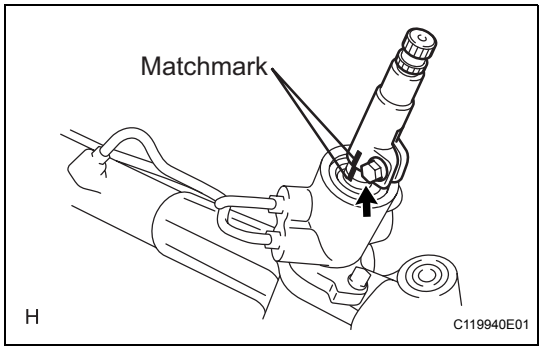
1. INSTALL POWER STEERING LINK ASSEMBLY

(a) Install the No. 2 grommet to the steering link.

(b) Align the matchmarks and install the No. 2 bracket to the steering link.
NOTICE:
Install the bracket with the inscribed mark facing to the front of the vehicle.



(c) Install the steering link with the 4 bolts and nuts.
Torque: 74 N*m (749 kgf*cm, 54 ft.*lbf)
NOTICE:
- **Torque the bolt with the nut fixed as the nut has its own stopper.**
- **Do not turn the nut.**

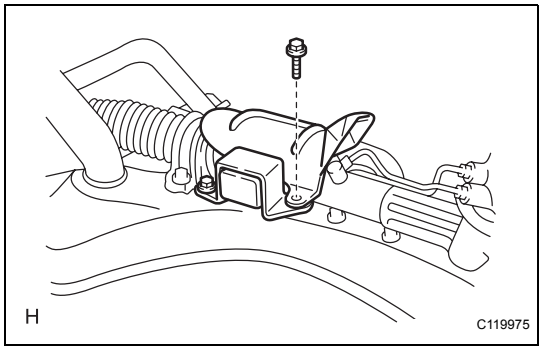


2. INSTALL STEERING INTERMEDIATE SHAFT

(a) Align the matchmarks on the intermediate shaft with the pinion shaft.

(b) Install the bolt.
Torque: 28 N*m (290 kgf*cm, 21 ft.*lbf)

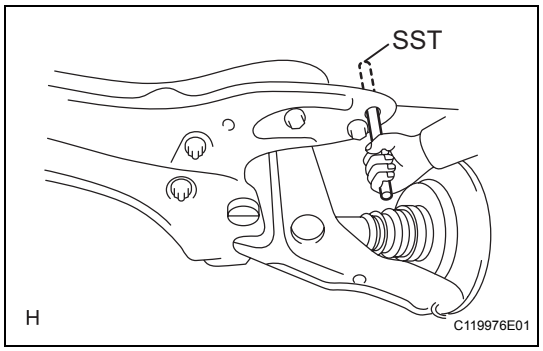
3. INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY



4. INSTALL POWER STEERING RACK HOUSING HEAT INSULATOR

(a) Install the heat insulator with the bolt as shown in the illustration.
Torque: 18 N*m (178 kgf*cm, 13 ft.*lbf)

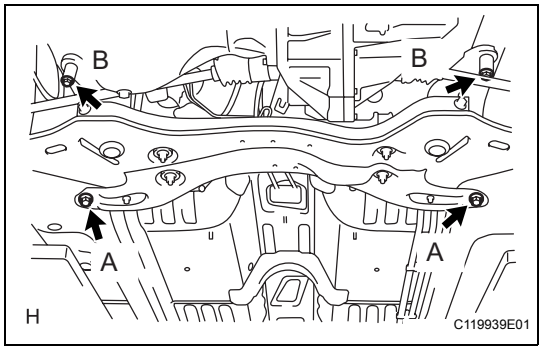
(b) Install the bolt to the heat insulator.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)



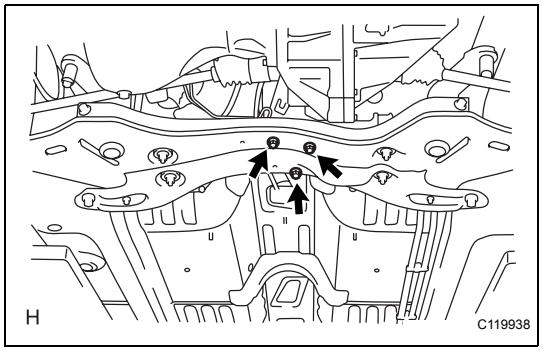
5. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

(a) Using a transmission jack, support the crossmember.

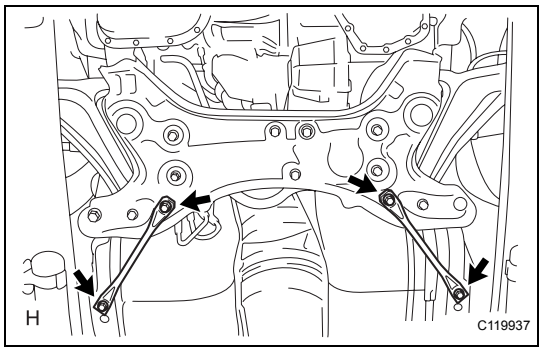
(b) Using SST, align the holes of the crossmember.
SST 09670-00010
HINT:
Use the same procedures described for the other side.



(c) Install the crossmember with the 4 bolts.
Torque: 116 N*m (1,183 kgf*cm, 86 ft.*lbf) for bolt A
Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf) for bolt B



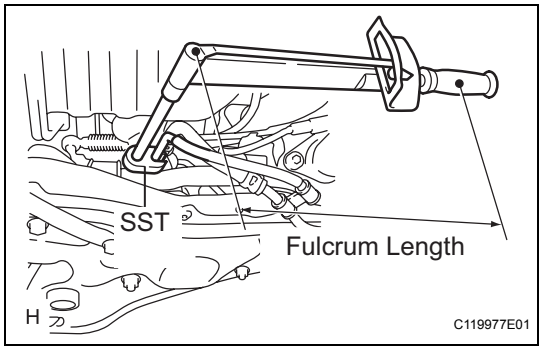
(d) Install the crossmember with the bolt and 2 nuts.
Torque: 72 N*m (734 kgf*cm, 53 ft.*lbf)



(e) Install the 2 reinforcements with the 4 bolts.
Torque: 47 N*m (479 kgf*cm, 35 ft.*lbf)

6. CONNECT NO. 1 FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER LH (See page DS-13)

7. REMOVE NO. 1 FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER RH
HINT:
Use the same procedures described for the LH side.



8. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Using SST, connect the pressure feed tube.
SST 09023-12701
Torque: 27 N*m (273 kgf*cm, 20 ft.*lbf)
HINT:
- Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).
- This torque value is effective when SST is parallel to a torque wrench.

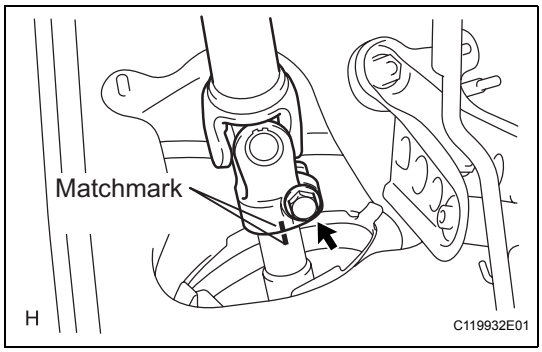
(b) Connect the return hose with the clip.

(c) Install the tube clamp to the crossmember with the bolts.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

9. **INSTALL TIE ROD END SUB-ASSEMBLY LH (See page DS-13)**

10. **INSTALL TIE ROD END SUB-ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.

11. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



12. **INSTALL STEERING SLIDING YOKE SUB-ASSEMBLY**
(a) Align the matchmarks on the sliding yoke and intermediate shaft.
(b) Tighten the bolt.
Torque: 28 N*m (290 kgf*cm, 21 ft.*lbf)

13. **INSPECT FRONT WHEELS FACING STRAIGHT AHEAD**

14. **REMOVE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY**

15. **ADD POWER STEERING FLUID**

16. **BLEED AIR FROM POWER STEERING SYSTEM (See page PS-3)**

17. **CHECK POWER STEERING FLUID LEVEL IN RESERVOIR (See page PS-3)**

18. **INSPECT POWER STEERING FLUID LEAK**

19. **INSTALL HOOD SUB-ASSEMBLY**
(a) Install the hood with the 4 bolts.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

20. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
(a) Inspect and adjust the front wheel alignment (see page SP-2).

21. **INSTALL ENGINE UNDER COVER LH**

22. **INSTALL ENGINE UNDER COVER RH**

23. **INSTALL COWL PANEL SUB-ASSEMBLY**

24. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**

25. **INSTALL COWL TOP VENTILATOR LOUVER LH (See page WW-10)**

26. **INSTALL COWL TOP VENTILATOR LOUVER RH (See page WW-11)**

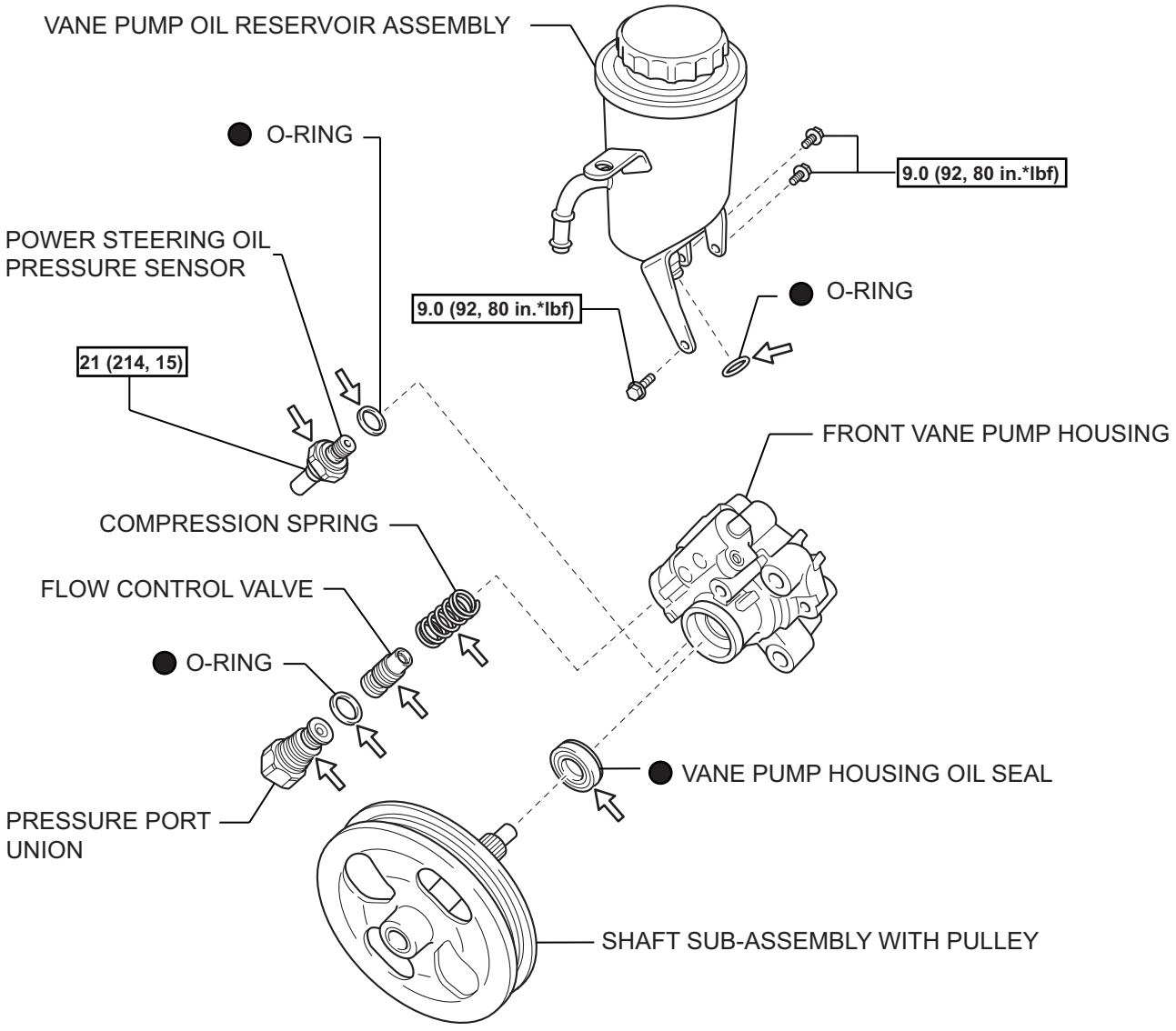
27. **INSTALL HOOD TO COWL TOP SEAL (See page WW-10)**

28. **INSTALL FRONT WIPER ARM LH (See page WW-11)**

29. **INSTALL FRONT WIPER ARM RH (See page WW-11)**

VANE PUMP

COMPONENTS

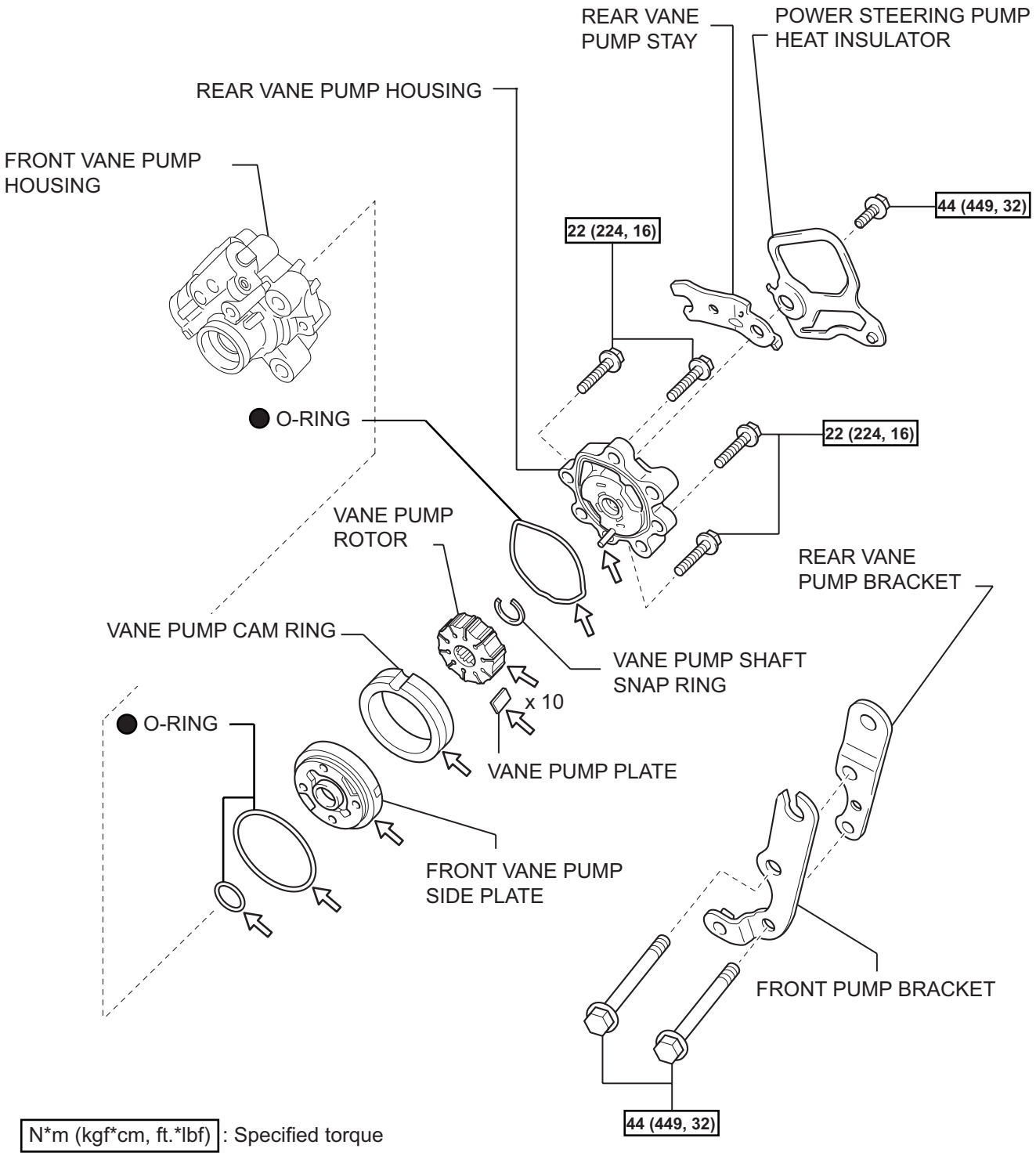


N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⇦ Power steering fluid

C119900E01



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⇦ Power steering fluid

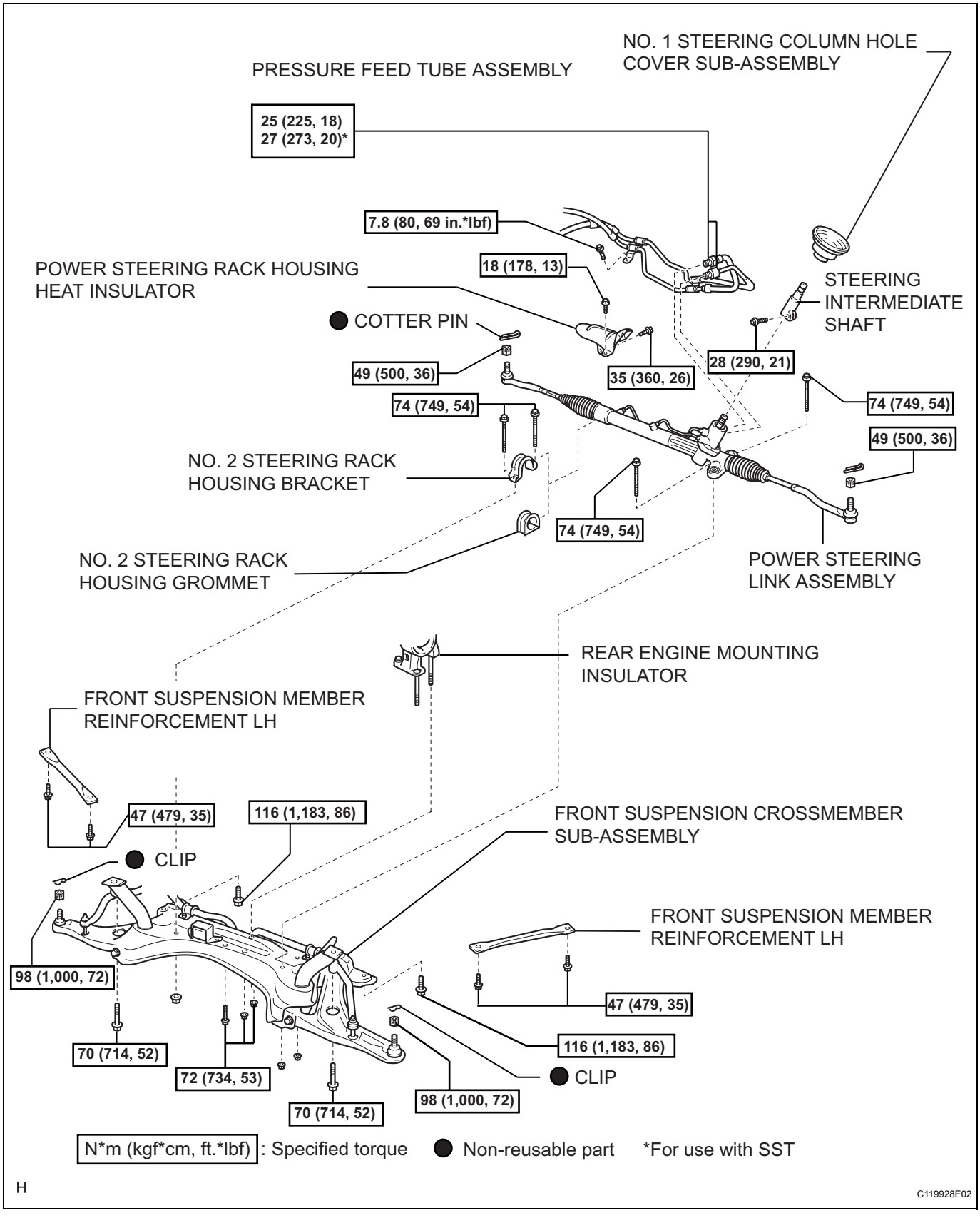
H

PS

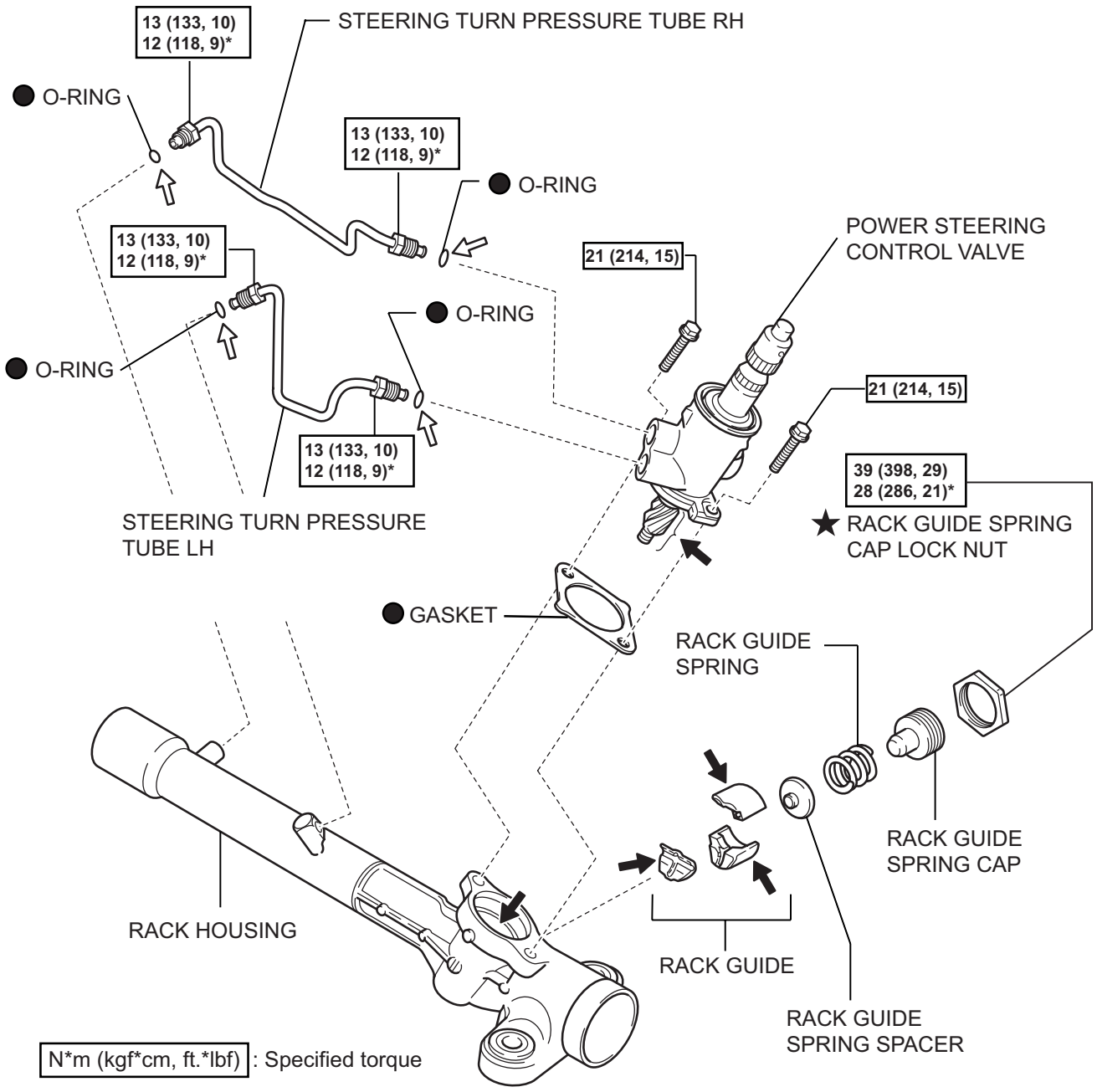
C119901E01

POWER STEERING LINK

COMPONENTS



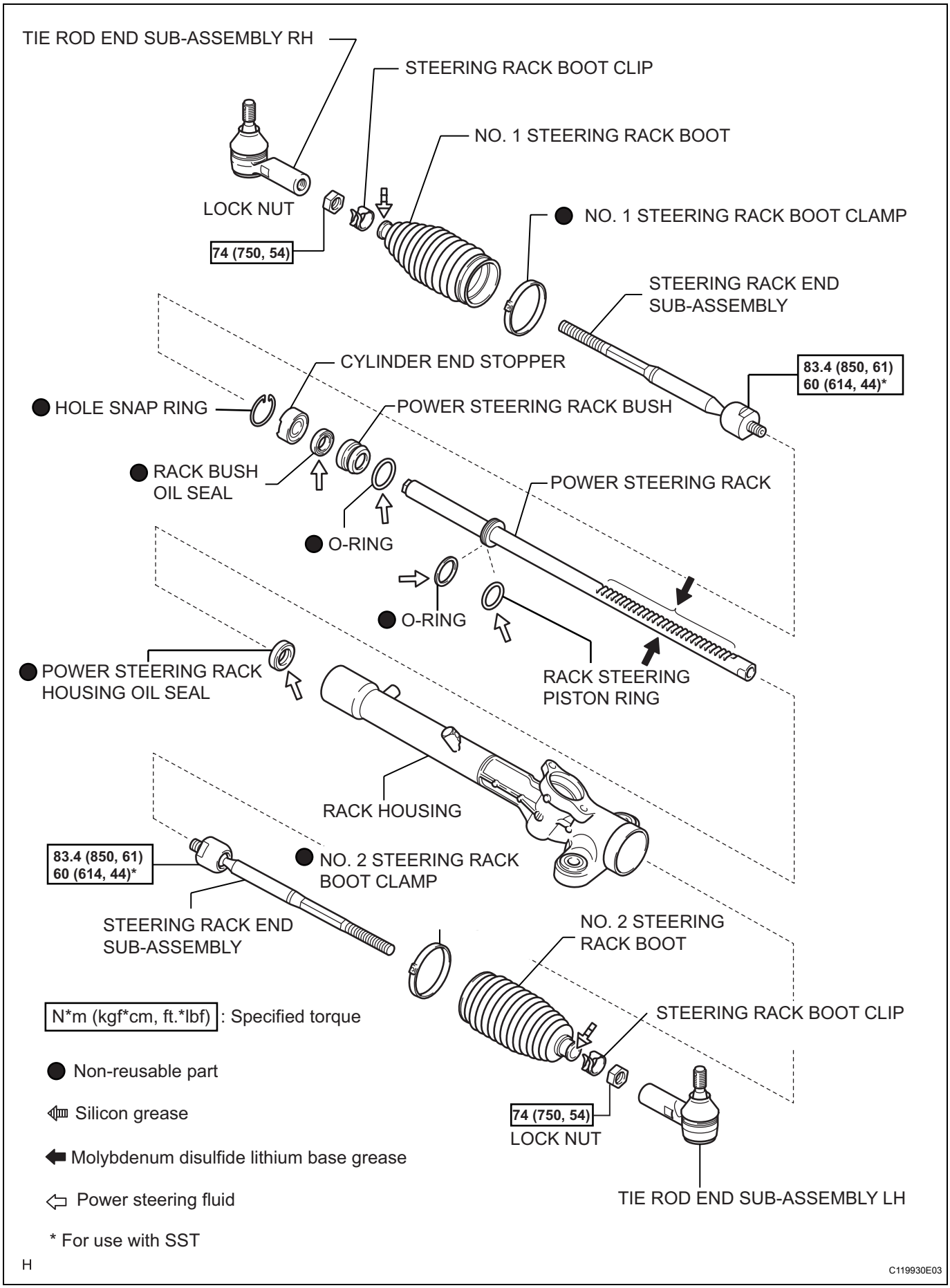
PS



H

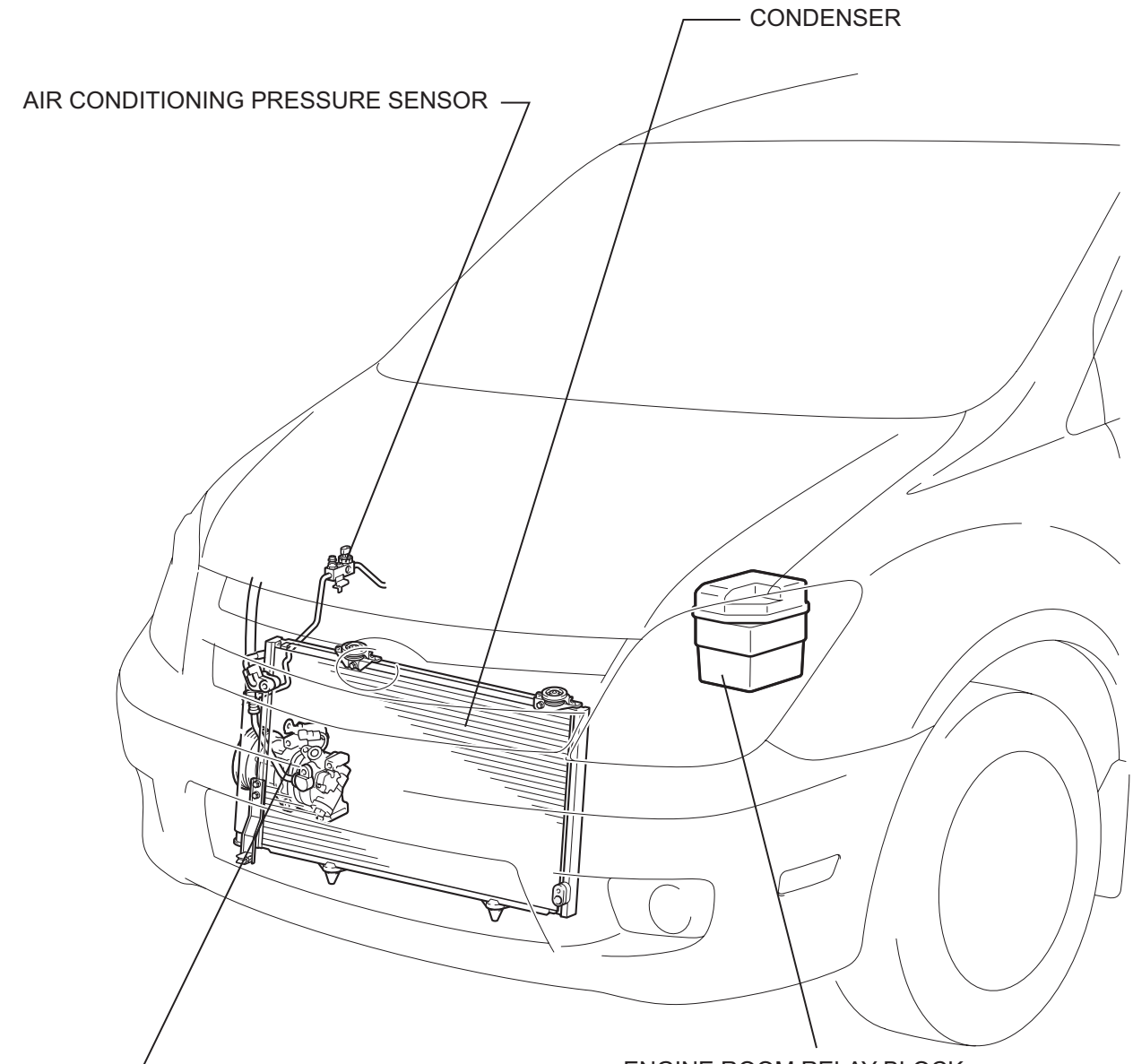
C119929E02

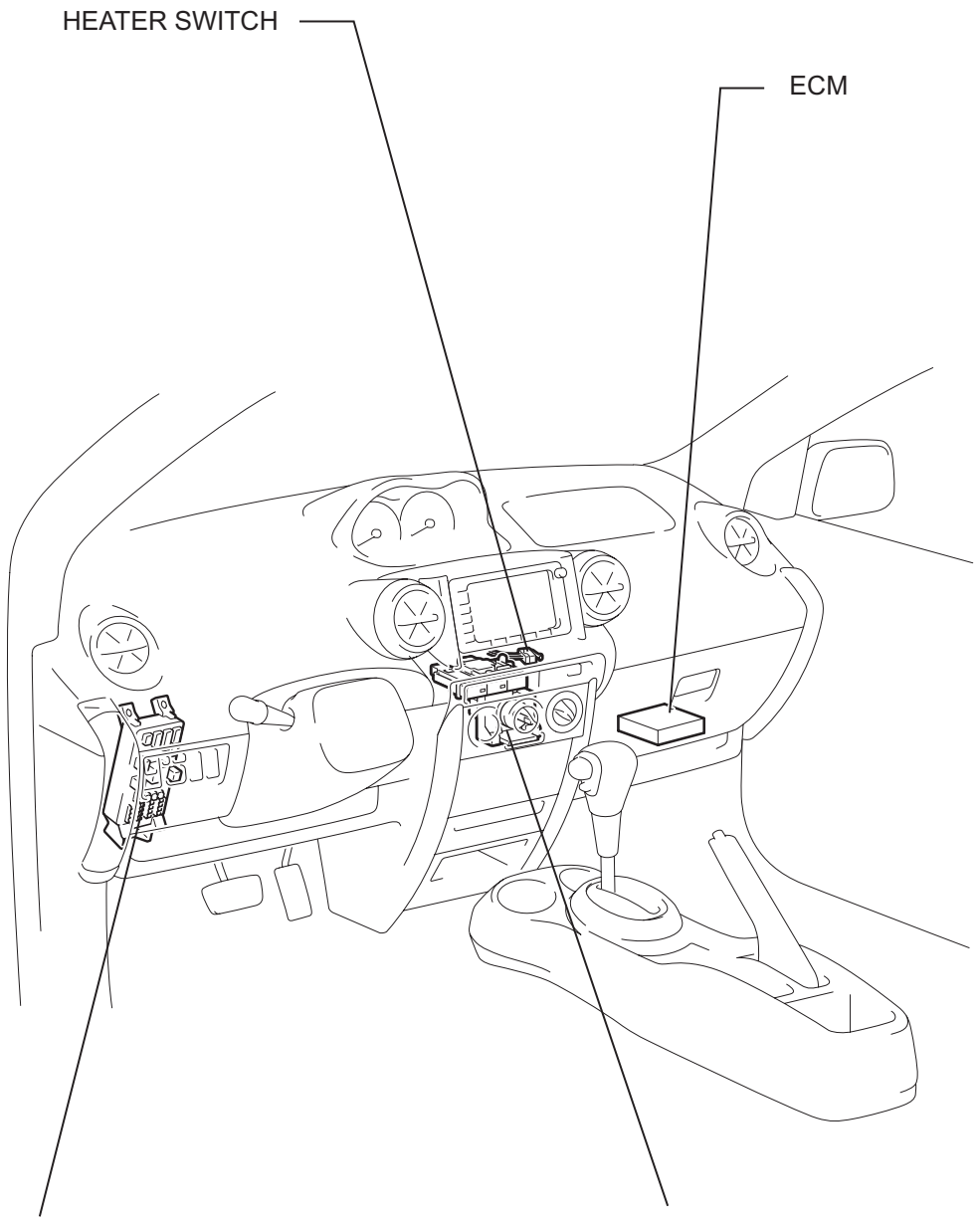
PS


TIE ROD END SUB-ASSEMBLY RH
STEERING RACK BOOT CLIP
NO. 1 STEERING RACK BOOT
LOCK NUT
74 (750, 54)
NO. 1 STEERING RACK BOOT CLAMP
STEERING RACK END SUB-ASSEMBLY
CYLINDER END STOPPER
83.4 (850, 61) 60 (614, 44)*
HOLE SNAP RING
POWER STEERING RACK BUSH
RACK BUSH OIL SEAL
POWER STEERING RACK
O-RING
O-RING
POWER STEERING RACK HOUSING OIL SEAL
RACK STEERING PISTON RING
RACK HOUSING
83.4 (850, 61) 60 (614, 44)*
NO. 2 STEERING RACK BOOT CLAMP
STEERING RACK END SUB-ASSEMBLY
NO. 2 STEERING RACK BOOT
STEERING RACK BOOT CLIP
74 (750, 54)
LOCK NUT
TIE ROD END SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Silicon grease
Molybdenum disulfide lithium base grease
Power steering fluid
* For use with SST
H
C119930E03

PS

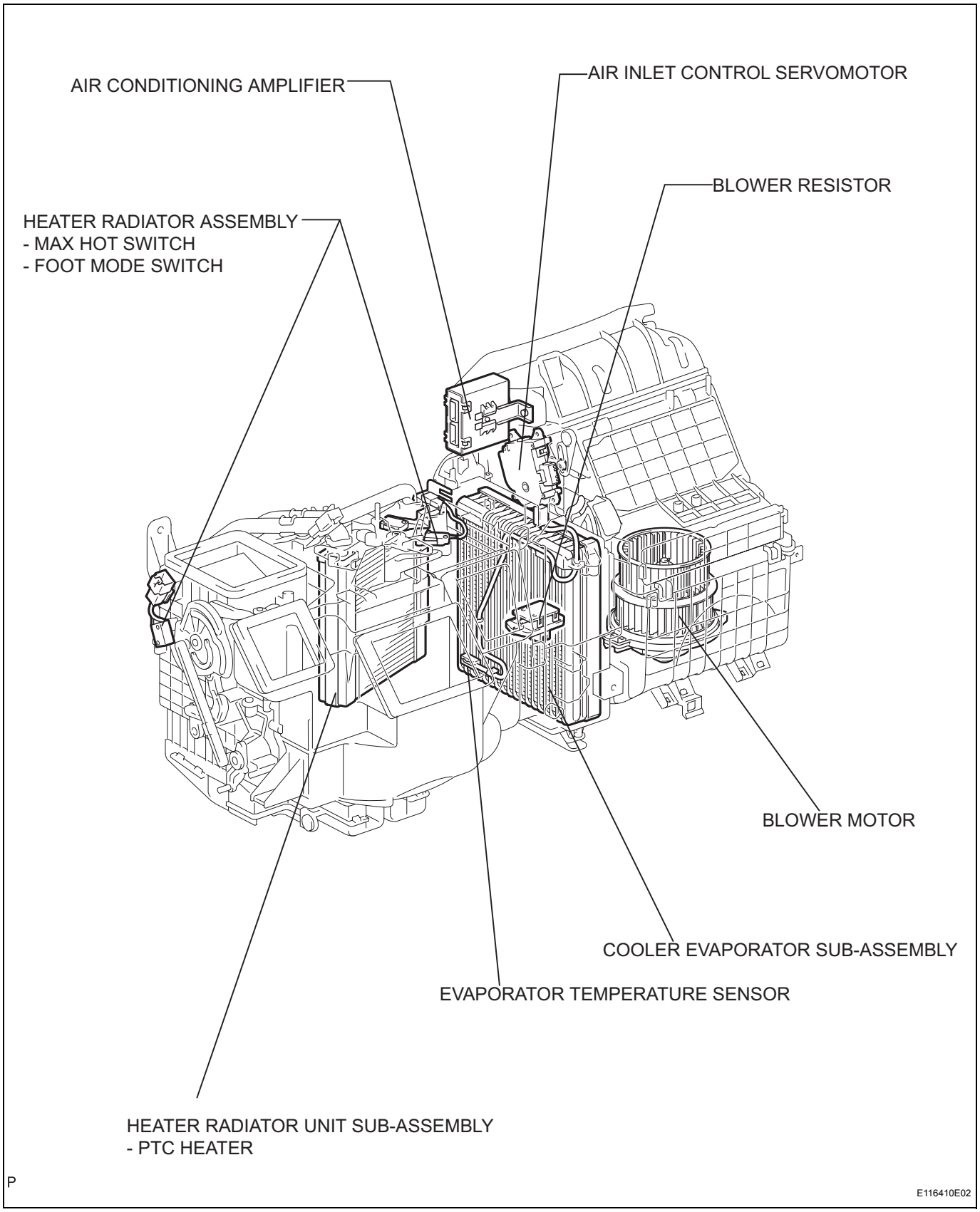
PARTS LOCATION



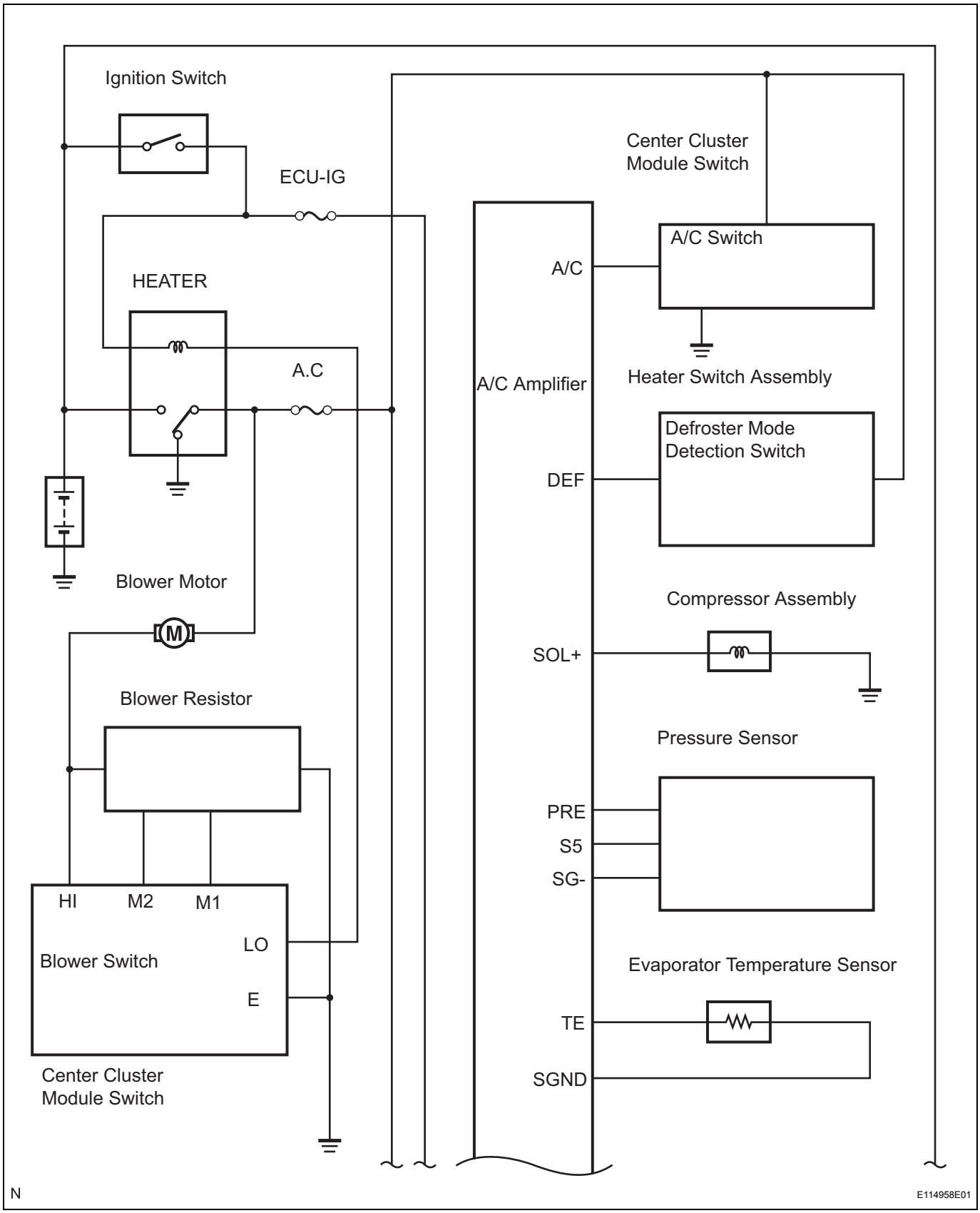


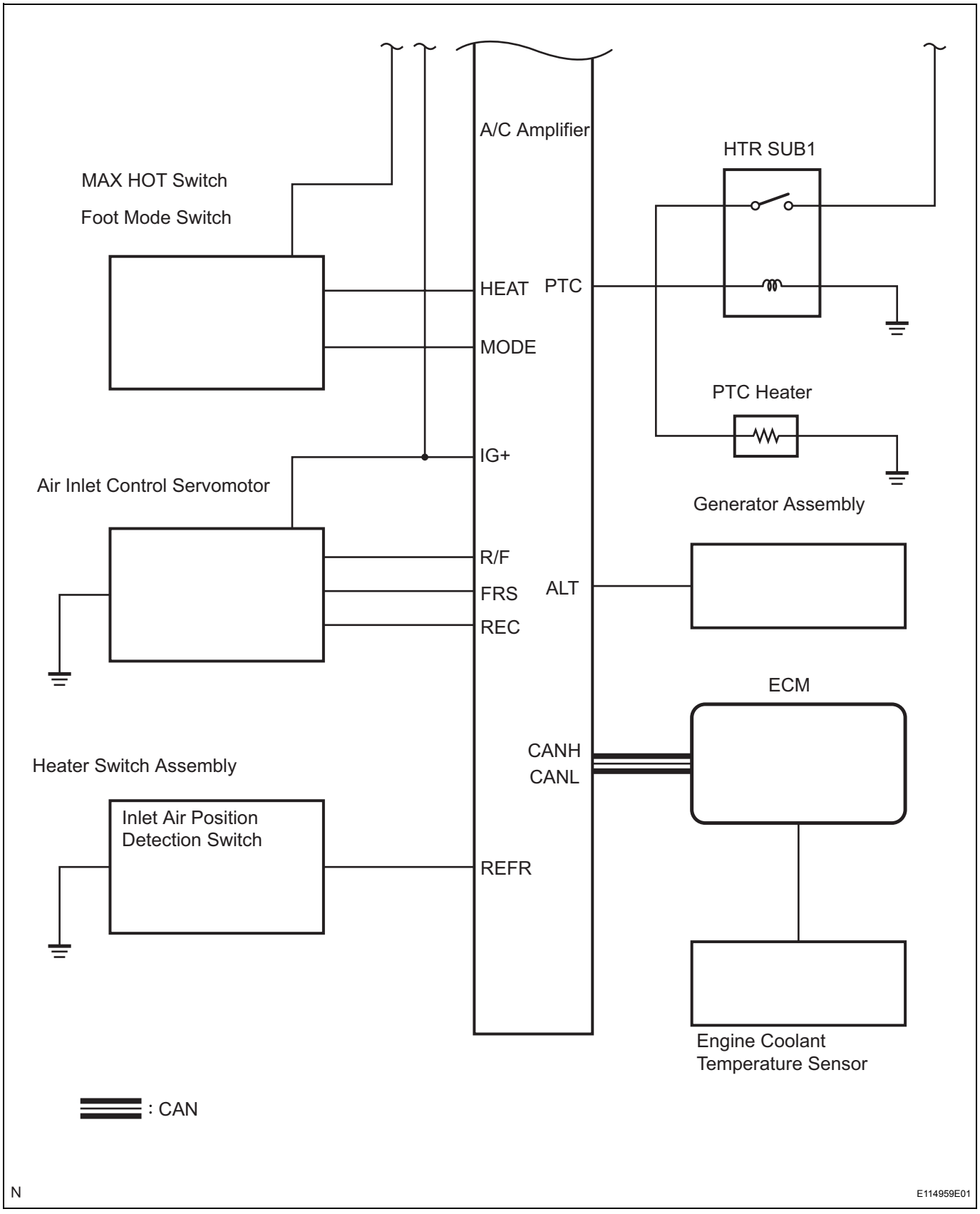
P

E116409E01


AIR CONDITIONING AMPLIFIER
AIR INLET CONTROL SERVOMOTOR
BLOWER RESISTOR
HEATER RADIATOR ASSEMBLY
- MAX HOT SWITCH
- FOOT MODE SWITCH
BLOWER MOTOR
COOLER EVAPORATOR SUB-ASSEMBLY
EVAPORATOR TEMPERATURE SENSOR
HEATER RADIATOR UNIT SUB-ASSEMBLY
- PTC HEATER
P
E116410E02

SYSTEM DIAGRAM




A/C Amplifier
HTR SUB1
MAX HOT Switch
Foot Mode Switch
HEAT
PTC
MODE
PTC Heater
IG+
Air Inlet Control Servomotor
Generator Assembly
R/F
FRS
REC
ALT
ECM
CANH
CANL
Heater Switch Assembly
Inlet Air Position
Detection Switch
REFR
Engine Coolant
Temperature Sensor
: CAN
N
E114959E01

AC

SYSTEM DESCRIPTION

1. GENERAL

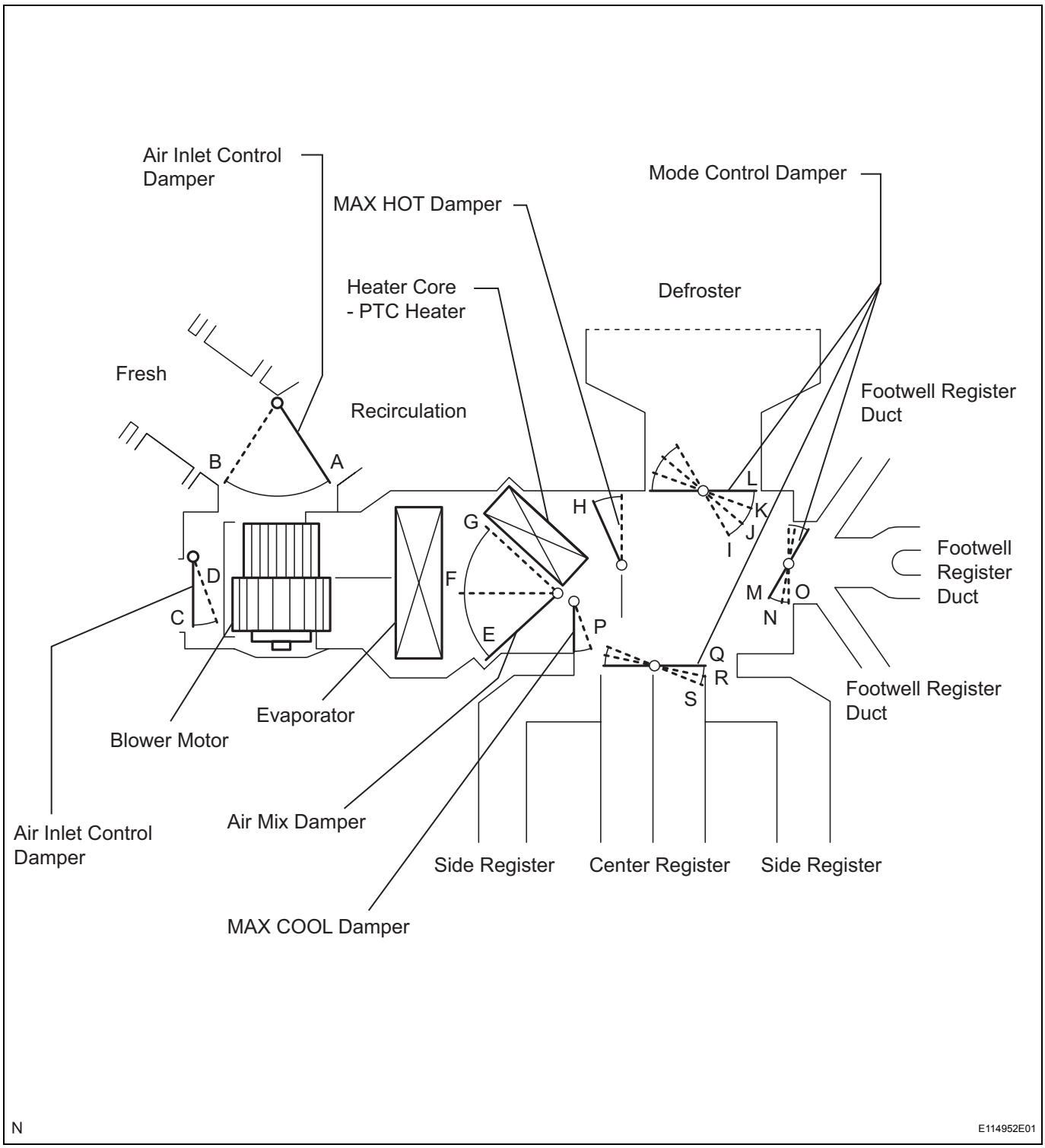
(a) Air Conditioning Unit

- The evaporator body has been coated with a type of resin that contains an antibacterial agent in order to minimize foul odor and the propagation of bacteria.
- An MS (Multi-tank, Super-slim) structure evaporator consists of the top and bottom tanks and inner fin.
- A compact, lightweight, and highly efficient straight flow (full-path flow) aluminum heater core is used.
- A 2-way flow type air conditioning unit changes the 2-way flow operation if specified conditions are met. Under 2-way flow operation, the system introduces external air and internal air simultaneously as follows: 1) warm internal air is discharged to the foot area; and 2) fresh, dry, external air is discharged to the upper area. Thus, it realizes both excellent heating performance and demisting performance.
- The PTC (Positive Temperature Coefficient) heater contains electrodes that are interposed with a PTC element, to which current is applied in order to warm the air that passes through the fin.

(b) Other Equipment

- The compressor is a continuously variable capacity type in which its capacity varies in accordance with the cooling load of the air conditioner.
- The A/C amplifier assembly is equipped with a self-diagnosis function. If there is a malfunction in the system, it stores DTC(s) in its memory.
- When the A/C amplifier assembly uses the CAN communication line, necessary data is shared with the ECM.

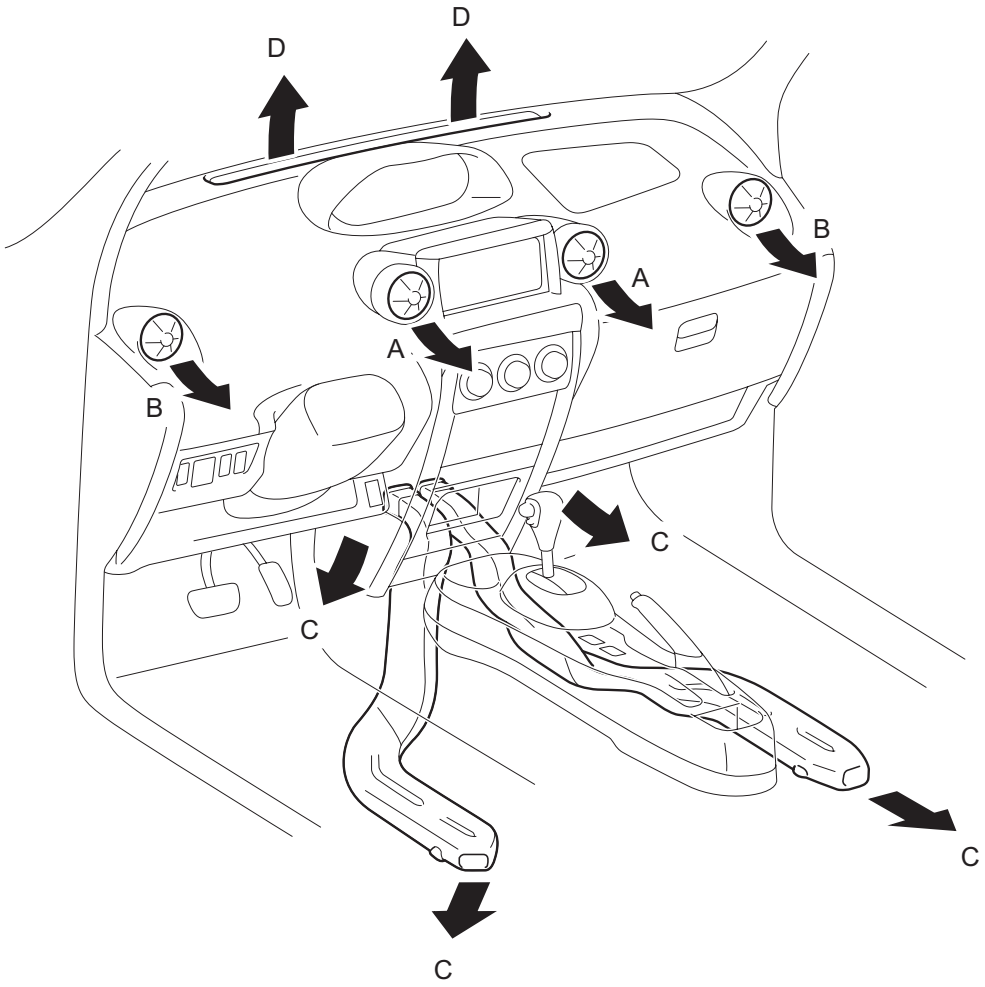
2. MODE POSITION AND DAMPER OPERATION



Control Damper	Control Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A, C	Brings in fresh air
	FRESH (During 2-way flow control)	A, D	Brings in fresh air and recirculates internal air
	RECIRCULATION	B, D	Recirculates internal air
Air Mix Control Damper	HOT TO COOL	E, F, G	Varies mixture ratio of fresh air and recirculation air in order to regulate temperature continuously from HOT to COLD

Control Damper	Control Position	Damper Position	Operation
Mode Control Damper	FACE	L, O, S	Air blows out of center register and side register
	BI-LEVEL	L, N, R	Air blows out of center register, side register and footwell register duct
	FOOT	K, M, Q	Air blows out of footwell register duct, and side register. In addition, air blows out slightly from center defroster.
	FOOT/DEF	J, N, Q	Defrosts windshield through center defroster and side register, while air is also blown out from footwell register duct
	DEF	I, O, Q	Defrosts windshield through center defroster and side register
MAX COOL Damper	MAX COOL	P	Operates during MAX COOL to improve maximum cooling performance
MAX HOT Damper	MAX HOT	H	Operates during MAX HOT to improve maximum heating performance

3. AIR OUTLETS AND AIRFLOW VOLUME



P E114951E01

		A	B	C	D
Air Outlet Mode		**Center Face**	**Side Face**	**Foot**	**Defroster**
FACE		○	○	-	-
BI-LEVEL		○	○	○	-
FOOT		MAX COOL only ○	○	◯	○

AC

		A	B	C	D
Air Outlet Mode		**Center Face**	**Side Face**	**Foot**	**Defroster**
FOOT / DEF		MAX COOL only ○	○	◯	◯
DEF		MAX COOL only ○	○	-	◯

HINT:
The circle size (○) indicates the proportion of air flow volume.
There are 4 sizes.

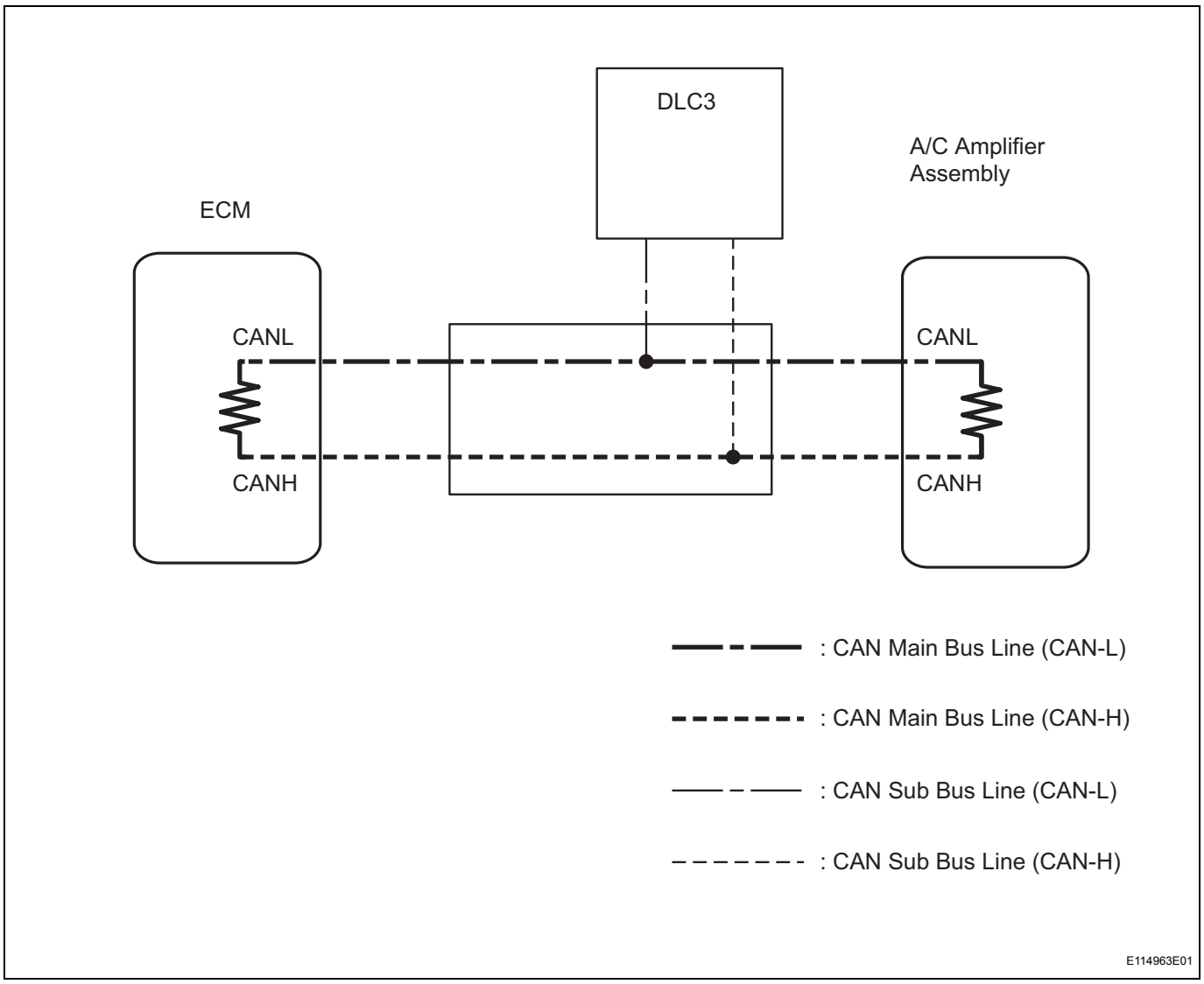
DTC	B1499	Multiplex Communication Circuit

DESCRIPTION

The A/C amplifier assembly communicates data with the ECM through the CAN communication system.

DTC No.	DTC Detection Condition	Trouble Area
B1499	Communication stop between ECM and A/C amplifier assembly	• A/C amplifier assembly • ECM • CAN communication line

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INTELLIGENT TESTER VIA CAN VIM

(a) Connect the intelligent tester to the DLC3 with the ignition switch turned OFF.
(b) Turn the ignition switch ON and turn the intelligent tester on.

AC

(c) Select "BUS CHECK".

Display	Proceed to
ENGINE is not indicated on the tester display (A/C AMPLIFIER is indicated)	A
A/C AMPLIFIER is not indicated on the tester display (ENGINE is indicated)	B
Neither ENGINE nor A/C AMPLIFIER are indicated on the tester display	C

B → **GO TO A/C AMPLIFIER COMMUNICATION STOP MODE (CAN COMMUNICATION SYSTEM)**

C → **GO TO CAN COMMUNICATION SYSTEM**

A

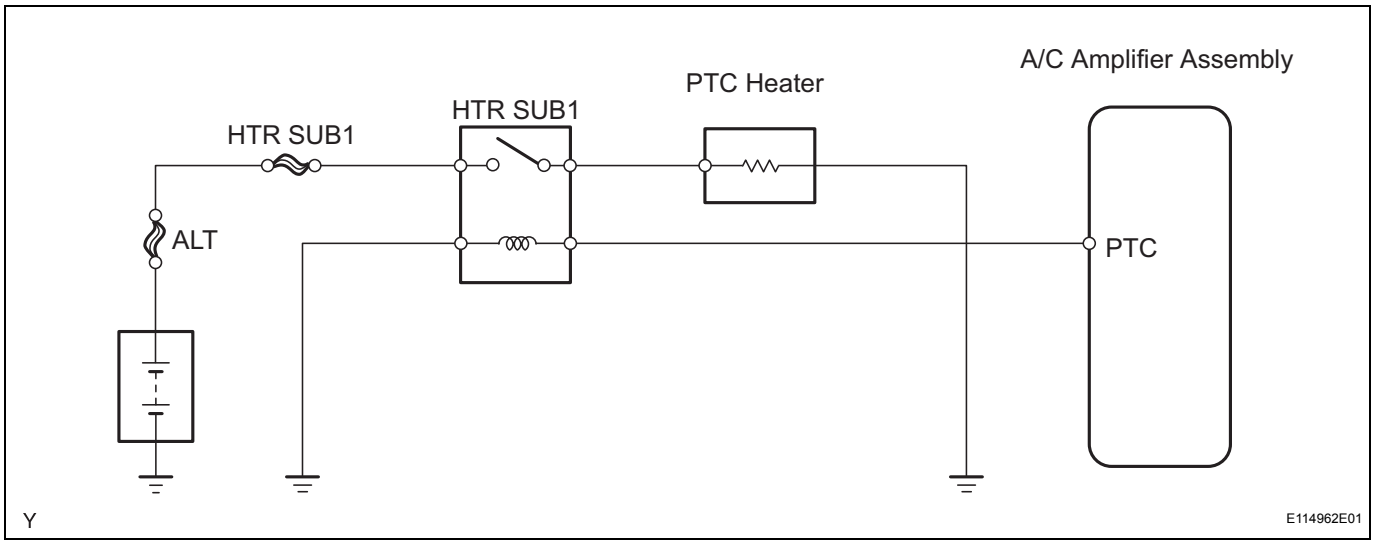
GO TO ECM COMMUNICATION STOP MODE (CAN COMMUNICATION SYSTEM)

PTC Heater Circuit

DESCRIPTION

The PTC relay turns on when it receives a signal from the A/C amplifier. As a result, power is supplied to the PTC heater installed on the heater radiator unit sub-assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

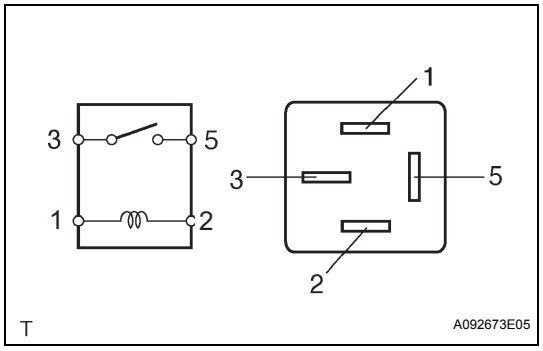
1	INSPECT FUSE (HTR SUB1)

(a) Remove the HTR SUB1 H-fuse from the engine room relay block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	INSPECT PTC HEATER RELAY (Marking: HTR SUB1)



(a) Remove the PTC heater relay from the engine room relay block.
(b) Measure the resistance of the relay.
Standard resistance

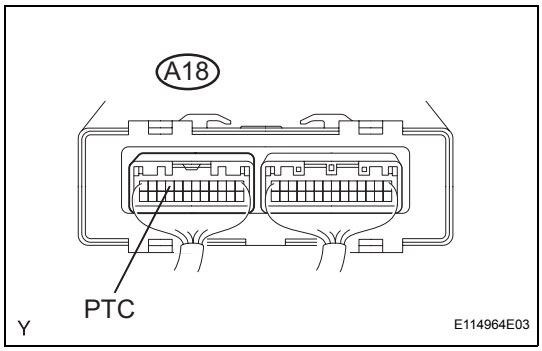
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE PTC HEATER RELAY**

AC

OK

3	CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY (PTC VOLTAGE)



(a) Remove the A/C amplifier assembly but do not disconnect its connector.
(b) Turn the ignition switch ON.
(c) While the PTC operating conditions are met (engine rpm is at idle rpm or more, engine coolant temperature is 70°C (158°F) or less, air mix control knob setting is MAX HOT), turn the blower switch to the Lo setting.
(d) Measure the voltage of the connector.

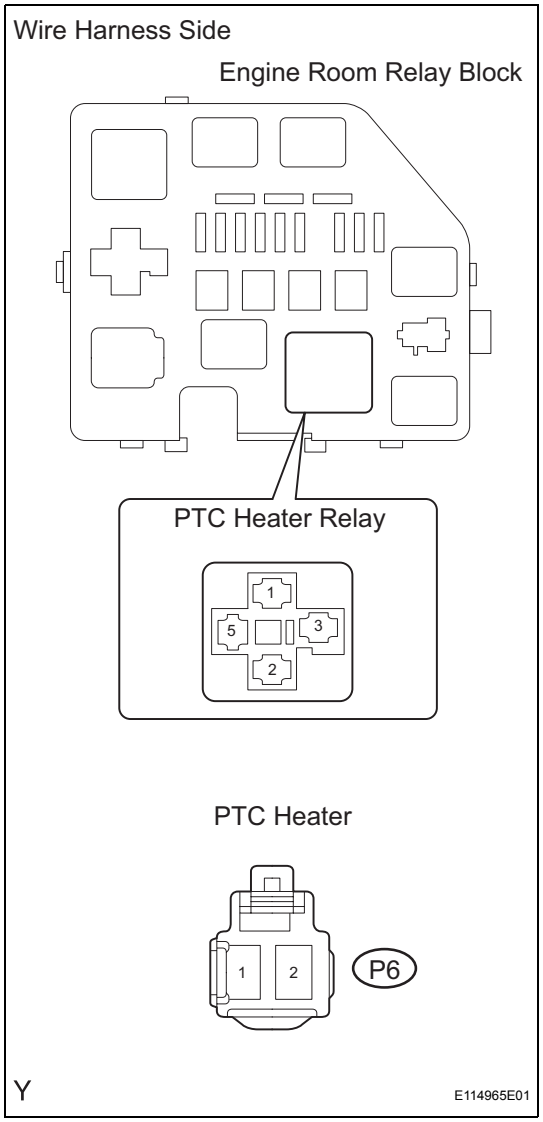
Standard voltage

Tester Connection	Specified Condition
A18-9 (PTC) - Body ground	Below 1 V

NG → **Go to step 6**

OK

4	CHECK WIRE HARNESS (PTC HEATER RELAY - PTC HEATER AND BATTERY)



(a) Remove the PTC heater relay from the engine room relay block.
(b) Disconnect the P6 heater connector.
(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
PTC heater relay terminal 3 - Body ground	10 to 14 V

(d) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
PTC heater relay terminal 5 - P6-1	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK PTC HEATER

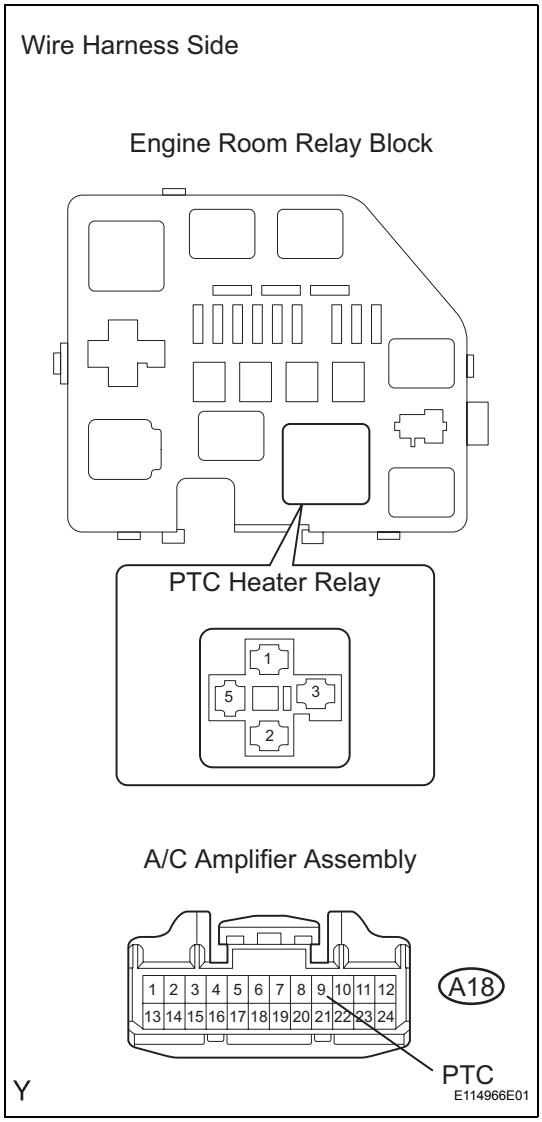
(a) After replacing the PTC heater with a normal one, check that the PTC heater function operates normally.
OK:
PTC heater function operates normally.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

REPLACE HEATER RADIATOR UNIT SUB-ASSEMBLY

6	CHECK WIRE HARNESS (PTC HEATER RELAY - AMPLIFIER AND BODY GROUND)



(a) Remove the PTC heater relay from the engine room relay block.
(b) Disconnect the A18 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
PTC heater relay terminal 2 - A18-9 (PTC)	Below 1 Ω
PTC heater relay terminal 1 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7	CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY

(a) After replacing the A/C amplifier assembly with a normal one, check that the PTC heater function operates normally.

OK:

PTC heater function operates normally.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

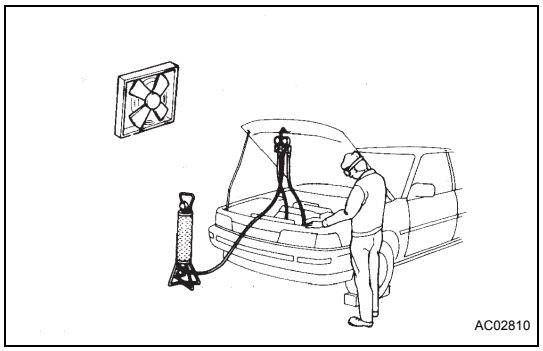
REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY

AIR CONDITIONING SYSTEM

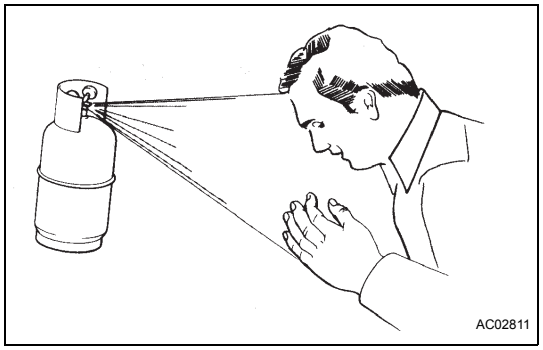
PRECAUTION

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

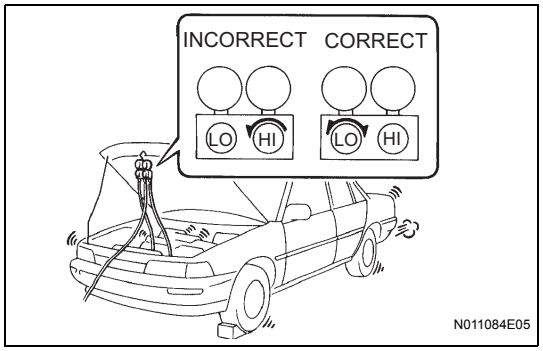
System Name	See procedure
Sliding Roof System	IN-5



1. **DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME**
2. **ALWAYS WEAR PROTECTIVE GLASSES**



3. **AVOID SKIN OR EYE CONTACT WITH LIQUID REFRIGERANT**
   If liquid refrigerant comes in contact with your eyes or skin:
   (a) Rinse the area thoroughly with cold water.
   CAUTION:
   Do not rub your eyes or skin.
   (b) Apply clean petroleum jelly to the skin.
   (c) Go immediately to a hospital or see a physician for professional treatment.
4. **NEVER HEAT CONTAINER OR EXPOSE IT TO OPEN FLAME**
5. **DO NOT DROP OR STRIKE CONTAINER OF REFRIGERANT**



6. **DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT SYSTEM**
   If there is not enough refrigerant in the refrigerant system, oil lubrication will be insufficient and the compressor may burn out. Care should be taken to avoid this.
7. **DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING**
   Only open and close the low pressure valve. If the high pressure valve is opened, refrigerant flows in the reverse direction and causes the charging cylinder to rupture.
8. **BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT**
   Overcharged refrigerant will cause problems such as insufficient cooling, poor fuel economy, engine overheating, etc.

9. DO NOT OPERATE ENGINE AND COMPRESSOR WITHOUT REFRIGERANT IN REFRIGERANT SYSTEM

NOTICE:

This may damage the inside of the compressor because the compressor parts move regardless of whether the A/C system is turned on or off.

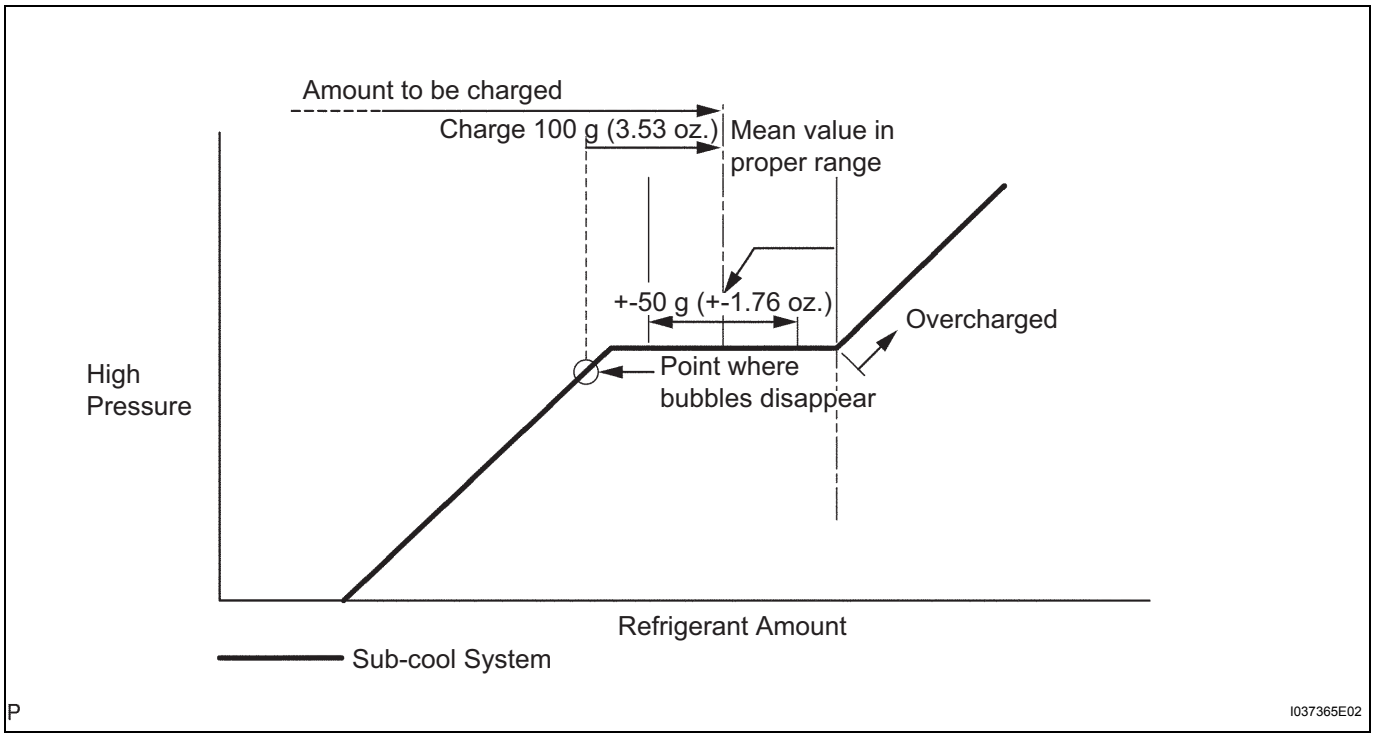
REPLACEMENT

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

(a) Start up the engine.
(b) Turn the A/C switch ON.
(c) Operate the cooler compressor with the engine running at approximately 1,000 rpm for 5 to 6 minutes to circulate the refrigerant and collect the compressor oil remaining in each component into the cooler compressor.
(d) Stop the engine.
(e) Using SST, discharge the refrigerant gas.
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)

2. CHARGE REFRIGERANT

(a) Perform vacuum purging using a vacuum pump.
(b) Using SST, charge refrigerant HFC-134a (R134a).
Standard amount:
460 +-30 g (16.2 +-1.1 oz.)
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)



NOTICE:

- **Do not operate the cooler compressor before charging refrigerant as the cooler compressor will not work properly without any refrigerant, and will overheat.**

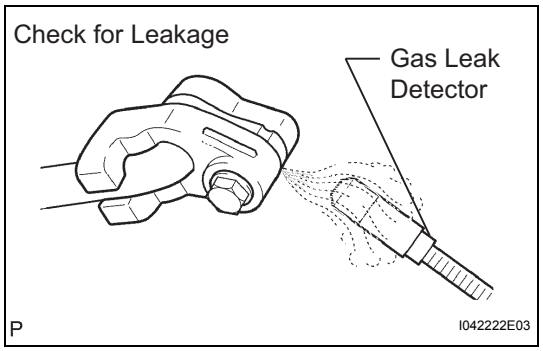
- **Approximately 100 g (3.53 oz.) of refrigerant may need to be charged after bubbles disappear. The refrigerant amount should be checked by measuring its quantity, not with the sight glass.**

3. WARM UP ENGINE

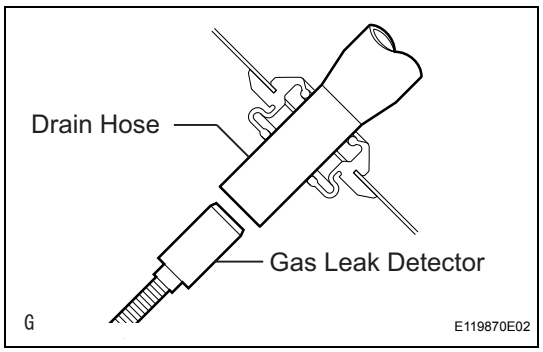
(a) Warm up the engine at less than 1,850 rpm for 2 minutes or more after charging the refrigerant.
NOTICE:
After removing and installing the cooler refrigerant lines (with the compressor), be sure to warm up the compressor when turning the A/C switch ON. This is done to prevent damage to the compressor.

4. CHECK FOR LEAKAGE OF REFRIGERANT

(a) After recharging the refrigerant gas, prepare the vehicle for a refrigerant gas leakage check by making sure the following conditions are met.
- The ignition switch is OFF.
- The vehicle is in a place with good air ventilation and without any volatile gases, such as evaporated gasoline or exhaust gas. The detector is very sensitive to volatile gases. If volatile gases are unavoidable, the vehicle must be lifted up.
- Some refrigerant is remaining in the refrigerant system.
- The compressor is OFF and its pressure is approximately 392 to 588 kPa (4 to 6 kgf/cm^2).



(b) Check for refrigerant gas leakage from the refrigerant line.
(1) After the blower motor stops, wait at least 15 minutes.
(2) Using a gas leak detector, check that gas is not leaking from the refrigerant line.
If leakage is found, tighten parts or replace damaged parts as necessary to stop the leak.



(c) Check for refrigerant gas leakage from the drain hose.
(1) Hold the gas leak detector so that the sensor is under the drain hose, as shown in the illustration.
(2) Check that gas is not leaking from the drain hose.
If leakage is found, tighten parts or replace damaged parts as necessary to stop the leak.

(d) Check for refrigerant gas leakage from the cooling unit.
  (1) Remove the blower motor control from the unit. Insert the gas leak detector's sensor into the unit.
  (2) Check that gas is not leaking from the unit. If leakage is found, tighten parts or replace damaged parts as necessary to stop the leak.

(e) Check for refrigerant gas leakage from the pressure switch.
  (1) Disconnect the pressure switch connector and wait approximately 20 minutes.
  (2) Using a gas leak detector, check that gas is not leaking from the pressure switch. If leakage is found, tighten parts or replace damaged parts as necessary to stop the leak.

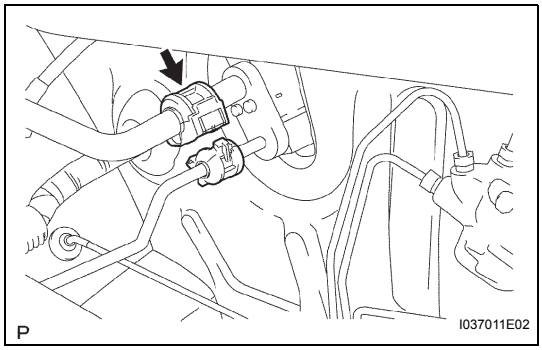
(f) Repeat all steps above 2 to 3 times.

REMOVAL

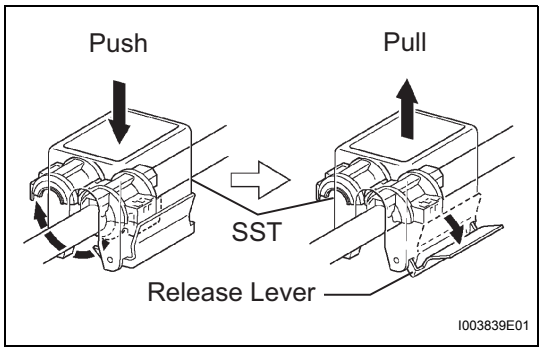
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM**

3. **DISCONNECT SUCTION HOSE SUB-ASSEMBLY**

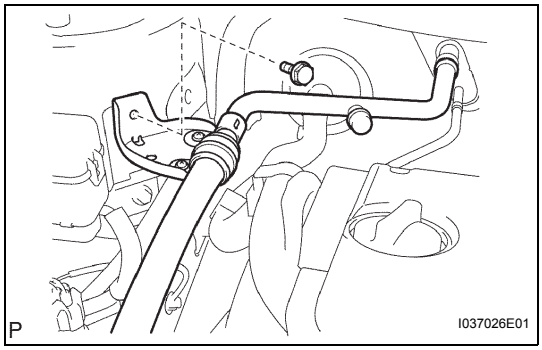


(a) Install SST to the piping clamp.
SST 09870-00015
NOTICE:
Be careful not to deform the hose when pushing down on SST.
HINT:
Confirm the direction of the piping clamp claw and SST by referring to the illustration shown on the caution label.

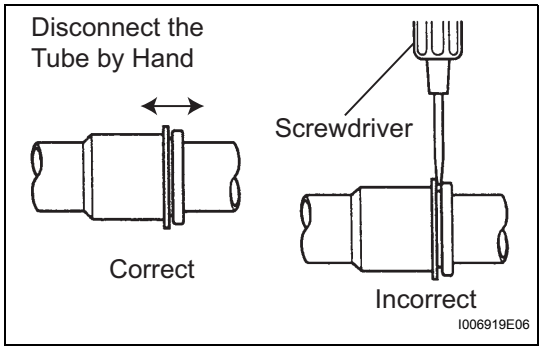


(b) Push down on SST and detach the clamp lock.
NOTICE:
Be careful not to deform the hose when pushing down on SST.

(c) Pull SST slightly, push the release lever, and then remove the piping clamp with SST.



(d) Remove the bolt and disconnect the bracket.



(e) Disconnect the suction hose.
NOTICE:
- **Do not use tools, such as a screwdriver, to remove the tube.**
- **Cap the open fittings immediately to keep moisture or dirt out of the system.**

(f) Remove the 2 O-rings from the suction hose.
NOTICE:
Seal the openings of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.

AC

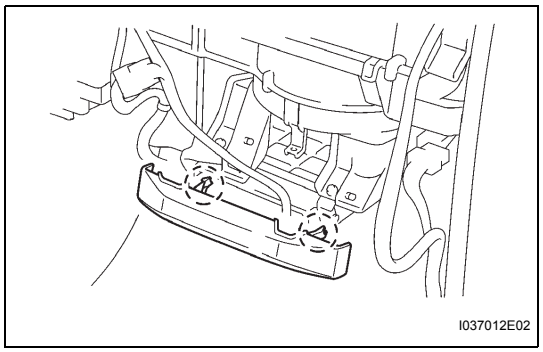
4. **DISCONNECT LIQUID TUBE SUB-ASSEMBLY**
HINT:
Use the same procedures described for the suction hose.

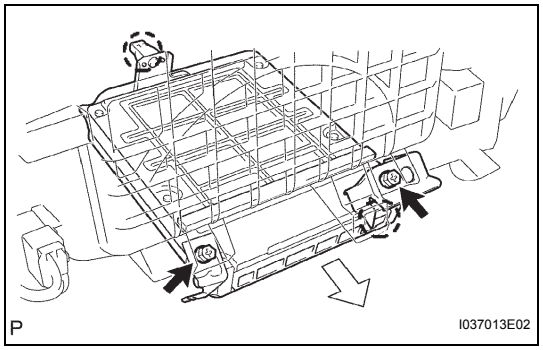
5. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY**
(a) Remove the instrument panel (see page IP-4).

6. **REMOVE LOWER INSTRUMENT PANEL ASSEMBLY**
(a) Remove the instrument panel (see page IP-17).

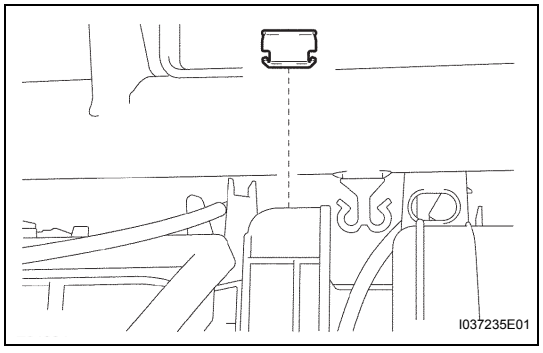
7. **REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY**

8. **REMOVE ECM COVER**
(a) Detach the 2 claws and remove the cover.

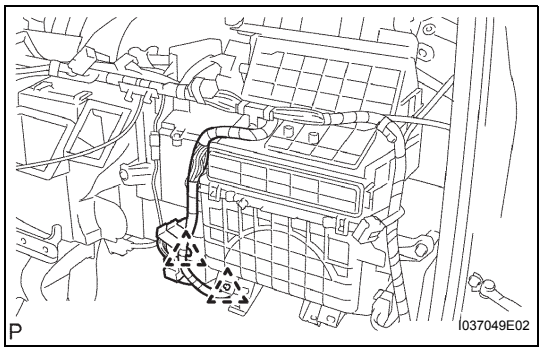




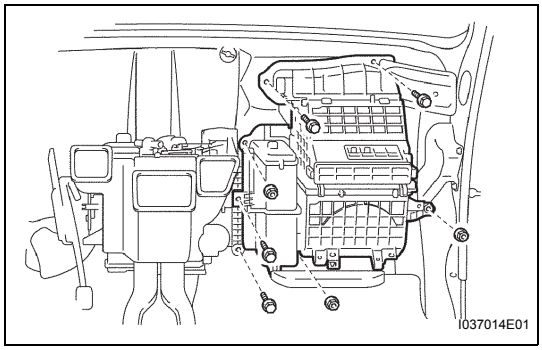
9. **REMOVE ECM**
(a) Disconnect the connectors.
(b) Remove the 2 screws.
(c) Detach the 2 claws and remove the ECM.



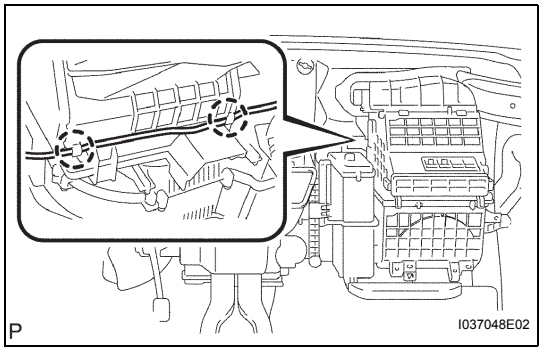
10. **REMOVE AIR CONDITIONING BLOWER ASSEMBLY**
(a) Remove the clamp.
(b) Disconnect the connectors.



(c) Detach the 2 clamps and disconnect the wire harness.



(d) Remove the 4 bolts and 3 nuts. Then remove the A/C blower.

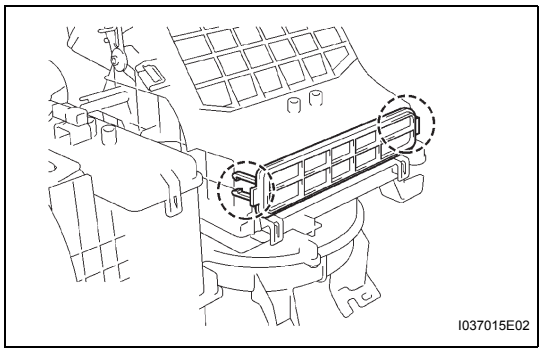


(e) Disconnect the 2 clamps and remove the wire harness.

DISASSEMBLY

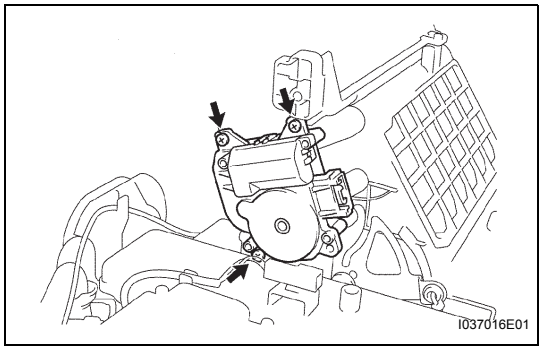
1. REMOVE AIR FILTER CASE

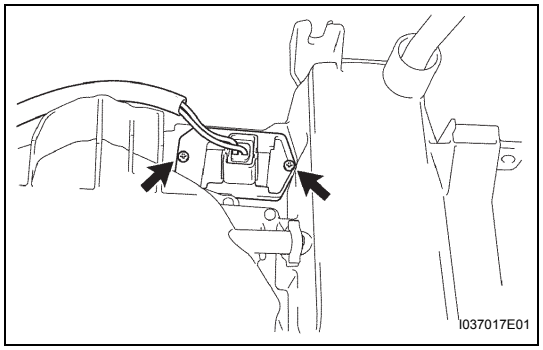
(a) Detach the 2 claws and remove the air filter case.



2. REMOVE DAMPER SERVO SUB-ASSEMBLY

(a) Remove the 3 screws and damper servo.

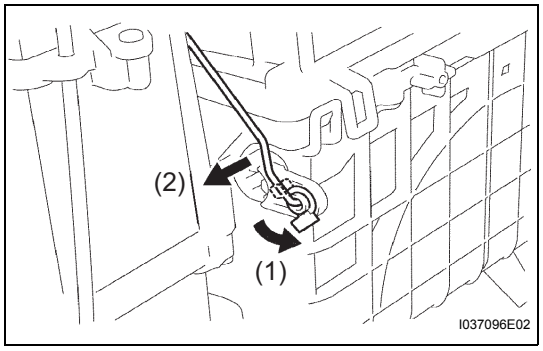




3. REMOVE BLOWER RESISTOR

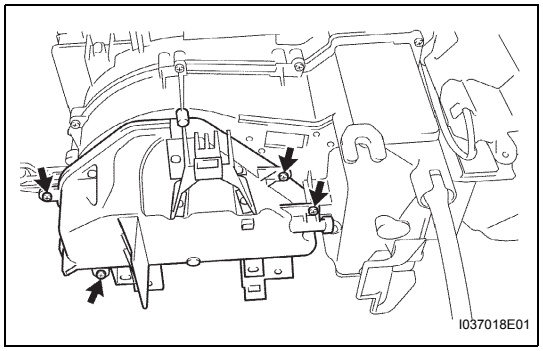
(a) Disconnect the connector.

(b) Remove the 2 screws and blower resistor.

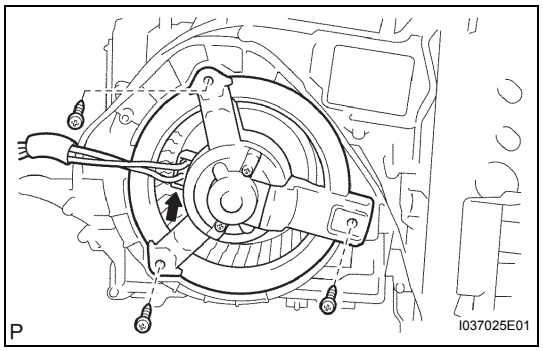


4. REMOVE BLOWER MOTOR COVER

(a) Disconnect the rod in the order shown in the illustration.



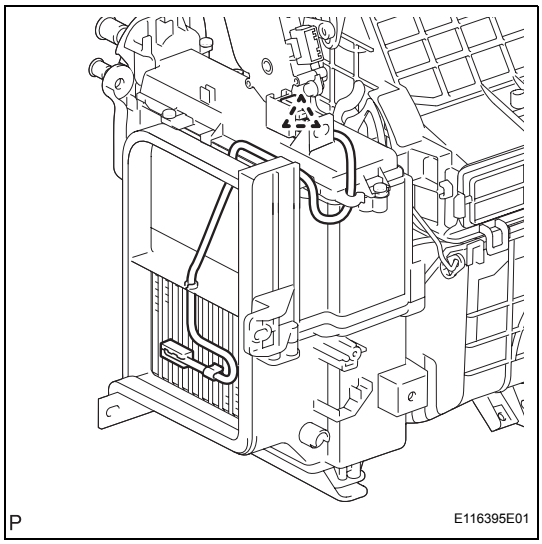
(b) Remove the 4 screws and blower motor cover.



5. REMOVE BLOWER WITH FAN MOTOR SUB-ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 3 screws and blower motor.

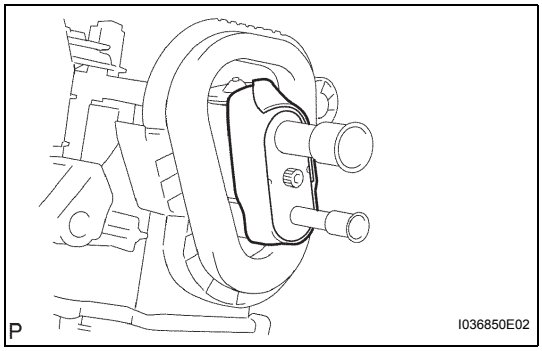


6. REMOVE COOLER THERMISTOR

(a) Detach the clamp and remove the cooler thermistor.

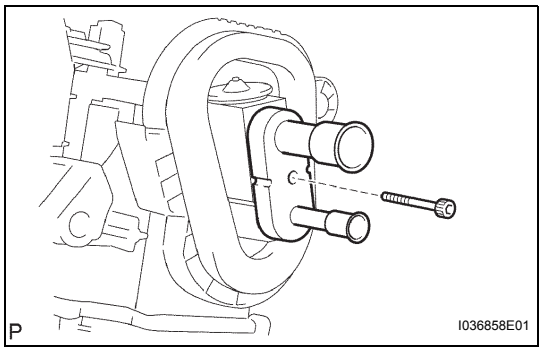
NOTICE:

Do not damage the packing when removing the thermistor.



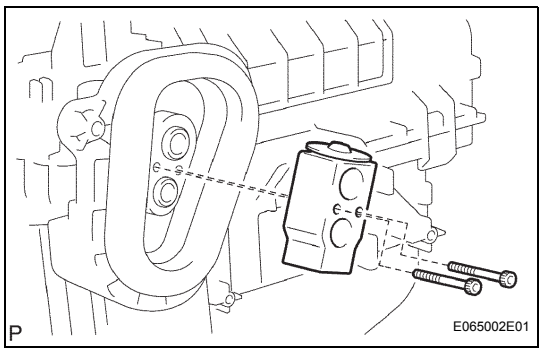
7. REMOVE AIR CONDITIONING TUBE ASSEMBLY

(a) Remove the packing.



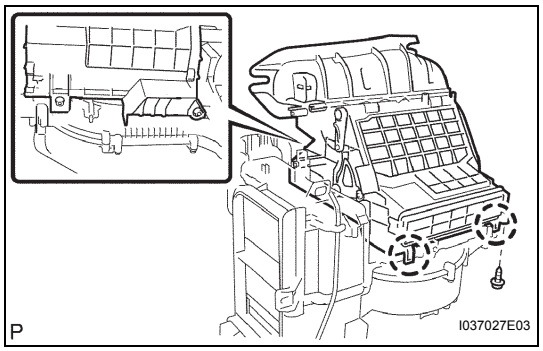
(b) Using a 5 mm hexagon wrench, remove the bolt and A/C tube.

(c) Remove the 2 O-rings from the A/C tube.



8. REMOVE COOLER EXPANSION VALVE

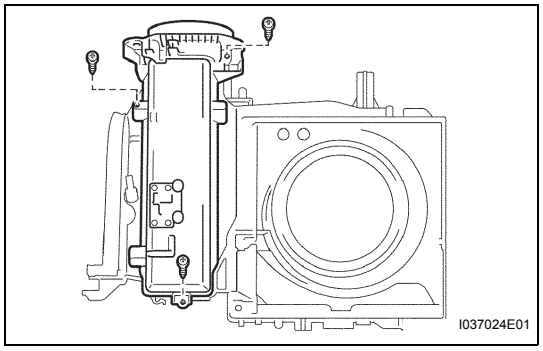
(a) Using a 4 mm hexagon wrench, remove the 2 bolts and cooler expansion valve.



9. REMOVE COOLER EVAPORATOR SUB-ASSEMBLY

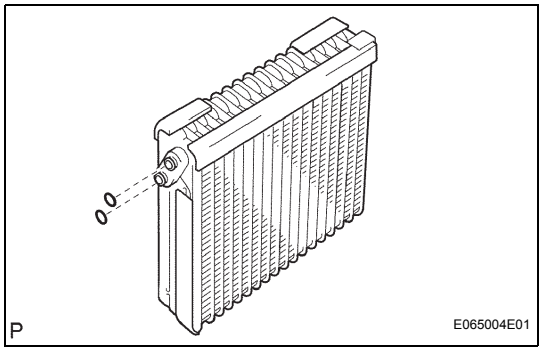
(a) Remove the screw.

(b) Detach the 2 claws and remove the air duct.



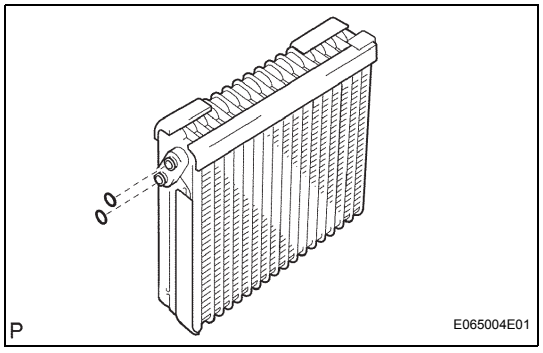
(c) Remove the 3 screws and evaporator cover.

(d) Remove the cooler evaporator.



(e) Remove the 2 O-rings from the cooler evaporator.

REASSEMBLY

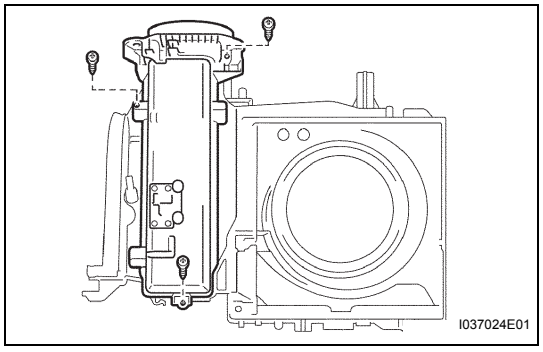


1. INSTALL COOLER EVAPORATOR SUB-ASSEMBLY

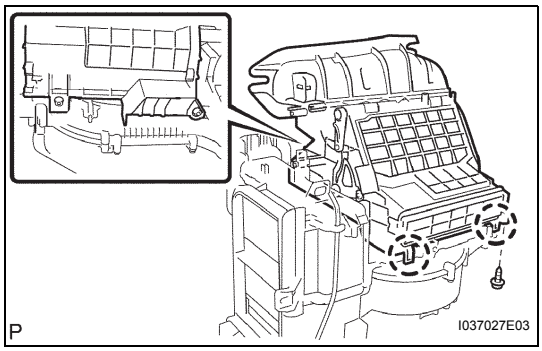
(a) Sufficiently apply compressor oil to the contact surfaces of 2 new O-rings and install them in the cooler evaporator.

Compressor oil:
ND-OIL 8 or equivalent

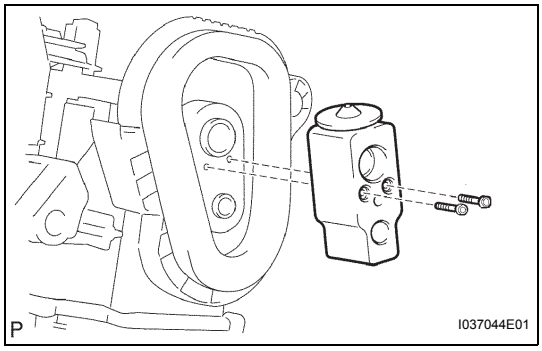
(b) Install the cooler evaporator on the blower unit.



(c) Install the evaporator cover with the 3 screws.

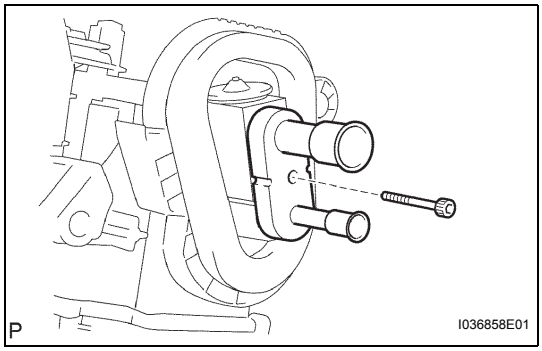


(d) Attach the 2 claws to install the air duct.
(e) Install the screw.



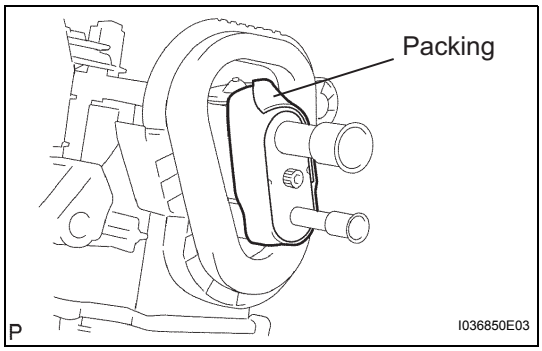
2. INSTALL COOLER EXPANSION VALVE

(a) Using a 4 mm hexagon wrench, install the cooler expansion valve with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

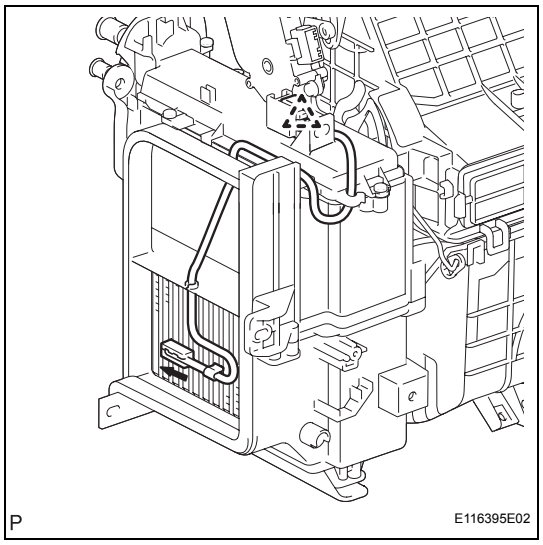


3. INSTALL AIR CONDITIONING TUBE ASSEMBLY

(a) Sufficiently apply compressor oil to the contact surfaces of 2 new O-rings and install them in the A/C tube.
Compressor oil:
ND-OIL 8 or equivalent
(b) Using a 5 mm hexagon wrench, install the A/C tube with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



(c) Install the packing.

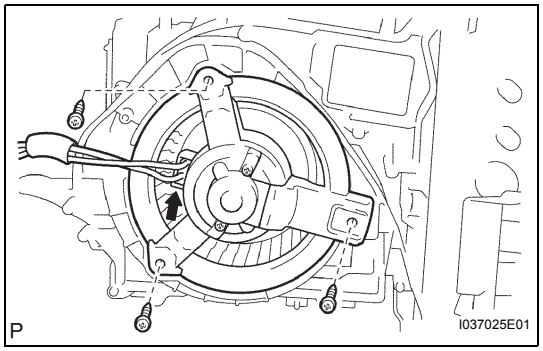


4. INSTALL COOLER THERMISTOR

(a) Install the cooler thermistor and attach the clamp.

NOTICE:

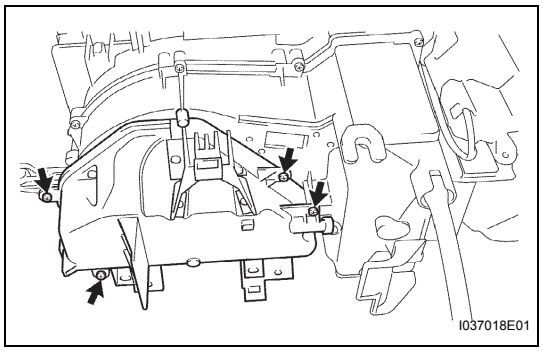
- **When installing the thermistor, move it one fin horizontally toward the front of the vehicle from its former position. Do not install it to its former position, as that fin may be bent and the thermistor may not function properly.**
- **Do not install the thermistor to a position that is horizontally toward the rear of the vehicle.**



5. INSTALL BLOWER WITH FAN MOTOR SUB-ASSEMBLY

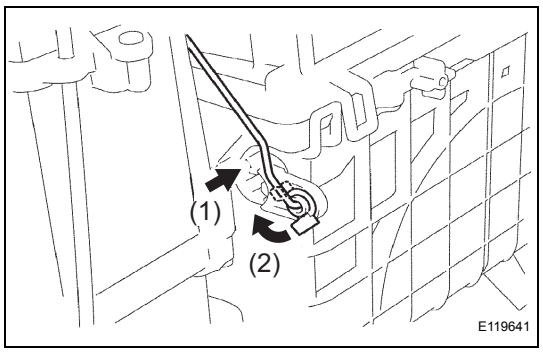
(a) Install the blower motor with the 3 screws.

(b) Connect the connector.

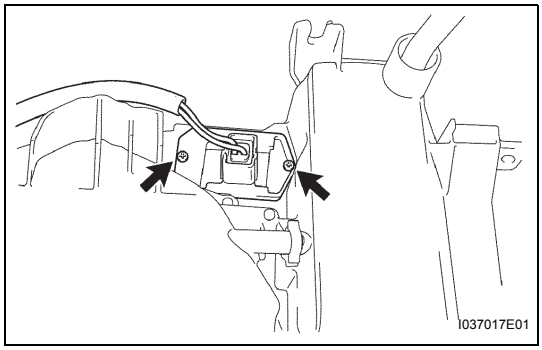


6. INSTALL BLOWER MOTOR COVER

(a) Install the blower motor cover with the holding spring and 4 screws.



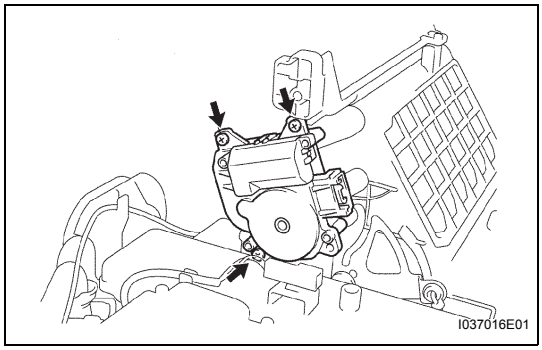
(b) Connect the rod in the order shown in the illustration.



7. INSTALL BLOWER RESISTOR

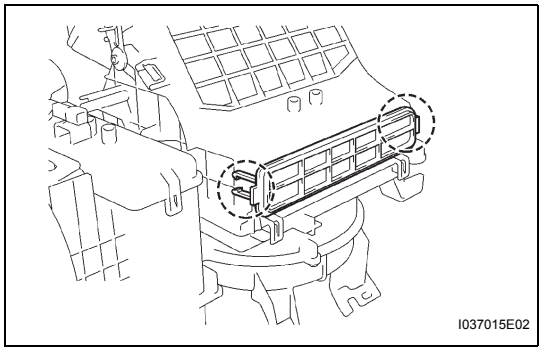
(a) Install the blower resistor with the 2 screws.

(b) Connect the connector.



8. INSTALL DAMPER SERVO SUB-ASSEMBLY

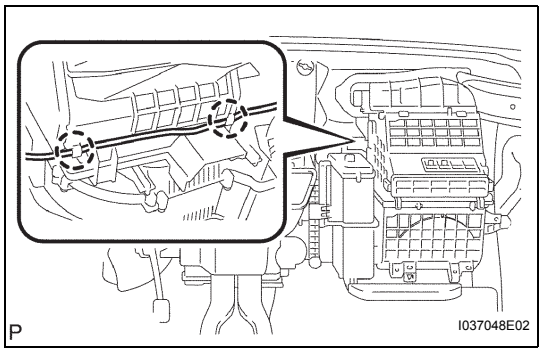
(a) Install the damper servo with the 3 screws.



9. INSTALL AIR FILTER CASE

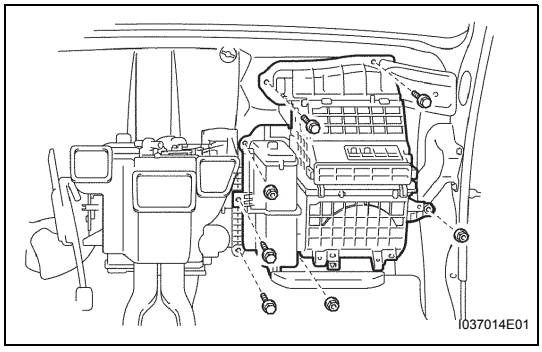
(a) Attach the 2 claws to install the air filter case.

INSTALLATION

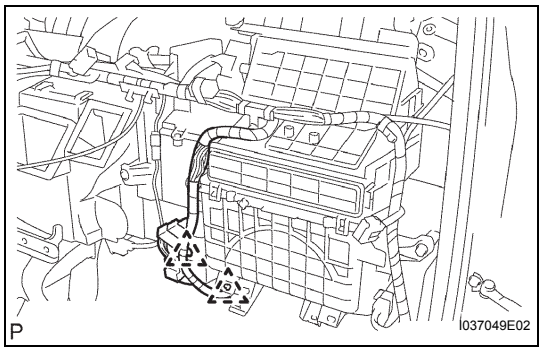


1. INSTALL AIR CONDITIONING BLOWER ASSEMBLY

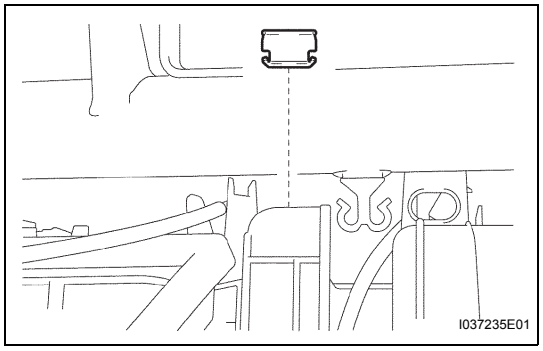
(a) Install the wire harness and connect the 2 clamps.



(b) Install the A/C blower with the 4 bolts and 3 nuts.



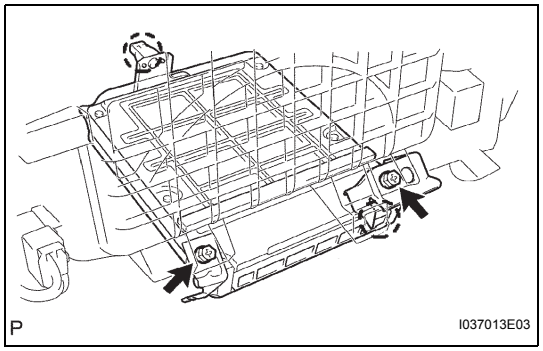
(c) Attach the 2 clamps to connect the wire harness.
(d) Connect the connectors.



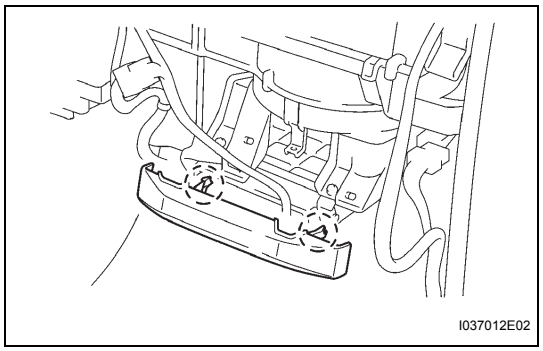
(e) Install the clamp.

2. INSTALL ECM

(a) Attach the 2 claws to install the ECM.



(b) Install the 2 screws.
(c) Connect the connectors.



3. INSTALL ECM COVER

(a) Attach the 2 claws to install the cover.

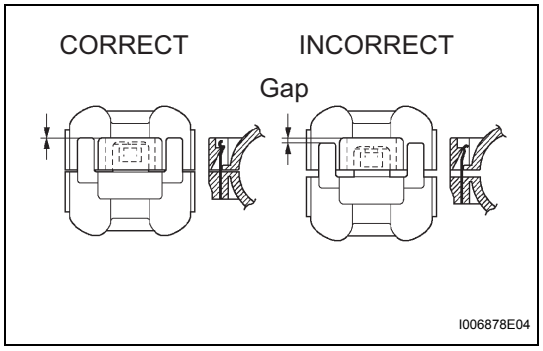
4. INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY

5. INSTALL LOWER INSTRUMENT PANEL ASSEMBLY

(a) Install the instrument panel (see page IP-22).

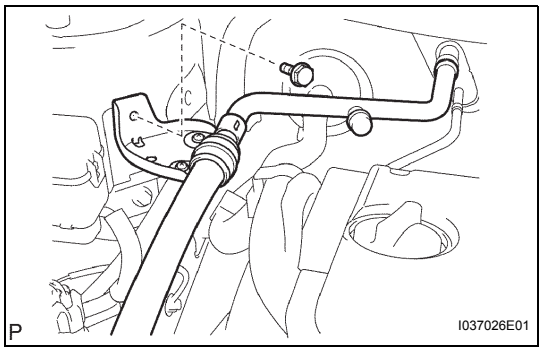
6. INSTALL INSTRUMENT PANEL SUB-ASSEMBLY

(a) Install the instrument panel (see page IP-10).



7. CONNECT LIQUID TUBE SUB-ASSEMBLY

(a) Remove the vinyl tape attached to the liquid tube and condenser.
(1) Lubricate 2 new O-rings with compressor oil and install them to the liquid tube.
Compressor oil:
ND-OIL 8 or equivalent
(2) Connect the liquid tube and piping clamp.



8. CONNECT SUCTION HOSE SUB-ASSEMBLY

(a) Remove the vinyl tape attached to the hose and condenser.

(1) Lubricate 2 new O-rings with compressor oil and install them to the hose.

Compressor oil:
ND-OIL 8 or equivalent

(b) Connect the suction hose and piping clamp.

(1) Connect the bracket with the bolt.

Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)

9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

10. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

11. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

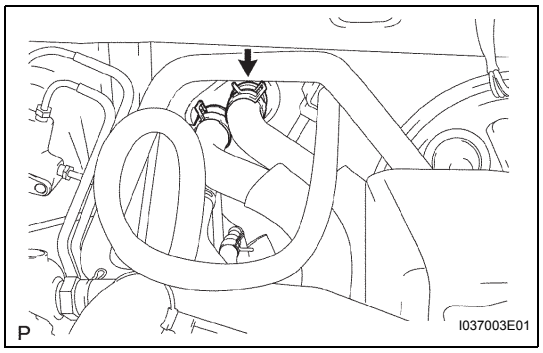
12. CHARGE REFRIGERANT (See page AC-46)

13. WARM UP ENGINE (See page AC-47)

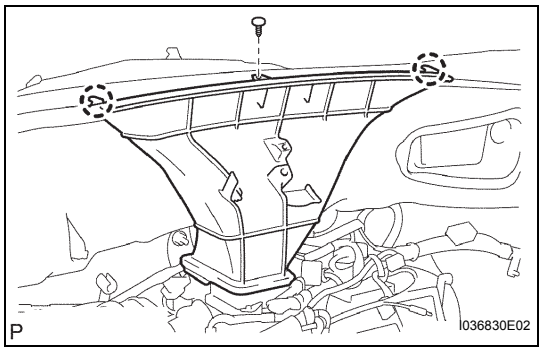
14. CHECK FOR LEAKAGE OF REFRIGERANT (See page AC-47)

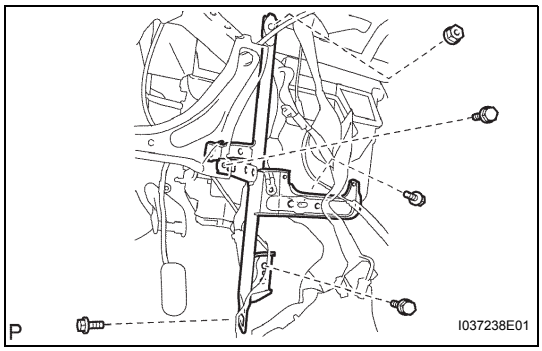
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **DRAIN ENGINE COOLANT**
3. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-46)**
4. **DISCONNECT SUCTION HOSE SUB-ASSEMBLY (See page AC-52)**
5. **DISCONNECT LIQUID TUBE SUB-ASSEMBLY (See page AC-53)**



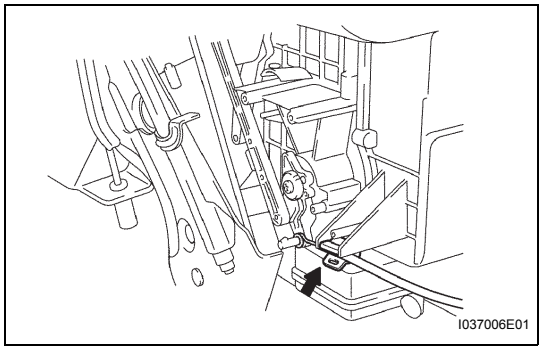
6. **DISCONNECT HEATER WATER INLET HOSE**
   (a) Using pliers, grip the claw of the clip and slide the clip to disconnect the heater water hose.
7. **DISCONNECT HEATER WATER OUTLET HOSE**
   HINT:
   Use the same procedures described for the inlet hose.
8. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY**
   (a) Remove the instrument panel (see page IP-4).
9. **REMOVE LOWER INSTRUMENT PANEL ASSEMBLY**
   (a) Remove the instrument panel (see page IP-17).
10. **REMOVE ECM (See page ES-362)**
11. **REMOVE AIR CONDITIONING BLOWER ASSEMBLY (See page AC-53)**
12. **REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY**
13. **REMOVE DEFROSTER NOZZLE ASSEMBLY**
    (a) Remove the clip.
    (b) Detach the 2 claws and remove the defroster nozzle.





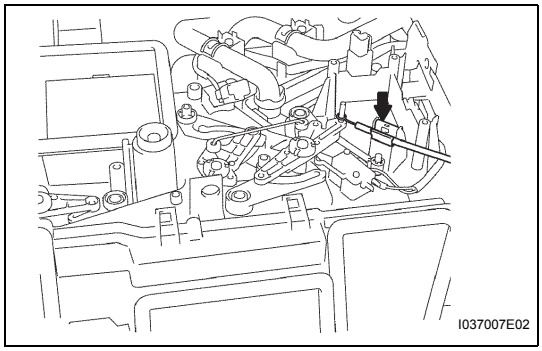
14. REMOVE NO. 1 INSTRUMENT PANEL BRACE SUB-ASSEMBLY

(a) Disconnect the wire harness.
(b) Remove the 4 bolts, nut and instrument panel brace.



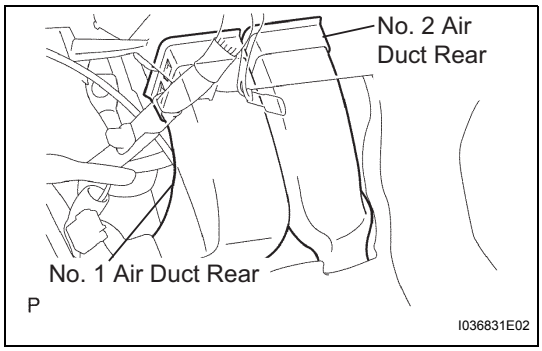
15. REMOVE DEFROSTER DAMPER CONTROL CABLE SUB-ASSEMBLY

(a) Disconnect the outer cable.
(b) Disconnect the inner cable and remove the defroster damper control cable.



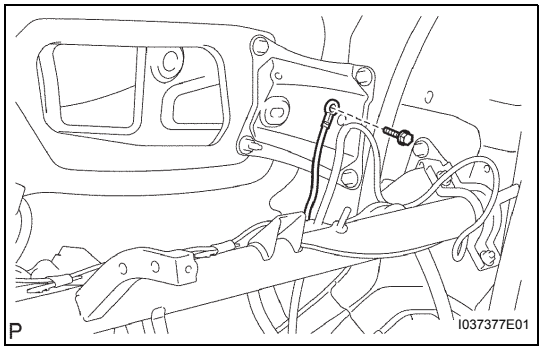
16. REMOVE AIR MIX DAMPER CONTROL CABLE SUB-ASSEMBLY

(a) Disconnect the air outer cable.
(b) Disconnect the inner cable and remove the air mix damper control cable.



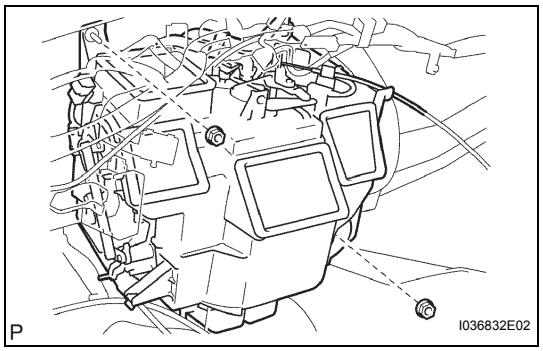
17. DISCONNECT NO. 2 AIR DUCT REAR

18. DISCONNECT NO. 1 AIR DUCT REAR



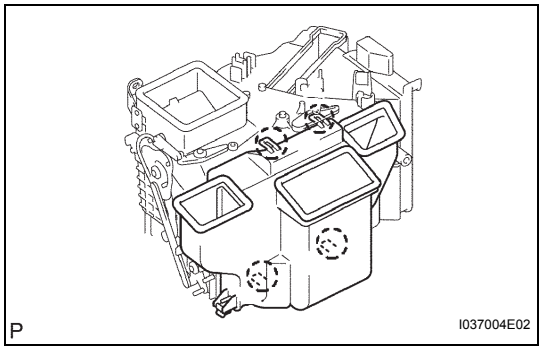
19. REMOVE HEATER RADIATOR ASSEMBLY

(a) Disconnect the 3 connectors.
(b) Remove the bolt and disconnect the ground wire from the PTC heater.



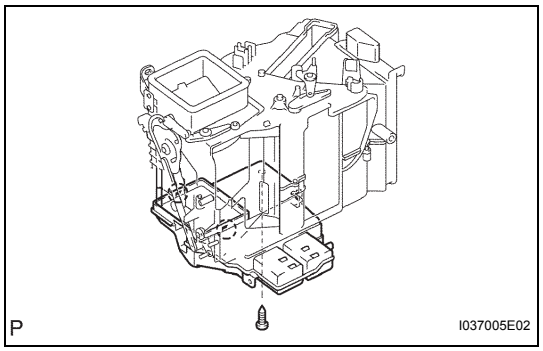
(c) Remove the 2 nuts and heater radiator.

DISASSEMBLY



1. REMOVE AIR DUCT ASSEMBLY

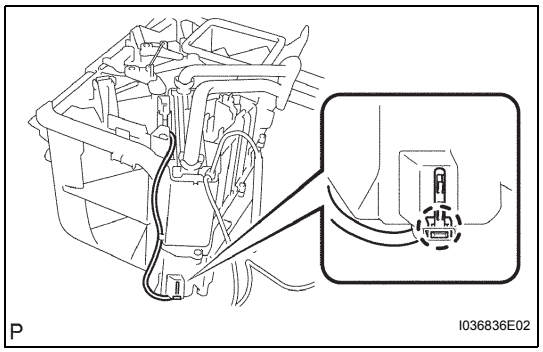
(a) Detach the 4 claws and remove the air duct.



2. REMOVE HEATER COVER

(a) Remove the screw.

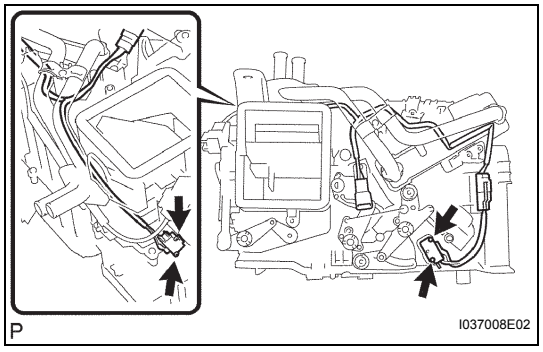
(b) Detach the 2 claws and remove the heater cover.



3. REMOVE THERMISTOR ASSEMBLY

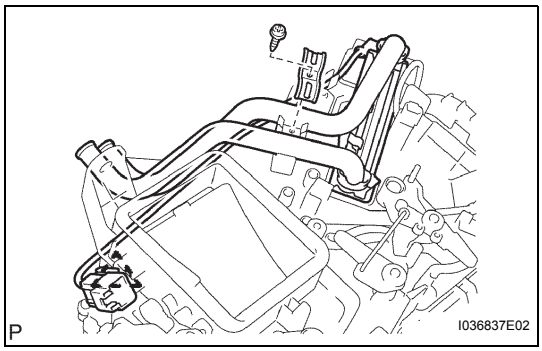
(a) Detach the claw and remove the clamp.

(b) Remove the thermistor.



4. REMOVE HEATER RADIATOR UNIT SUB-ASSEMBLY

(a) Remove the 4 screws and No. 2 cooler wiring.



(b) Remove the screw and bracket.
(c) Detach the clamp and disconnect the connector.
(d) Remove the heater radiator unit.

INSPECTION

1. INSPECT NO. 2 COOLER WIRING

(a) Measure the resistance of the switch.

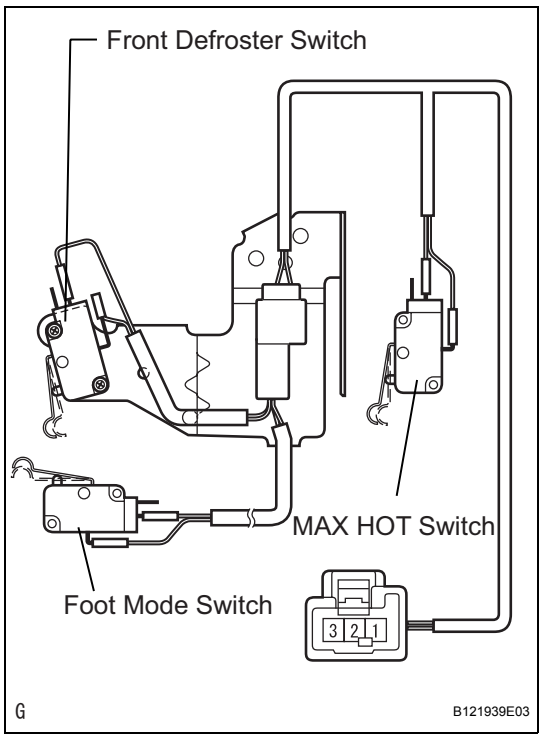
Standard resistance

MAX HOT switch

Tester Connection	Switch Condition	Specified Condition
2 - 3	ON	Below 1 Ω
2 - 3	OFF	10 kΩ or higher

Foot mode switch

Tester Connection		Switch Condition	Specified Condition
Front Defroster Switch	1 - 3	ON	Below 1 Ω
	1 - 3	OFF	10 kΩ or higher
Foot Mode Switch	1 - 3	ON	Below 1 Ω
	1 - 3	OFF	10 kΩ or higher

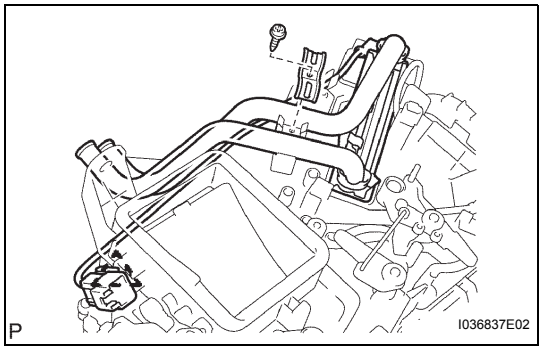


If the result is not as specified, replace the No. 2 cooler wiring.

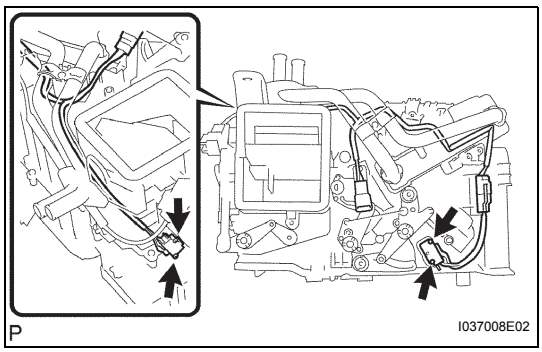
REASSEMBLY

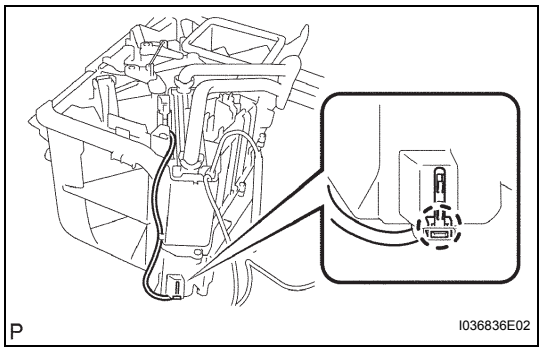
1. INSTALL HEATER RADIATOR UNIT SUB-ASSEMBLY

(a) Install the heater radiator unit sub-assembly.
(b) Attach the clamp to connect the connector.
(c) Install the bracket with the screw.



(d) Install the No. 2 cooler wiring with the 4 screws.

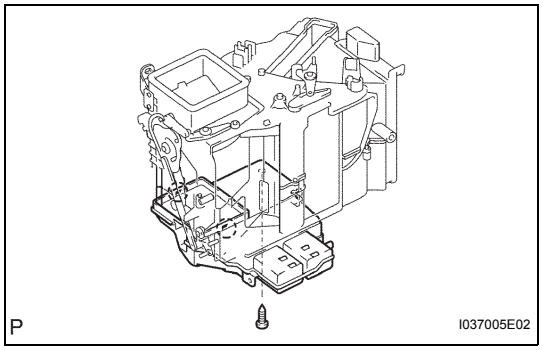




2. INSTALL THERMISTOR ASSEMBLY

(a) Install the thermistor.

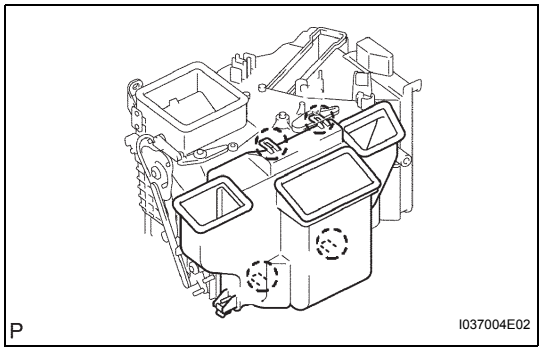
(b) Install the clamp and attach the claw.



3. INSTALL HEATER COVER

(a) Attach the 2 claws to install the heater cover.

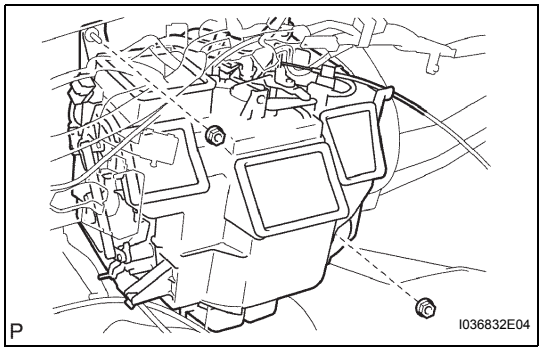
(b) Install the screw.



4. INSTALL AIR DUCT ASSEMBLY

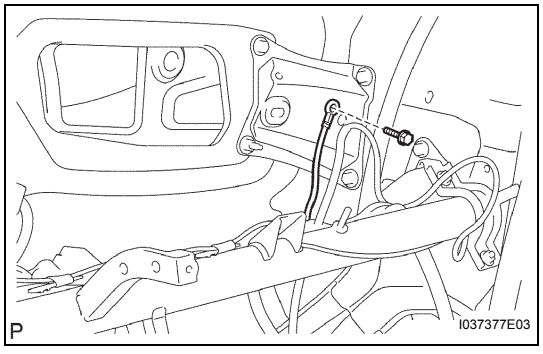
(a) Attach the 4 claws to install the air duct.

INSTALLATION



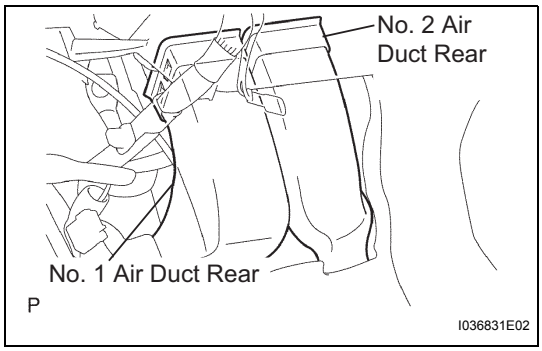
1. INSTALL HEATER RADIATOR ASSEMBLY

(a) Install the heater radiator with the 2 nuts.



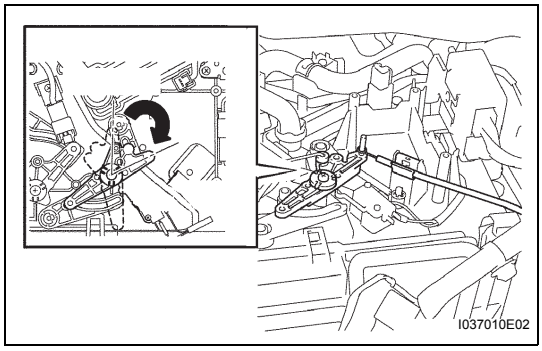
(b) Install the bolt to connect the ground wire to the PTC heater.

(c) Connect the 3 connectors.

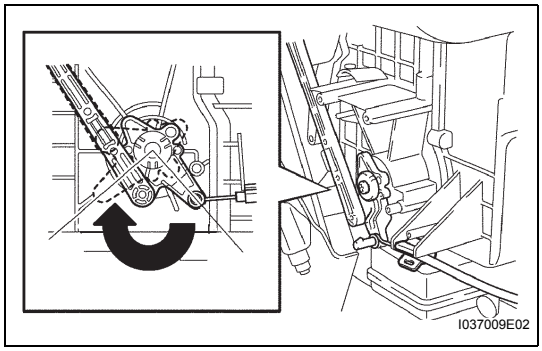


2. **CONNECT NO. 1 AIR DUCT REAR**

3. **CONNECT NO. 2 AIR DUCT REAR**

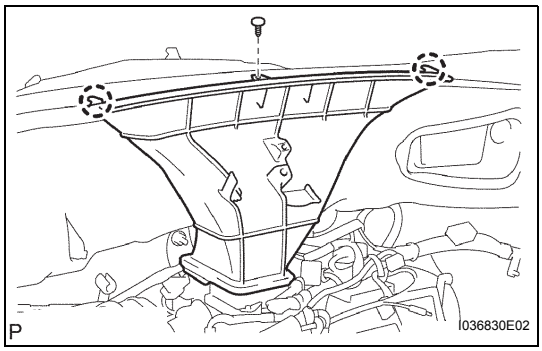


4. **INSTALL AIR MIX DAMPER CONTROL CABLE SUB-ASSEMBLY**
   (a) Connect the inner cable and install the air mix damper control cable.
   (b) Connect the outer cable.



5. **INSTALL DEFROSTER DAMPER CONTROL CABLE SUB-ASSEMBLY**
   (a) Connect the inner cable and install the defroster damper control cable.
   (b) Connect the outer cable.

6. **INSTALL NO. 1 INSTRUMENT PANEL BRACE SUB-ASSEMBLY**
   (a) Install the instrument panel brace with the 4 bolts and nut.
   (b) Connect the wire harness.



7. **INSTALL DEFROSTER NOZZLE ASSEMBLY**
   (a) Attach the 2 claws to install the defroster nozzle.
   (b) Install the clip.

8. **INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY (See page AC-113)**

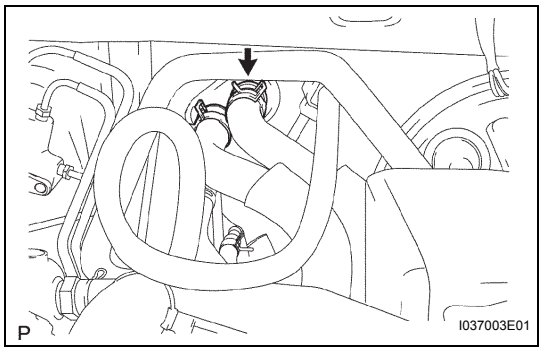
9. **INSTALL AIR CONDITIONING BLOWER ASSEMBLY (See page AC-60)**

10. **INSTALL ECM (See page ES-362)**

11. **INSTALL LOWER INSTRUMENT PANEL ASSEMBLY**
    (a) Install the instrument panel (see page IP-22).

12. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY**
    (a) Install the instrument panel (see page IP-10).

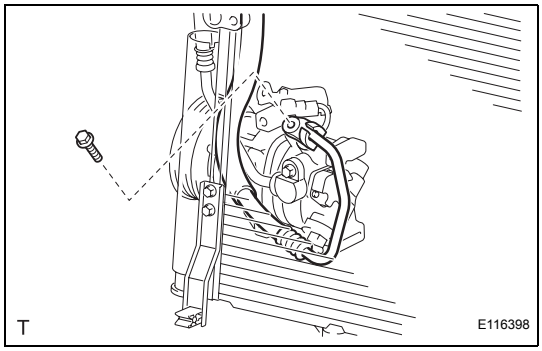
13. **CONNECT HEATER WATER OUTLET HOSE**
    (a) Using pliers, grip the claw of the clip and slide the clip to connect the heater water hose.



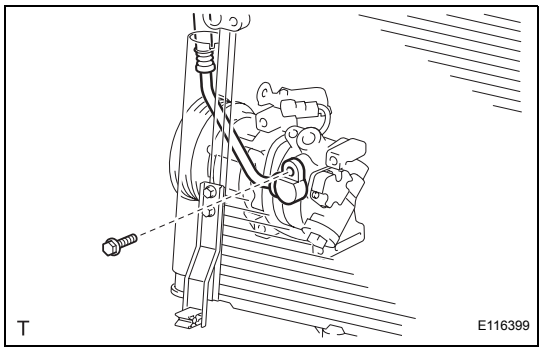
14. **CONNECT HEATER WATER INLET HOSE**
    HINT:
    Use the same procedures described for outlet hose.
15. **CONNECT LIQUID TUBE SUB-ASSEMBLY**
16. **CONNECT SUCTION HOSE SUB-ASSEMBLY**
17. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
18. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
19. **CHECK SRS WARNING LIGHT**
    (a) Check the SRS warning light (see page RS-28).
20. **ADD ENGINE COOLANT**
21. **CHARGE REFRIGERANT (See page AC-46)**
22. **WARM UP ENGINE (See page AC-47)**
23. **CHECK FOR ENGINE COOLANT LEAKS**
24. **CHECK FOR LEAKAGE OF REFRIGERANT (See page AC-47)**

REMOVAL

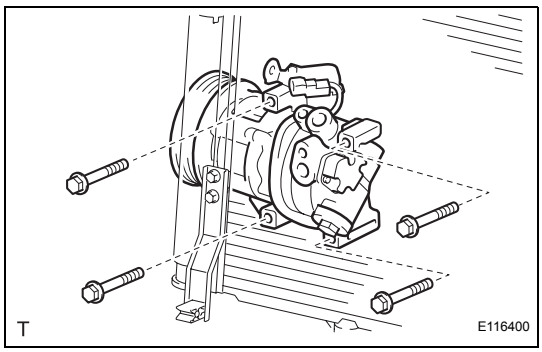
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-46)**
3. **REMOVE FAN AND GENERATOR V BELT (See page EM-7)**
4. **DISCONNECT NO. 1 COOLER REFRIGERANT DISCHARGE HOSE**
   (a) Remove the bolt and disconnect the cooler refrigerant discharge hose from the compressor.
   (b) Remove the O-ring from the cooler refrigerant discharge hose.
   NOTICE:
   Seal the openings of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.

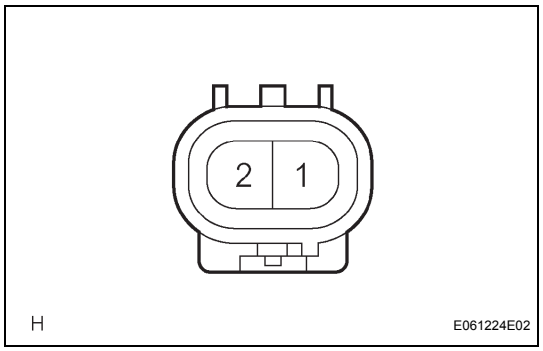


5. **DISCONNECT SUCTION HOSE SUB-ASSEMBLY**
   (a) Remove the bolt and disconnect the suction hose from the compressor.
   (b) Remove the O-ring from the suction hose.
   NOTICE:
   Seal the openings of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.
6. **REMOVE ENGINE UNDER COVER RH**



7. **REMOVE COMPRESSOR WITH PULLEY ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 4 bolts and compressor.





INSPECTION

1. INSPECT COMPRESSOR WITH PULLEY ASSEMBLY

(a) Measure the resistance between terminals 1 and 2.

Standard resistance:

160 to 320 Ω at 20°C (68°F)

If the value is not as specified, replace the compressor assembly.

INSTALLATION

1. INSPECT COMPRESSOR OIL

(a) When replacing the compressor with a new one, after gradually removing the refrigerant gas from the service valve, drain the following amount of oil from the new compressor before installation.

Standard amount:

(Oil capacity inside new compressor and magnetic clutch: 60 + 15 cc (2.0 + 0.5 fl. oz.)) - (Remaining oil amount in the removed compressor and magnetic clutch) = (Oil amount to be removed when replacing)

NOTICE:

- **When checking the compressor oil level, observe the precautions for cooler removal/ installation.**
- **Since compressor oil remains in the pipes of the vehicle, do not install a new compressor without removing some oil from the vehicle. Excessive oil prevents heat exchange in the refrigerant cycle and causes refrigerant failure.**
- **If the remaining oil in the removed compressor and magnetic clutch is too low, check for oil leakage.**
- **Be sure to use ND-OIL 8 or equivalent for compressor oil.**

2. INSTALL ENGINE UNDER COVER RH

3. INSTALL COMPRESSOR WITH PULLEY ASSEMBLY

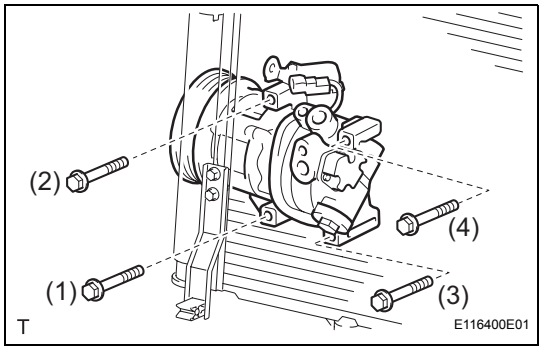
(a) Install the compressor with the 4 bolts.

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTICE:

Tighten the bolts in the order shown in the illustration to install the compressor.

(b) Connect the connector.



4. CONNECT SUCTION HOSE SUB-ASSEMBLY

(a) Remove the vinyl tape attached to the hose and condenser.

(b) Apply a sufficient amount of compressor oil to a new O-ring and the fitting surface of the compressor.

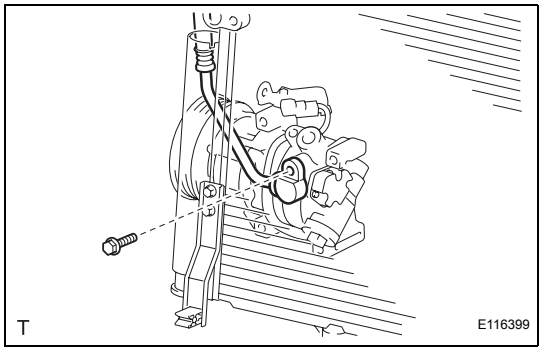
Compressor oil:

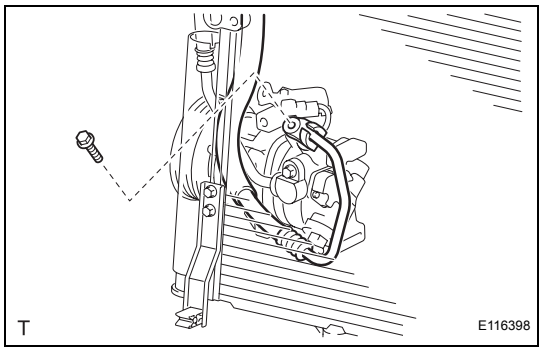
ND-OIL 8 or equivalent

(c) Install the O-ring on the suction hose.

(d) Connect the suction hose on the compressor with the bolt.

Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)





5. **CONNECT NO. 1 COOLER REFRIGERANT DISCHARGE HOSE**
   (a) Remove the vinyl tape attached to the hose and condenser.
   (b) Apply a sufficient amount of compressor oil to a new O-ring and the fitting surface of the compressor.
   Compressor oil:
   ND-OIL 8 equivalent
   (c) Install the O-ring on the No. 1 cooler refrigerant discharge hose.
   (d) Connect the No. 1 cooler refrigerant discharge hose on the compressor with the bolt.
   Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)
6. **INSTALL FAN AND GENERATOR V BELT (See page EM-7)**
7. **ADJUST FAN AND GENERATOR V BELT (See page EM-7)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
10. **CHARGE REFRIGERANT (See page AC-46)**
11. **WARM UP ENGINE (See page AC-47)**
12. **CHECK FOR LEAKAGE OF REFRIGERANT (See page AC-47)**

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
- Use these procedures to troubleshoot the air conditioning system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3 CHECK CAN COMMUNICATION SYSTEM*

(a) Use the intelligent tester to check if the CAN communication system is functioning.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

HINT:
The amplifier of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

B → **Go to CAN COMMUNICATION SYSTEM**

A

4 CHECK DTC

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Based on the DTCs output above, try to force output of the A/C system DTC by simulating the operation indicated by the DTC.
Result

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

B → Go to step 6

A

5	DTC CHART

Refer to the diagnostic trouble code chart (see page AC-21).

NEXT

6	PROBLEM SYMPTOMS TABLE

Refer to the problem symptoms table (see page AC-14).

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 8

A

7	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) DATA LIST / ACTIVE TEST (see page AC-20).
(b) Terminals of ECU (see page AC-16).
(c) Inspection

NEXT

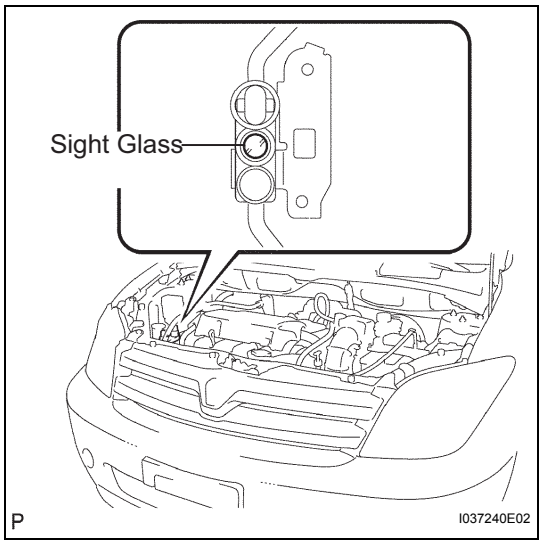
8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END



REFRIGERANT

ON-VEHICLE INSPECTION

1. INSPECT REFRIGERANT VOLUME

(a) Check the sight glass on the liquid tube.
Test conditions:
- Engine is running at 1,500 rpm.
- Blower switch is at HI.
- A/C switch is ON.
- Temperature control switch is at the MAX. COOL position.
- Doors are fully open.

Item	Symptom	Amount of Refrigerant	Corrective Procedures
1	Bubbles visible	Insufficient*	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles visible	Empty, insufficient or too much	Refer to items 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet	Correct or too much	Refer to items 5 and 6
5	Immediately after A/C is turned OFF, refrigerant becomes clear	Too much	(1) Drain or discharge refrigerant (2) Bleed air and supply proper amount of purified refrigerant
6	Immediately after A/C is turned OFF, refrigerant foams and then becomes clear	Correct	-

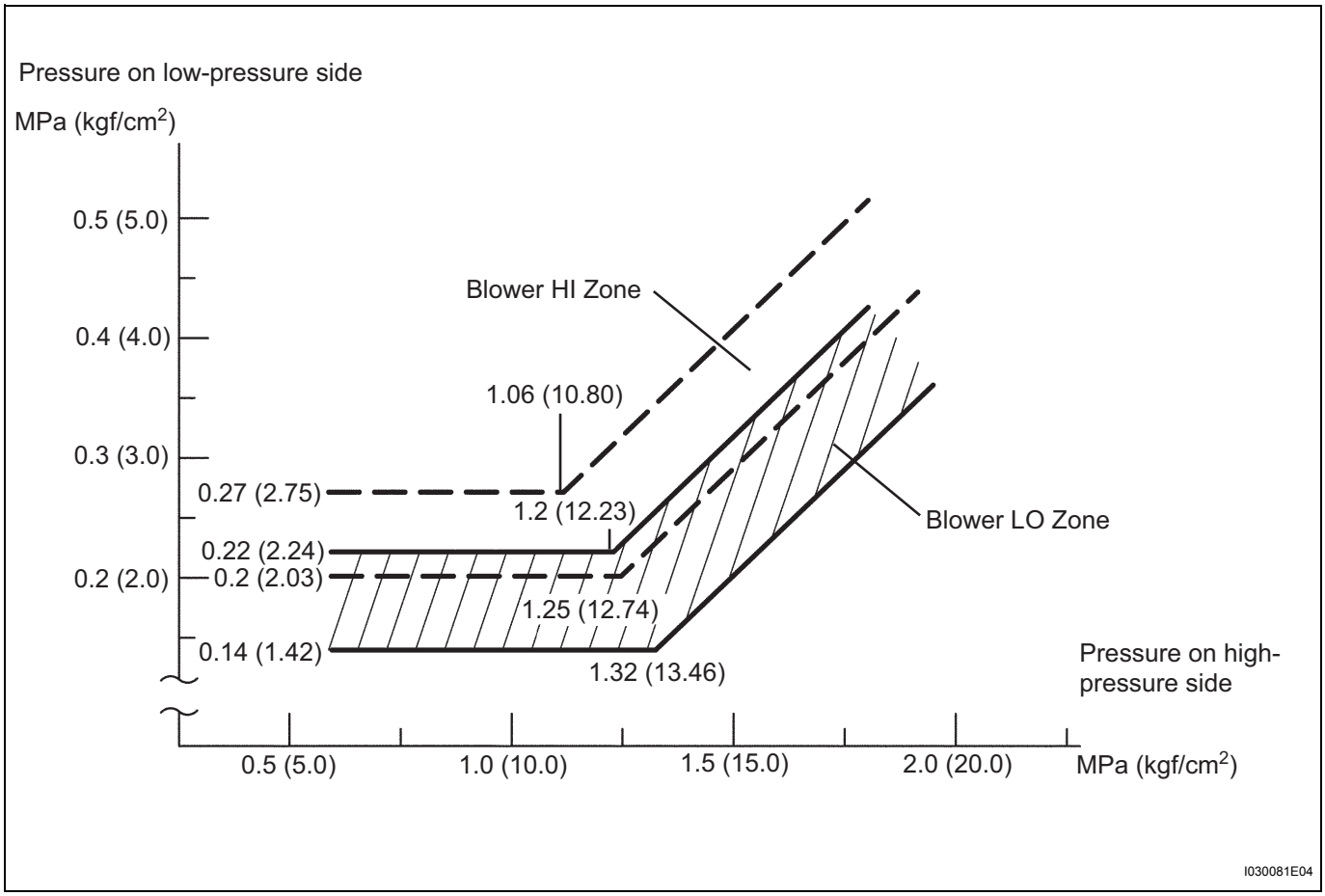
HINT:

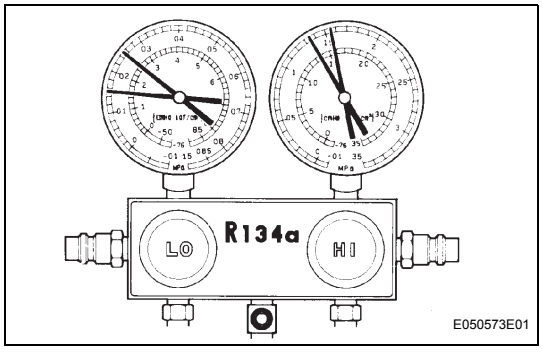
*: If the ambient temperature is higher than usual but cooling is sufficient, bubbles in the sight glass are permissible.

2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

(a) This method uses a manifold gauge set to locate problem areas. Read the manifold gauge pressure when the following conditions are established:
- Temperature at the air inlet is 30 to 35°C (86 to 95°F).
- Engine is running at 1,500 rpm.
- All doors are fully open.
- Blower switch is at HI.
- Temperature control switch is at MAX. COOL.
- A/C switch is ON.

Gauge readings (reference)



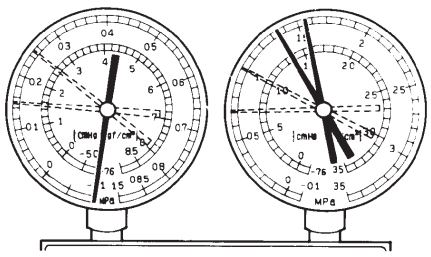


(1) If the refrigeration system is functioning normally, the gauge readings are as shown in the table below.

Gauge reading

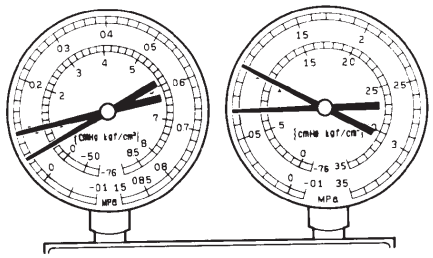
Pressure Side	Refrigerant Volume
Low	0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2)
High	1.37 to 1.57 MPa (14 to 16 kgf/cm^2)

(2) The A/C system periodically changes between normal and improper function due to moisture in the refrigeration system.



Symptoms	Probable Cause	Diagnosis	Corrective Actions
During operation, pressure on low-pressure side cycles between normal and vacuum	Moisture in refrigeration system freezes at expansion valve orifice, causing temporary stop of cycle. However, when melted, normal state is restored.	- Dryer is overly saturated - Moisture in refrigeration system freezes at expansion valve orifice and blocks refrigerant circulation	1. Replace cooler dryer 2. Remove moisture from cycle by repeatedly evacuating air 3. Supply appropriate volume of new refrigerant

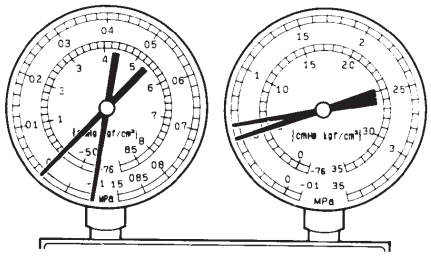
(3) The A/C system does not function effectively due to insufficient cooling.



I022118

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure low on both low and high-pressure sides - Cooling performance insufficient	Gas leakage from refrigeration system	- Insufficient refrigerant - Refrigerant leakage	1. Check for gas leakage and repair if necessary 2. Supply appropriate volume of new refrigerant 3. If indicated pressure value is close to 0 when connected to gauge, create vacuum after inspecting and repairing location of leakage

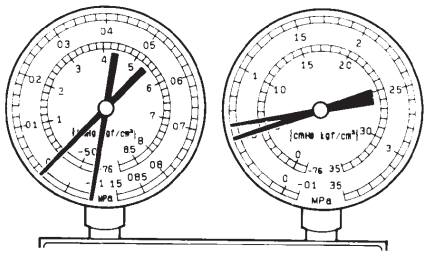
(4) The A/C system does not function effectively due to poor circulation of the refrigerant.



I022119

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure low on both low and high-pressure sides - Frost exists on piping from condenser to A/C unit	Refrigerant flow obstructed by dirt in condenser	Condenser clogged	Replace condenser

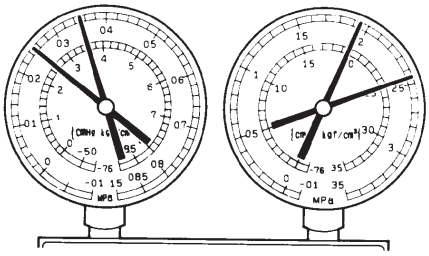
(5) The A/C system functions intermittently because the refrigerant does not circulate.



I022120

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Vacuum indicated on low-pressure side, and extremely low pressure indicated on high-pressure side - Frost or condensation seen on piping on both sides of condenser or expansion valve	- Refrigerant flow obstructed by moisture or dirt in refrigeration system - Refrigerant flow obstructed by gas leakage from expansion valve	Refrigerant does not circulate	1. Check expansion valve 2. Clean expansion valve by blowing air 3. Replace condenser 4. Evacuate air and charge appropriate volume of new refrigerant 5. For gas leakage from expansion valve, replace expansion valve

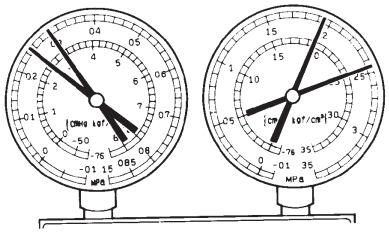
(6) The A/C system does not function effectively due to overcharged refrigerant or insufficient cooling of the condenser.



I022121

Symptoms	Probable Cause	Diagnosis	Corrective Actions
Pressure extremely high on both low and high-pressure sides	- Excessive refrigerant - Cooling performance of condenser insufficient	- Condenser is dirty - Condenser fan motor is malfunctioning - Excessive refrigerant	1. Clean condenser 2. Check condenser fan motor operation 3. If 1 and 2 are normal, check amount of refrigerant and supply appropriate volume of refrigerant

(7) The A/C system does not function due to air in the refrigeration system.
CAUTION:
The low-pressure piping may be very hot and cause serious burns.

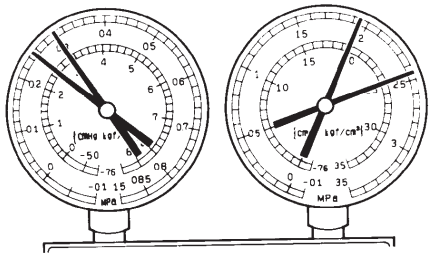


HINT: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging

I022122E03

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure extremely high on both low and high-pressure sides - Low-pressure piping is too hot to touch	Air in refrigeration system	- Air in refrigeration system - Vacuum purging insufficient	1. Check if compressor oil is dirty or insufficient 2. Evacuate air and charge new refrigerant

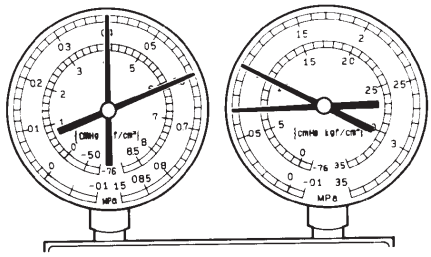
(8) The A/C system does not function effectively due to an expansion valve malfunction.



I022123

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure extremely high on both low and high-pressure sides - Frost or condensation on piping on low-pressure side	Problem with expansion valve	- Excessive refrigerant in low pressure piping - Expansion valve too wide open	Replace expansion valve

(9) The A/C system does not function due to a defective compressor.



I022124

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure extremely high on both low and high-pressure sides - Pressure extremely low on high-pressure side	Internal leakage in compressor	- Compression failure - Leakage from damaged valve or broken sliding parts	Repair or replace compressor

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.
- If the malfunction still exists even after checking and confirming that all the circuits are normal, replace the A/C amplifier.

A/C system

Symptom	Suspected area	See page
All functions of A/C system do not operate	1. Center cluster module switch	AC-107
	2. A/C amplifier assembly	AC-16
	3. Wire harness or connector	-
Air Flow Control: No blower operation	1. Blower resistor	AC-66
	2. Blower w/ fan motor sub-assembly	AC-64
	3. Center cluster module switch	AC-107
	4. Wire harness or connector	-
Air Flow Control: No blower control	1. Blower resistor	AC-66
	2. Blower w/ fan motor sub-assembly	AC-64
	3. Center cluster module switch	AC-107
	4. Wire harness or connector	-
Air Flow Control: Insufficient air comes out	1. Blower w/ fan motor sub-assembly	AC-64
	2. Blower resistor	AC-66
	3. Center cluster module switch	AC-107
	4. Wire harness or connector	-
Temperature Control: No cool air comes out	1. Volume of refrigerant	AC-41
	2. Drive belt tension	-
	3. Refrigerant pressure	AC-41
	4. Compressor solenoid circuit	AC-32
	5. Compressor assembly	AC-79
	6. Pressure switch circuit	AC-27
	7. Condenser fan	CO-4
	8. Evaporator temperature sensor	AC-23
	9. Heater control and accessory assembly	-
	10. ECM	ES-29
	11. CAN communication system	CA-6
	12. Wire harness or connector	-
Temperature Control: No warm air comes out	1. Engine coolant volume	-
	2. Evaporator temperature sensor	AC-23
	3. Heater control and accessory assembly	-
	4. Heater radiator unit sub-assembly	-
	5. A/C amplifier assembly	AC-16
	6. Wire harness or connector	-
Temperature Control: Output air is warmer or cooler than set temperature or response is slow	1. Heater control and accessory assembly	-
	2. Air mix damper control cable	-

Symptom	Suspected area	See page
Temperature Control: No temperature control	1. Heater control and accessory assembly	-
	2. Air mix damper control cable	-
No air inlet control	1. Air inlet control servomotor	AC-68
	2. Heater switch assembly	AC-111
	3. Heater control and accessory assembly	-
No air outlet control	1. Heater control and accessory assembly	-
	2. Defroster damper control cable	-
Engine idle-up does not occur, or is continuous	1. Center cluster module switch	AC-107
	2. Compressor solenoid circuit	AC-32
	3. Compressor assembly	AC-79
	4. A/C amplifier assembly	AC-16
	5. ECM	ES-29
	6. CAN communication system	CA-6
	7. Wire harness or connector	-
Diagnostic trouble codes are not recorded. Set mode is cleared when ignition switch turn OFF.	1. A/C amplifier assembly	AC-16
	2. Wire harness or connector	-

PTC heater

Symptom	Suspected area	See page
Warm air does not come out even if temperature control knob is MAX HOT before engine coolant temperature rises*	1. Heater switch assembly	AC-111
	2. PTC heater circuit	AC-37
	3. Generator assembly	CH-11
	4. A/C amplifier assembly	AC-16
	5. ECM	ES-29
	6. CAN communication system	CA-6
	7. Wire harness or connector	-

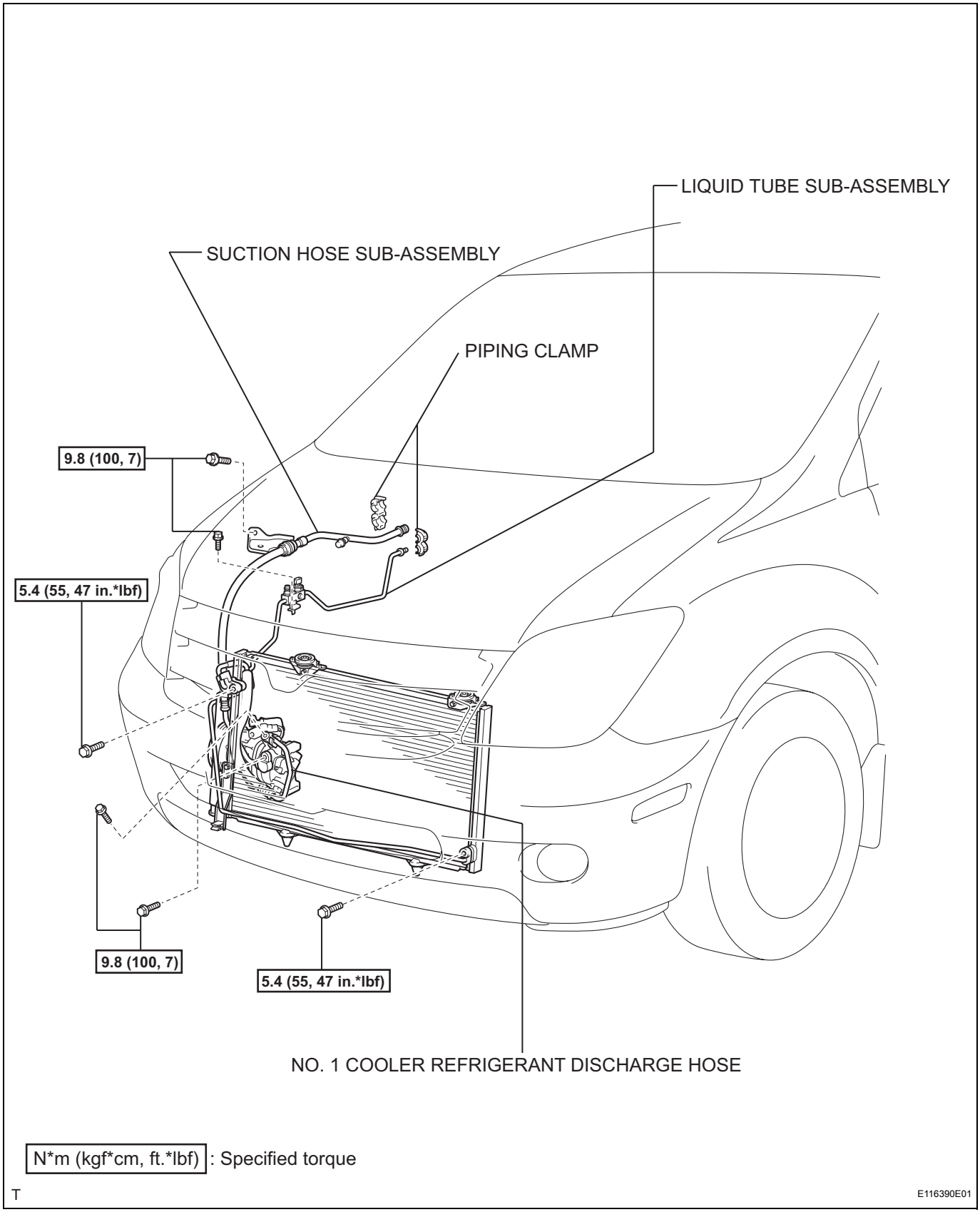
HINT:

*: PTC heater does not operate in these conditions:

- Engine coolant temperature: 70°C (158°F) or below
- Engine rpm is at idle rpm or more
- Air mix control knob is at MAX HOT

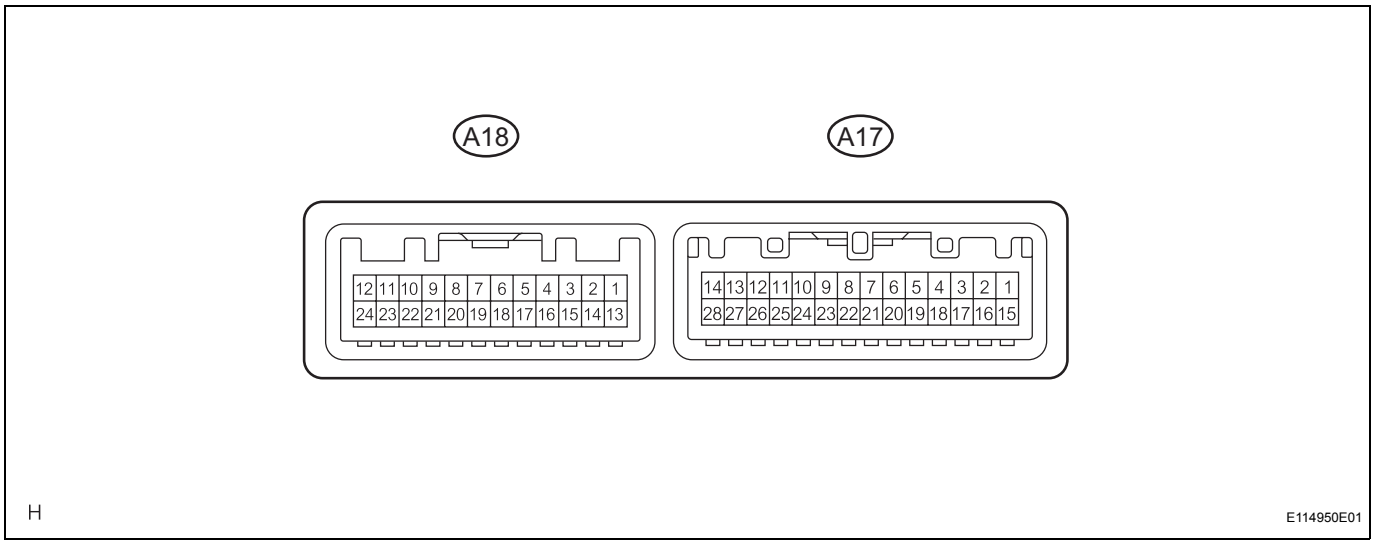
REFRIGERANT LINE

COMPONENTS



TERMINALS OF ECU

1. CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY



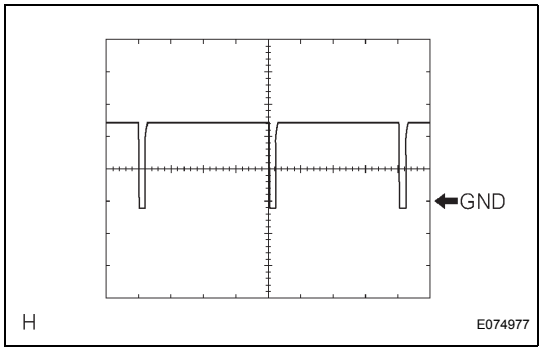
(a) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG+ (A17-14) - GND (A17-24)	L - W-B	Power source (IG)	Ignition switch OFF	0 V
IG+ (A17-14) - GND (A17-24)	L - W-B	Power source (IG)	Ignition switch ON	10 to 14 V
GND (A17-24) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
A/C (A17-27) - GND (A17-24)	O - W-B	A/C switch input signal	Ignition switch ON, blower switch ON, A/C switch ON	10 to 14 V
DEF (A17-26) - GND (A17-24)	B-Y - W-B	Defroster switch input signal	Ignition switch ON, blower switch ON, mode control knob DEF (defroster mode detection switch ON)	10 to 14 V
HEAT (A18-14) - GND (A17-24)	L-B - W-B	MAX HOT switch input signal	Ignition switch ON, blower switch ON, air mix control knob MAX HOT (MAX HOT switch ON)	10 to 14 V
MODE (A18-17) - GND (A17-24)	W - W-B	FOOT or FOOT/DEF switch input signal	Ignition switch ON, blower switch ON, air mix control knob MAX HOT (MAX HOT switch ON), mode control knob either FOOT or FOOT/DEF (foot mode switch ON)	10 to 14 V
REFR (A17-20) - GND (A17-24)	L-Y - W-B	Air inlet control signal	Air inlet control knob FRESH (inlet air position detection switch OFF)	10 to 14 V
REFR (A17-20) - GND (A17-24)	L-Y - W-B	Air inlet control signal	Air inlet control knob RECIRCULATION (inlet air position detection switch ON)	Below 1 V
FRS (A17-16) - GND (A17-24)	L-R - W-B	Air inlet control servomotor operation signal	Ignition switch ON, air inlet control knob FRESH (inlet air position detection switch OFF)	Below 1 V
REC (A17-28) - GND (A17-24)	L-D - W-B	Air inlet control servomotor operation signal	Ignition switch ON, air inlet control knob RECIRCULATION (inlet air position detection switch ON)	Below 1 V
R/F (A17-18) - GND (A17-24)	G - W-B	Air inlet control servomotor operation signal	Ignition switch ON, blower switch ON, air mix control knob MAX HOT (MAX HOT switch ON), mode control knob either FOOT or FOOT/DEF (foot mode switch ON), air inlet control knob FRESH (inlet air position detection switch OFF)	Below 1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
PTC (A18-9) - GND (A17-24)	L-W - W-B	PTC heater relay signal	Generator is generating, engine rpm is at idle rpm or more, engine coolant temperature is below 65°C (149°F), air mix control knob MAX HOT (MAX HOT switch ON)	Below 1 V
S5 (A17-7) - GND (A17-24)	R-W - W-B	Power supply for pressure sensor	Ignition switch ON	4.5 to 5.5 V
PRE (A17-12) - SG- (A17-10)	B-R - BR	Pressure sensor signal	Refrigerant pressure: normal pressure 0.176 MPa (1.8 kgf/cm^2, 25 psi) to 3.025 MPa (32.0 kgf/cm^2, 455 psi)	0.76 to 4.74 V
			Refrigerant pressure: abnormal pressure less than 0.176 MPa (1.8 kgf/cm^2, 25 psi)	Below 0.76 V
			Refrigerant pressure: abnormal pressure more than 3.025 MPa (32.0 kgf/cm^2, 455 psi)	Above 4.74 V
TE (A17-22) - SGND (A17-23)	B-W - BR	Evaporator temperature sensor signal	Ignition switch ON, evaporator temperature: 0°C (32°F)	2.3 to 2.7 V
TE (A17-22) - SGND (A17-23)	B-W - BR	Evaporator temperature sensor signal	Ignition switch ON, evaporator temperature: 15°C (59°F)	1.8 to 2.2 V
SOL+ (A17-13) - GND (A17-24)	L-B - W-B	Compressor signal	Engine idling, blower switch Lo, A/C switch ON	Pulse generation (see waveform 1)
ALT (A18-24) - GND (A17-24)	L - W-B	Generator input signal	Engine idling	Pulse generation
CANH (A17-8) - GND (A17-24)	B - W-B	CAN communication line	Ignition switch ON	Pulse generation (see waveform 2)
CANL (A17-9) - GND (A17-24)	W - W-B	CAN communication line	Ignition switch ON	Pulse generation (see waveform 3)

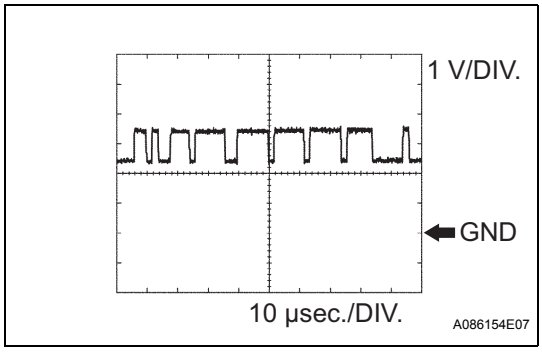
If the result is not as specified, the A/C amplifier may have a malfunction.

(1) Waveform 1 (Reference)



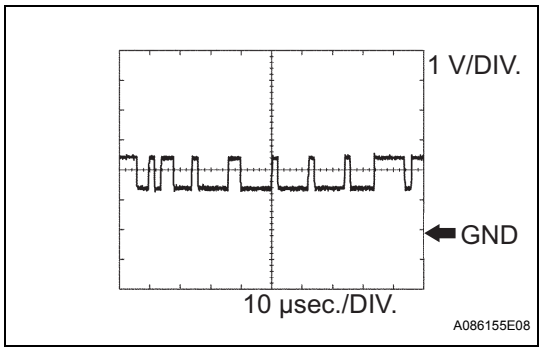
Item	Content
Symbols (Terminal No.)	SOLT (A17-13) - GND (A17-24)
Tool Setting	5 V/DIV., 500 μsec./DIV.
Conditions	Engine idling, blower switch Lo, A/C switch ON

(2) Waveform 2 (Reference)



Item	Content
Symbols (Terminal No.)	CANH (A17-8) - GND (A17-24)
Tool Setting	1 V/DIV., 10 μsec./DIV.
Conditions	Engine stopped and ignition switch ON

HINT:
The waveform varies depending on the CAN communication signal.

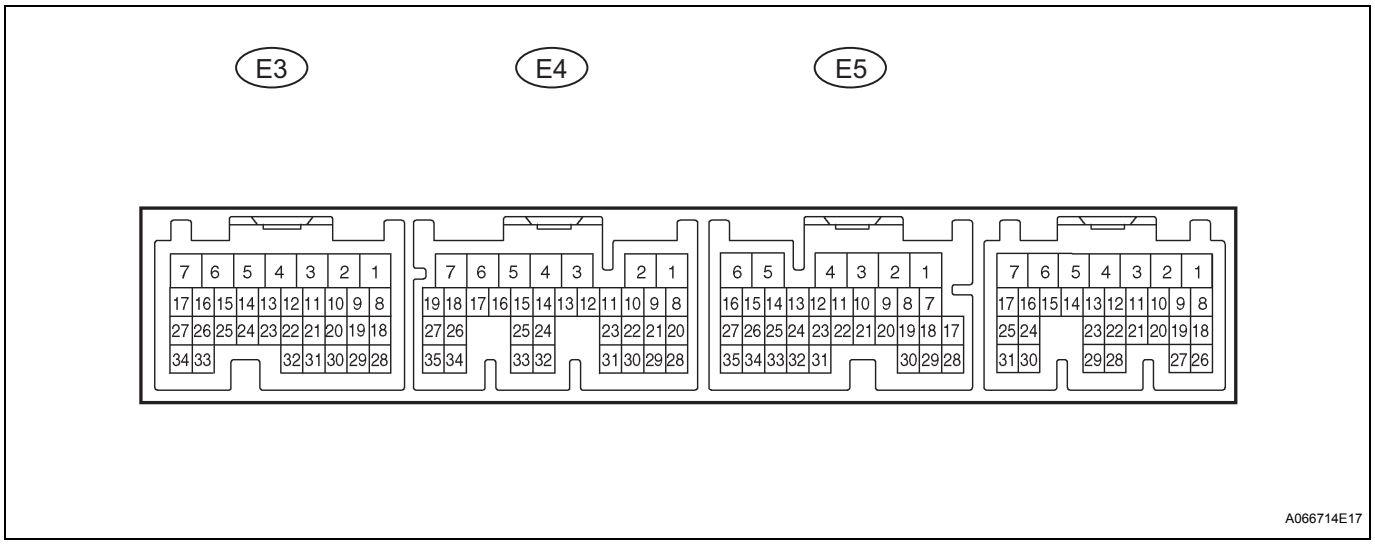


(3) Waveform 3 (Reference)

Item	Content
Symbols (Terminal No.)	CANL (A17-9) - GND (A17-24)
Tool Setting	1 V/DIV., 10 µsec./DIV.
Conditions	Engine stopped and ignition switch ON

HINT:
The waveform varies depending on the CAN communication signal.

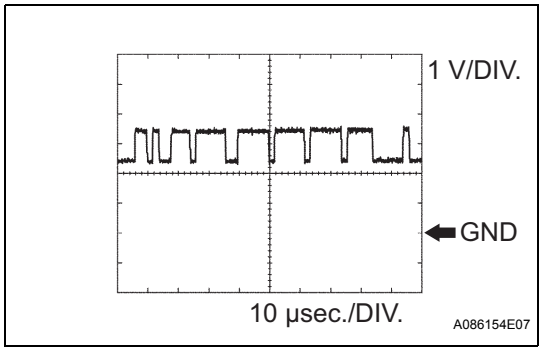
2. CHECK ECM



(a) Measure the voltage of the connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
THW (E3-32) - E2 (E3-28)	R-L - BR	Engine coolant temperature sensor	Idling, engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
CANH (E5-33) - E1 (E4-3)	B - BR	CAN communication line	Ignition switch ON	Pulse generation (see waveform 1)
CANL (E5-34) - E1 (E4-3)	W - BR	CAN communication line	Ignition switch ON	Pulse generation (see waveform 2)

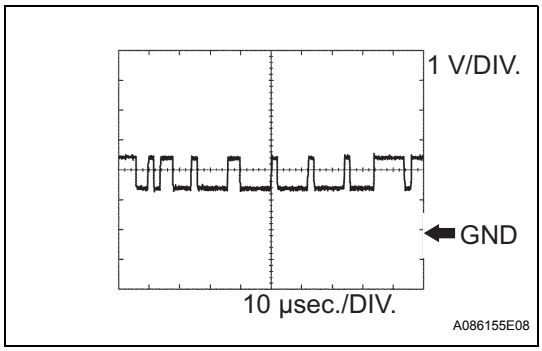
If the result is not as specified, the ECM may have a malfunction.



(1) Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	CANH (E5-33) - E1 (E4-3)
Tool Setting	1 V/DIV., 10 µsec./DIV.
Conditions	Engine stopped and ignition switch ON

HINT:
The waveform varies depending on the CAN communication signal.



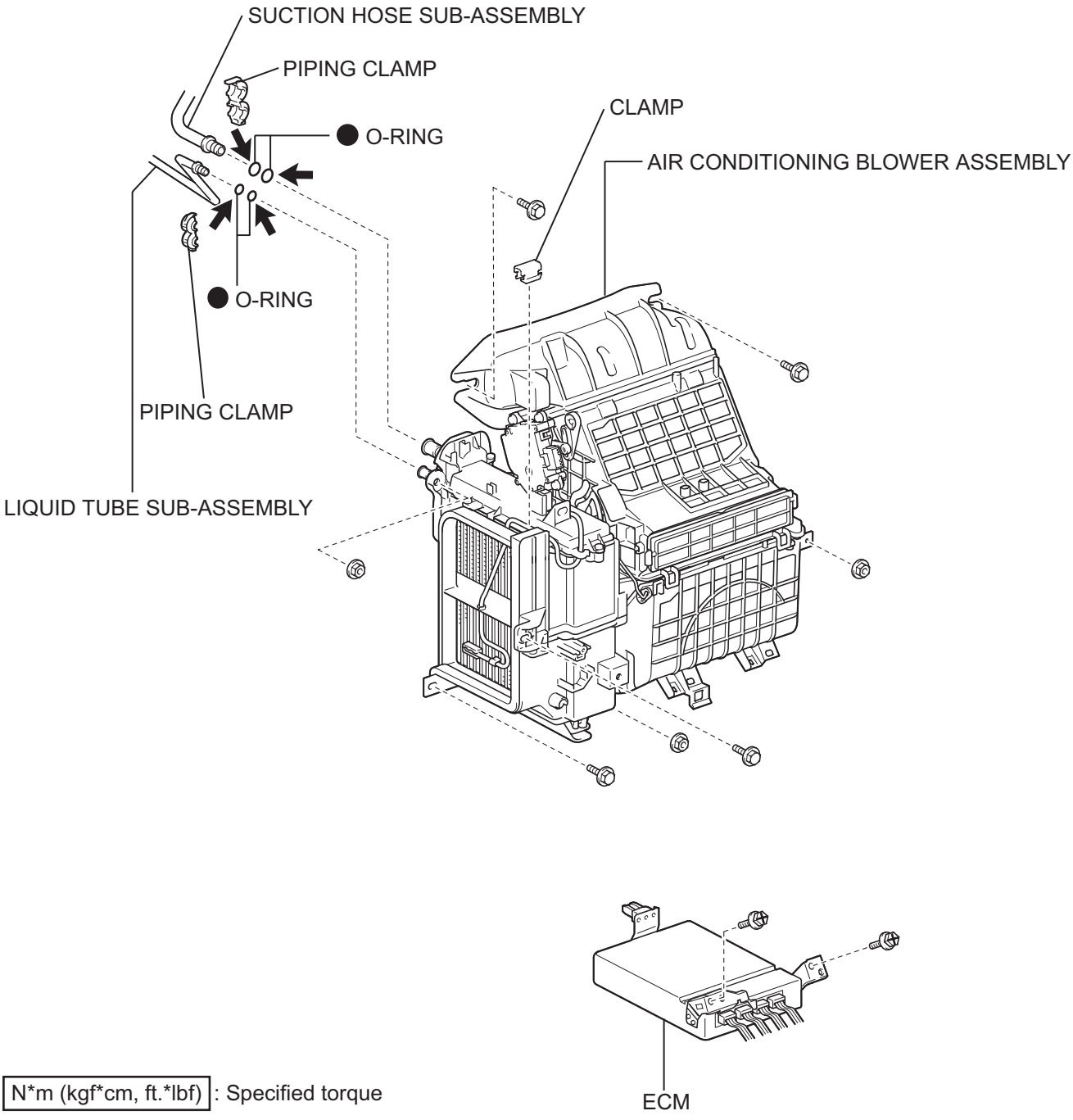
(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	CANL (E5-34) - E1 (E4-3)
Tool Setting	1 V/DIV., 10 µsec./DIV.
Conditions	Engine stopped and ignition switch ON

HINT:
The waveform varies depending on the CAN communication signal.

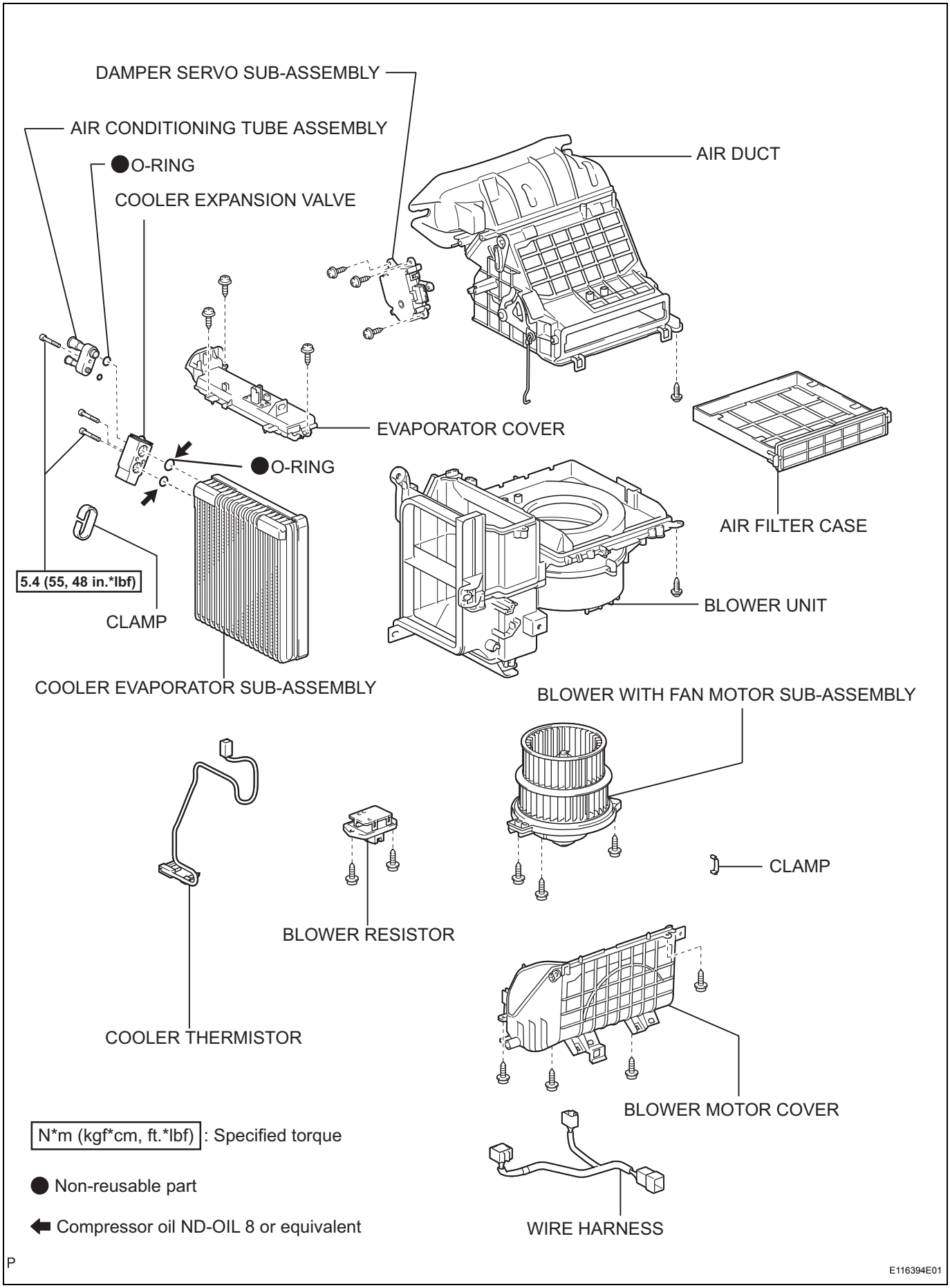
AIR CONDITIONING AND BLOWER UNIT

COMPONENTS



AC

P


DAMPER SERVO SUB-ASSEMBLY
AIR CONDITIONING TUBE ASSEMBLY
●O-RING
COOLER EXPANSION VALVE
AIR DUCT
EVAPORATOR COVER
●O-RING
AIR FILTER CASE
5.4 (55, 48 in.*lbf)
CLAMP
BLOWER UNIT
COOLER EVAPORATOR SUB-ASSEMBLY
BLOWER WITH FAN MOTOR SUB-ASSEMBLY
CLAMP
BLOWER RESISTOR
COOLER THERMISTOR
BLOWER MOTOR COVER
WIRE HARNESS
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
⬅ Compressor oil ND-OIL 8 or equivalent
P
E116394E01

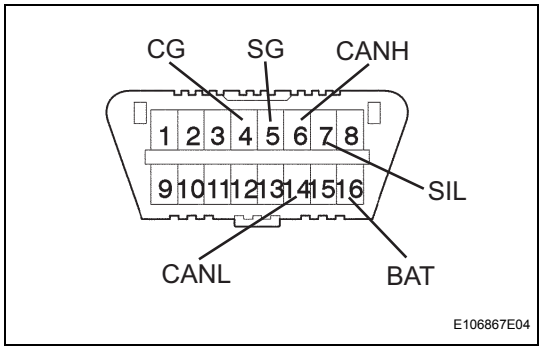
AC

DIAGNOSIS SYSTEM

1. DESCRIPTION

Air conditioning system data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

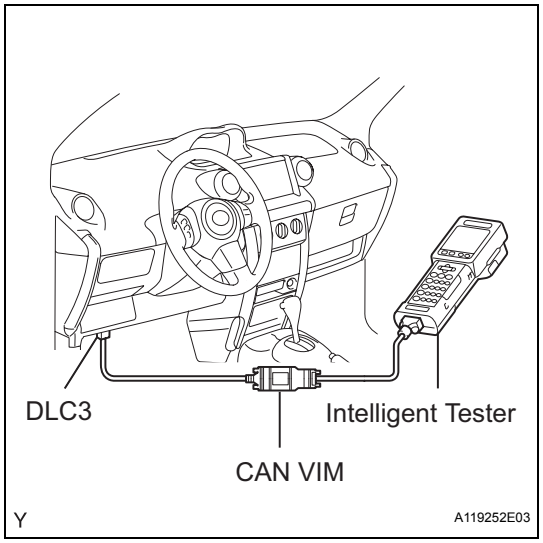
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF	54 to 67 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF	1 MΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF	3 kΩ or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF	1 MΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF	3 kΩ or higher

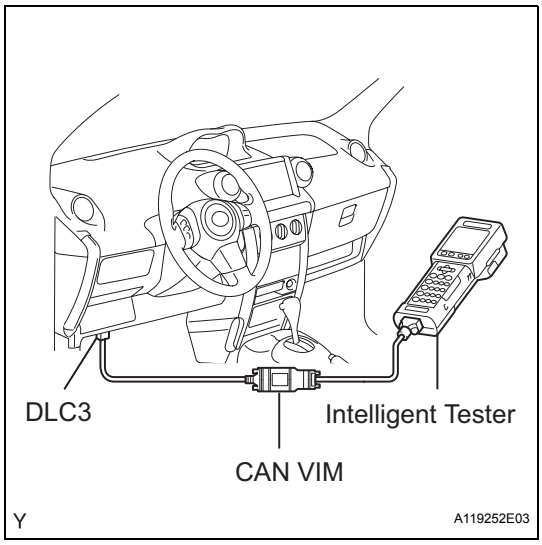
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch ON and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.





DTC CHECK / CLEAR

1. CHECK DTC

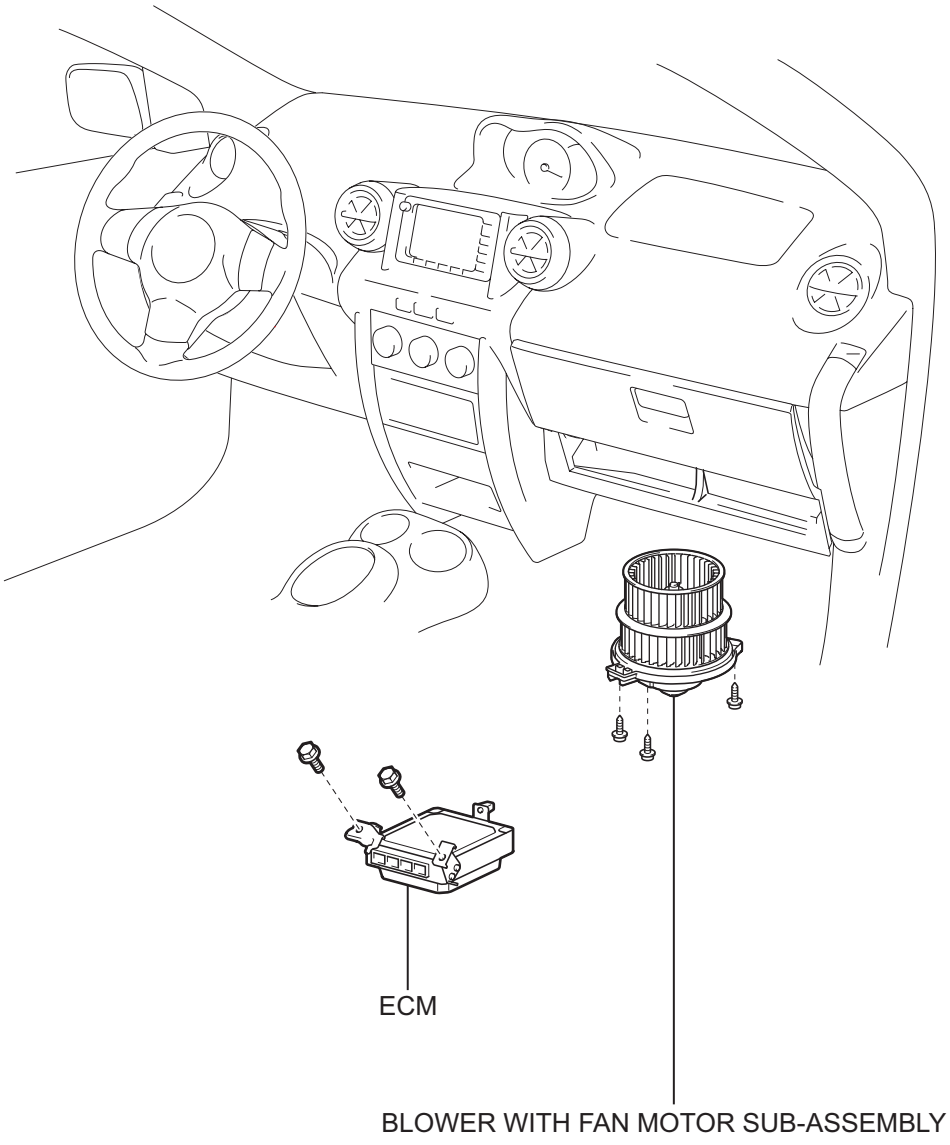
(a) Connect the intelligent tester (with CAM VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Read the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAM VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Operate the intelligent tester to erase the codes.
HINT:
Refer to the intelligent tester operator's manual for further details.

BLOWER MOTOR

COMPONENTS

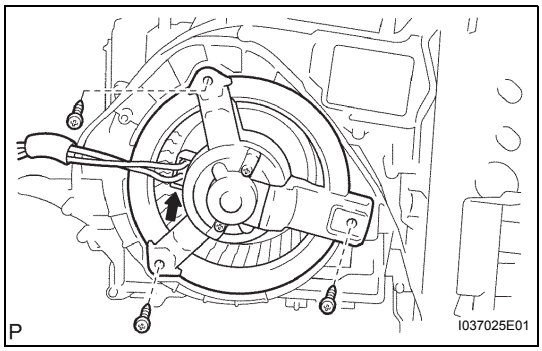


P

E116412E01

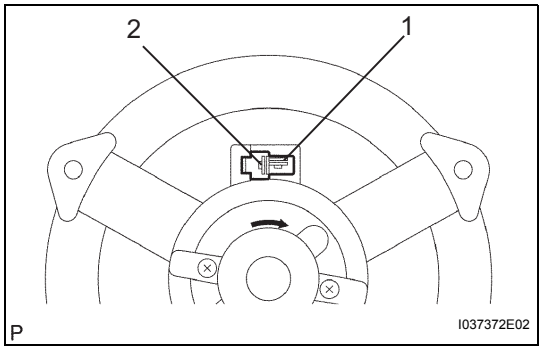
REMOVAL

1. **REMOVE ECM COVER (See page AC-53)**
2. **REMOVE ECM (See page AC-53)**
3. **REMOVE BLOWER WITH FAN MOTOR SUB-ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 3 screws and blower motor.



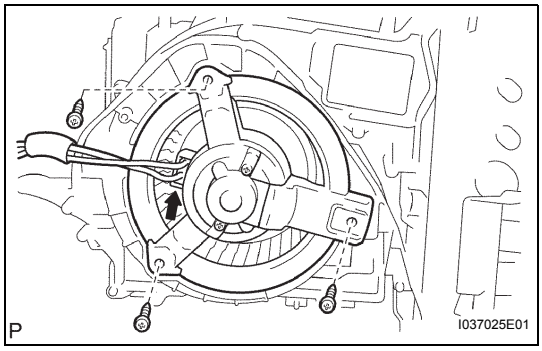
INSPECTION

1. **INSPECT BLOWER WITH FAN MOTOR SUB-ASSEMBLY**
   (a) Connect the positive (+) lead from the battery to terminal 2 and negative (-) lead to terminal 1, then check that the motor operates smoothly.
   If the result is not as specified, replace the blower motor.



INSTALLATION

1. **INSTALL BLOWER WITH FAN MOTOR SUB-ASSEMBLY**
   (a) Install the blower motor with the 3 screws.
   (b) Connect the connector.
2. **INSTALL ECM (See page AC-61)**
3. **INSTALL ECM COVER (See page AC-61)**



DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Read the DATA LIST.

A/C amplifier assembly

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
COOLANT TEMP (Engine Coolant Temperature)	Engine coolant temperature / Min.: 1.3°C (34.34°F), Max.: 90.55°C (194.99°F)	Actual engine coolant temperature	-
EVAP TEMP (Evaporator Temperature Sensor)	Evaporator temperature / Min.: -29.7°C (-21.46°F), Max.: 59.55°C (139.019°F)	Actual evaporator temperature is displayed	Open in circuit: -29.7°C (-21.46°F) (continuous, regardless of actual temperature) Short in circuit: 59.55°C (139.19°F) (continuous, regardless of actual temperature)
REG PRESS SENS (Regulator Pressure Sensor)	Regulator pressure sensor / Min.: 0 kgf/cm2G Max.: 38.19 kgf/cm2G	Actual regulator pressure is displayed	Open in circuit: 32.5 kgf/cm2G (continuous, regardless of actual temperature) Short in circuit: 0 kgf/cm2G (continuous, regardless of actual temperature)
REG CTRL CURRENT (Regulator Control Current)	Regulator control current / Min.: 0 A, Max.: 0.996 A	-	-

ECM

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/C SIG (A/C Signal)	A/C signal / ON or OFF	ON: A/C ON OFF: A/C OFF	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Perform the ACTIVE TEST.

A/C amplifier assembly

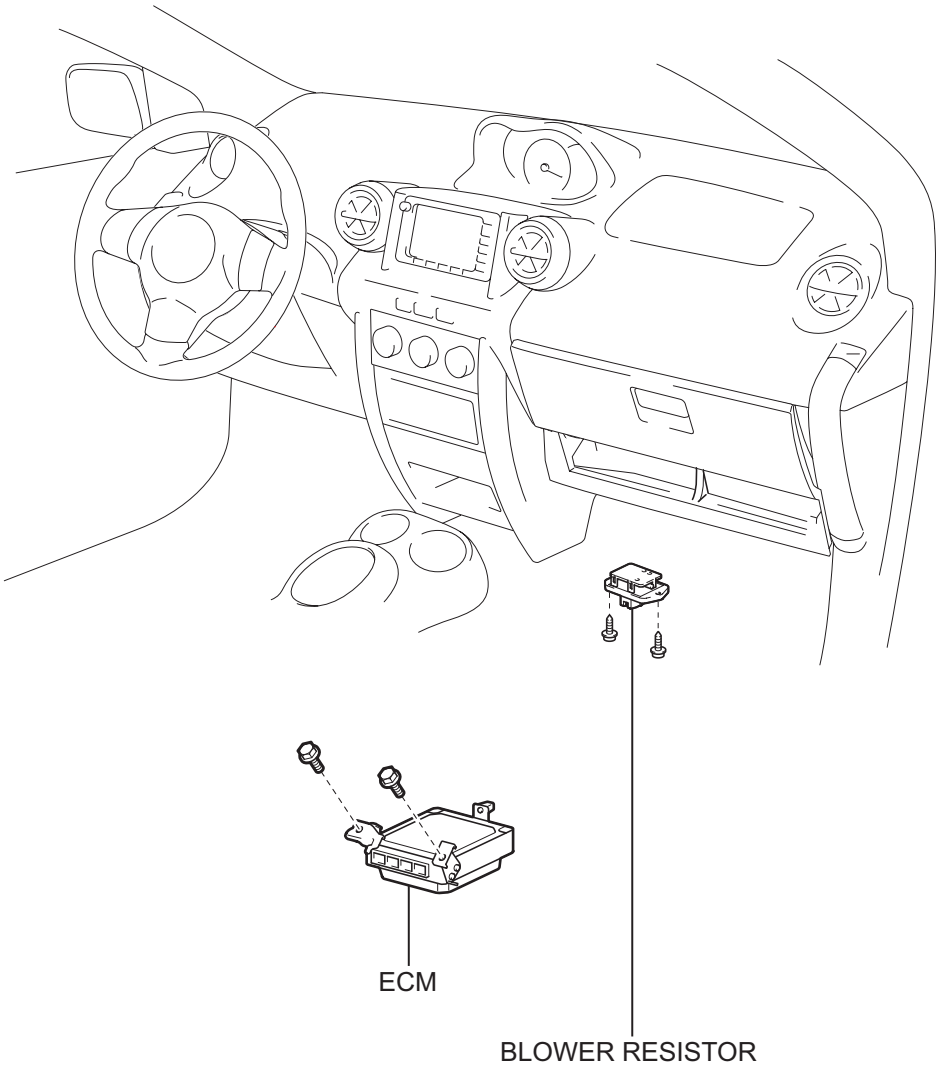
Item	Test Details / Display (Range)	Diagnostic Note
HEATER LEVEL (Heater Active Level)	Heater Active Level / Min.: 0, Max.: 3	-

DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	See page
B1413	Evaporator Temperature Sensor Circuit	- Cooler thermistor (evaporator temperature sensor) - Harness and connector between evaporator temperature sensor and A/C amplifier assembly - A/C amplifier assembly	AC-23
B1423	Pressure Switch Circuit	- Pressure sensor - Refrigerant line - Harness and connector between pressure sensor and A/C amplifier assembly - A/C amplifier assembly	AC-27
B1451	Compressor Solenoid Circuit	- Compressor assembly - Harness and connector between A/C amplifier assembly and compressor assembly - A/C amplifier assembly	AC-32
B1499	Multiplex Communication Circuit	- A/C amplifier assembly - ECM - CAN communication line	AC-35

BLOWER RESISTOR

COMPONENTS



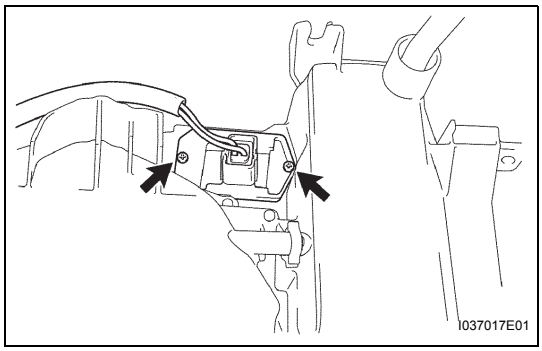
P

E116413E01

AC

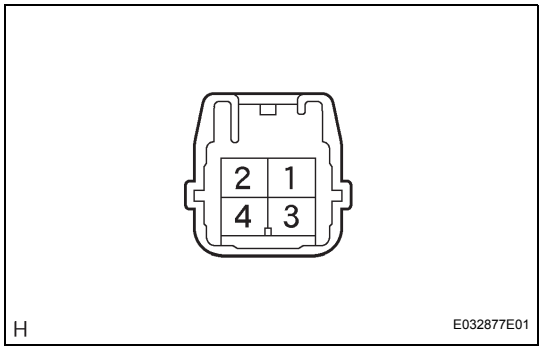
REMOVAL

1. **REMOVE ECM COVER (See page AC-53)**
2. **REMOVE ECM (See page AC-53)**
3. **REMOVE BLOWER RESISTOR**
   (a) Disconnect the connector.
   (b) Remove the 2 screws and blower resistor.



INSPECTION

1. **INSPECT BLOWER RESISTOR**
   (a) Measure the resistance of the resistor.
   Standard resistance

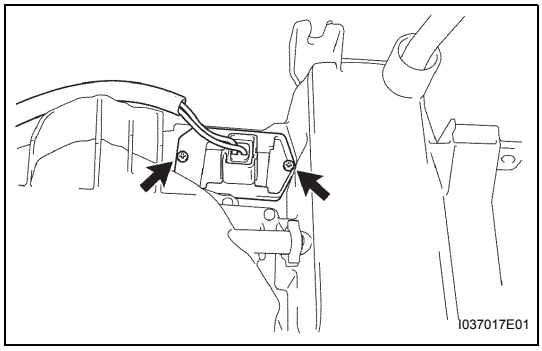


Tester Connection	Specified Condition
1 - 2	1.386 to 1.595 Ω
1 - 3	0.363 to 0.418 Ω
1 - 4	2.595 to 2.986 Ω

If the result is not as specified, replace the blower resistor.

INSTALLATION

1. **INSTALL BLOWER RESISTOR**
   (a) Install the blower resistor with the 2 screws.
   (b) Connect the connector.
2. **INSTALL ECM (See page AC-61)**
3. **INSTALL ECM COVER (See page AC-61)**



DTC	B1413	Evaporator Temperature Sensor Circuit

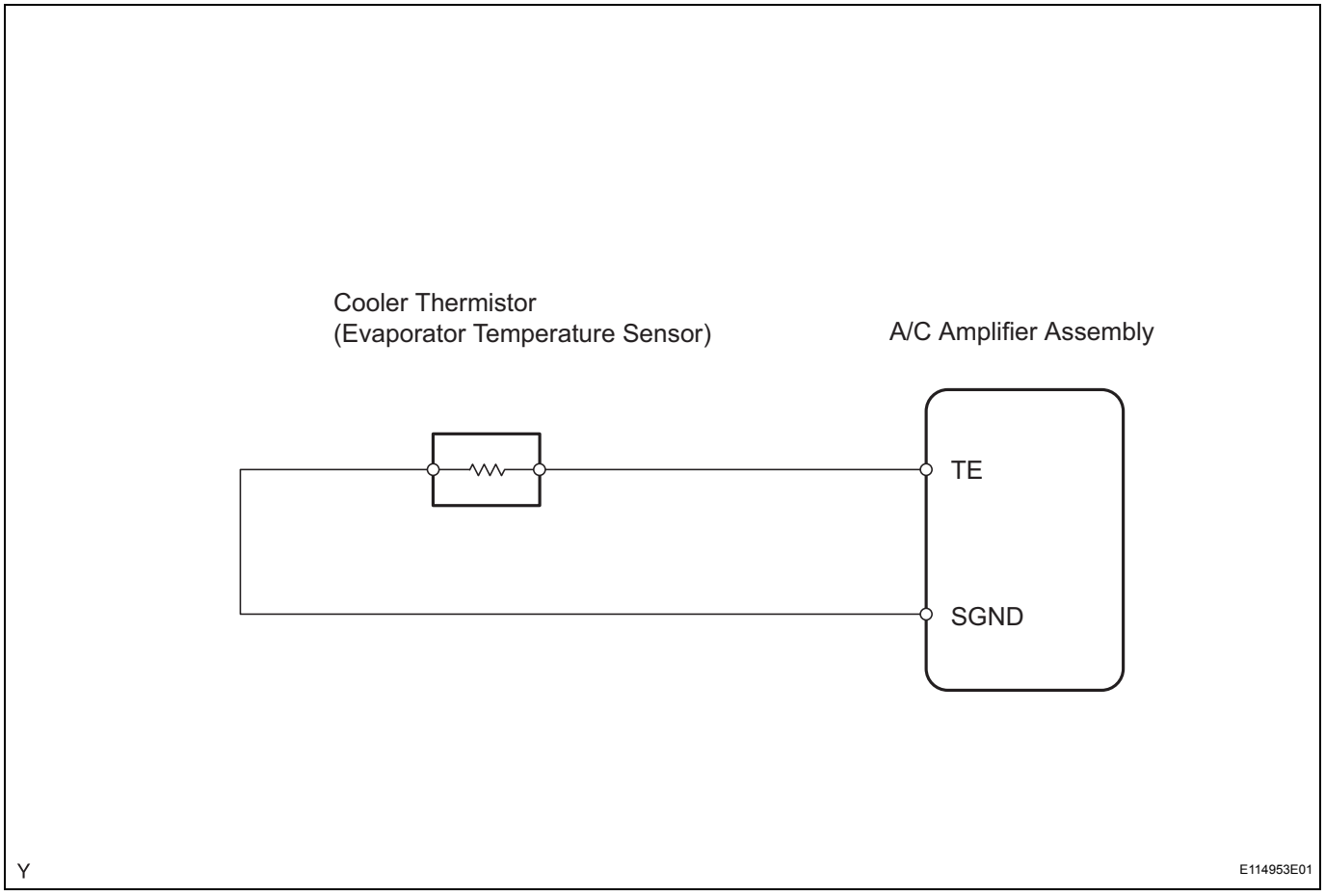
DESCRIPTION

The evaporator temperature sensor is installed on the evaporator in the A/C unit. It detects the temperature of the cooled air that has passed through the evaporator and controls the air conditioning. Then it sends appropriate signals to the A/C amplifier assembly. The resistance of the evaporator temperature sensor changes in accordance with the temperature of the cooled air that has passed through the evaporator. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The A/C amplifier assembly applies voltage (5 V) to the evaporator temperature sensor and reads voltage changes as the resistance of the evaporator temperature sensor changes. This sensor is used for frost prevention.

DTC No.	DTC Detection Condition	Trouble Area
B1413	Open or short in evaporator temperature sensor circuit	• Cooler thermistor • Harness and connector between cooler thermistor and A/C amplifier • A/C amplifier assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (COOLER THERMISTOR)

(a) Check the DATA LIST for proper functioning of the cooler thermistor (evaporator temperature sensor).

A/C amplifier assembly

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
EVAP TEMP (Evaporator temperature sensor)	Evaporator temperature / Min.: -29.7°C (-21.46°F), Max.: 59.55°C (139.019°F)	Actual evaporator temperature is displayed	Open in circuit: -29.7°C (-21.46°F) (continuous, regardless of actual temperature) Short in circuit: 59.55°C (139.19°F) (continuous, regardless of actual temperature)

OK:

The display is as specified in the normal condition.

Result

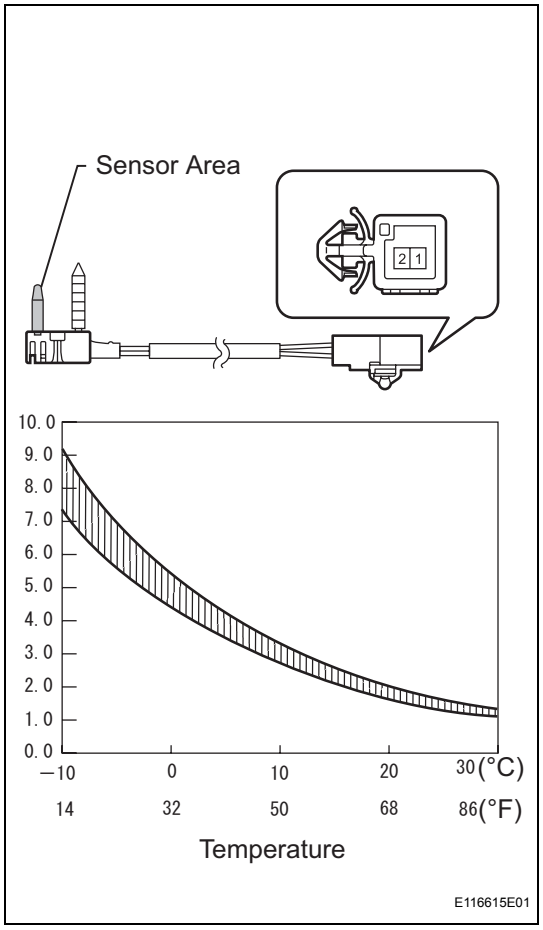
Result	Proceed to
NG	A
OK (when troubleshooting according to Problem Symptoms Table)	B
OK (when troubleshooting according to DTC Chart)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **CHECK INTERMITTENT PROBLEM**

A

2	**INSPECT COOLER THERMISTOR**



(a) Remove the cooler thermistor (evaporator temperature sensor).

(b) Measure the resistance of the thermistor.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	-10°C (14°F)	7.30 to 9.10 kΩ
1 - 2	-5°C (23°F)	5.65 to 6.95 kΩ
1 - 2	0°C (32°F)	4.40 to 5.35 kΩ
1 - 2	5°C (41°F)	3.40 to 4.15 kΩ
1 - 2	10°C (50°F)	2.70 to 3.25 kΩ
1 - 2	15°C (59°F)	2.14 to 2.58 kΩ
1 - 2	20°C (68°F)	1.71 to 2.05 kΩ
1 - 2	25°C (77°F)	1.38 to 1.64 kΩ
1 - 2	30°C (86°F)	1.11 to 1.32 kΩ

NOTICE:

- **Even slightly touching the thermistor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring the resistance, the thermistor temperature must be the same as the ambient temperature.**

HINT:

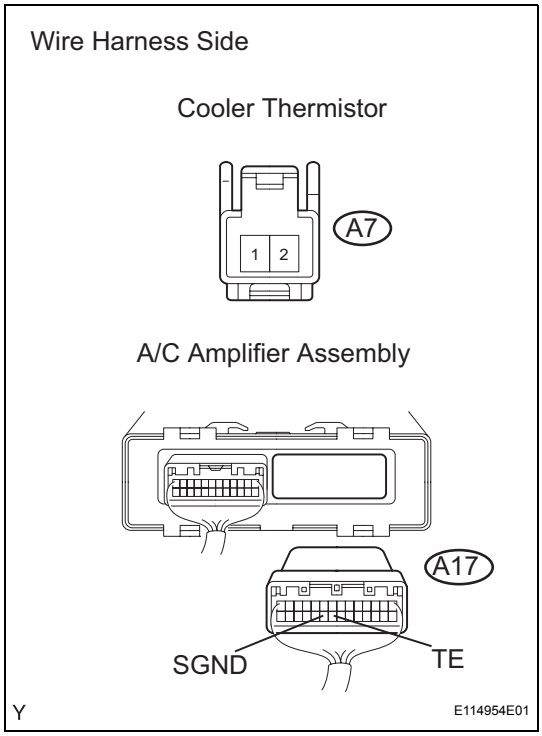
As the temperature increases, the resistance decreases (see graph).

NG → **REPLACE COOLER THERMISTOR**

OK

AC

3	CHECK WIRE HARNESS (COOLER THERMISTOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A7 thermistor connector.
(b) Disconnect the A17 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A17-22 (TE) - A7-2	Below 1 Ω
A17-23 (SGND) - A7-1	Below 1 Ω

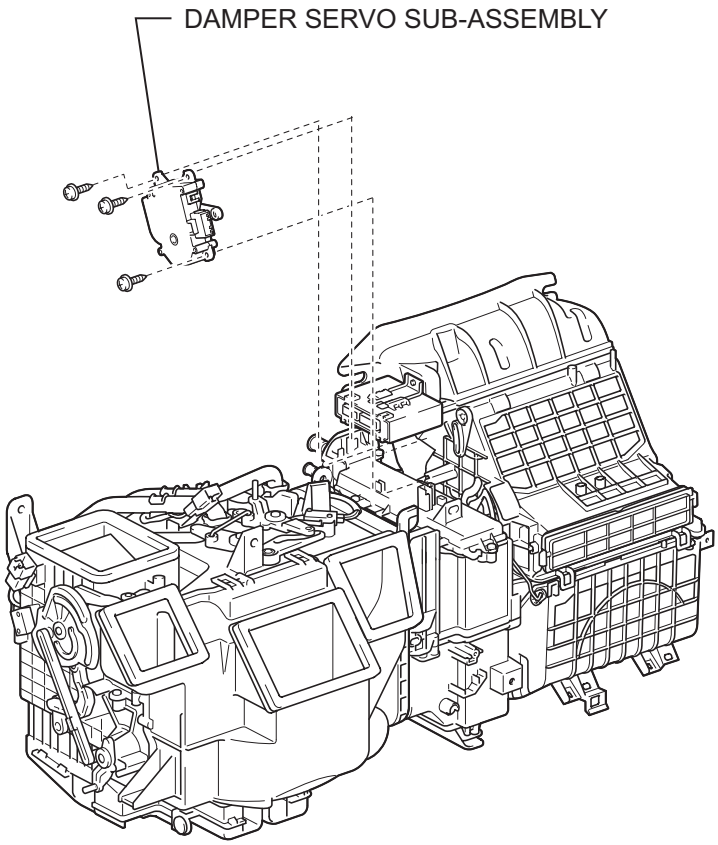
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY

AIR INLET CONTROL SERVO MOTOR

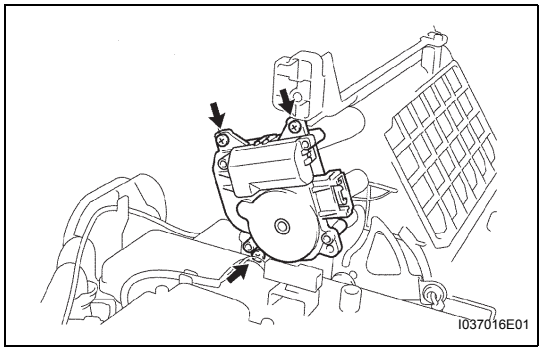
COMPONENTS



E119768E01

REMOVAL

1. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY**
   (a) Remove the instrument panel (see page IP-4).
2. **REMOVE LOWER INSTRUMENT PANEL ASSEMBLY**
   (a) Remove the instrument panel (see page IP-17).
3. **REMOVE DAMPER SERVO SUB-ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 3 screws and damper servo.

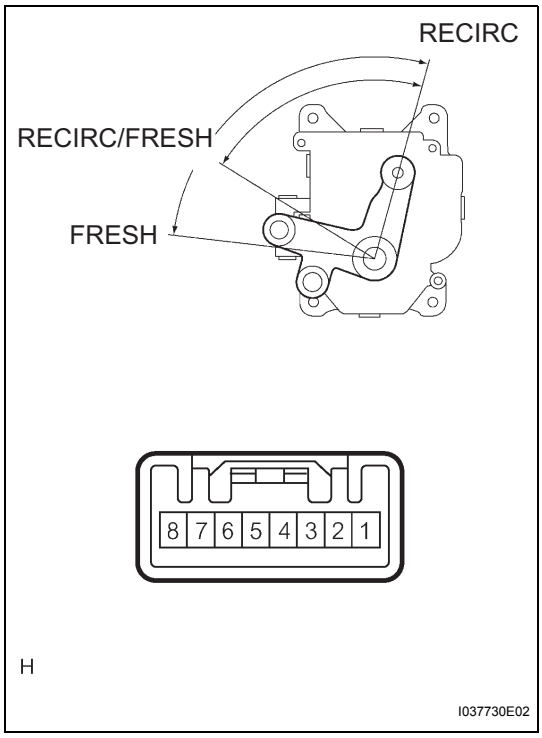


INSPECTION

1. **INSPECT DAMPER SERVO SUB-ASSEMBLY**
   (a) Check that the damper servo moves as follows.
   OK

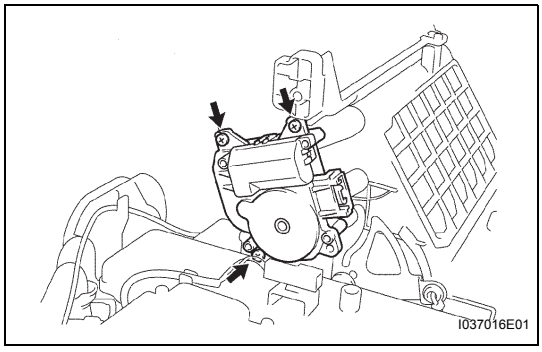
Measuring Condition	Specified Condition
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 1, 8	RECIRC
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 2, 8	RECIRC/FRESH
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 3, 8	FRESH

If the result is not as specified, replace the damper servo.



INSTALLATION

1. **INSTALL DAMPER SERVO SUB-ASSEMBLY**
   (a) Install the damper servo with the 3 screws.
   (b) Connect the connector.
2. **INSTALL LOWER INSTRUMENT PANEL ASSEMBLY**
   (a) Install the instrument panel (see page IP-22).
3. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY**
   (a) Install the instrument panel (see page IP-10).



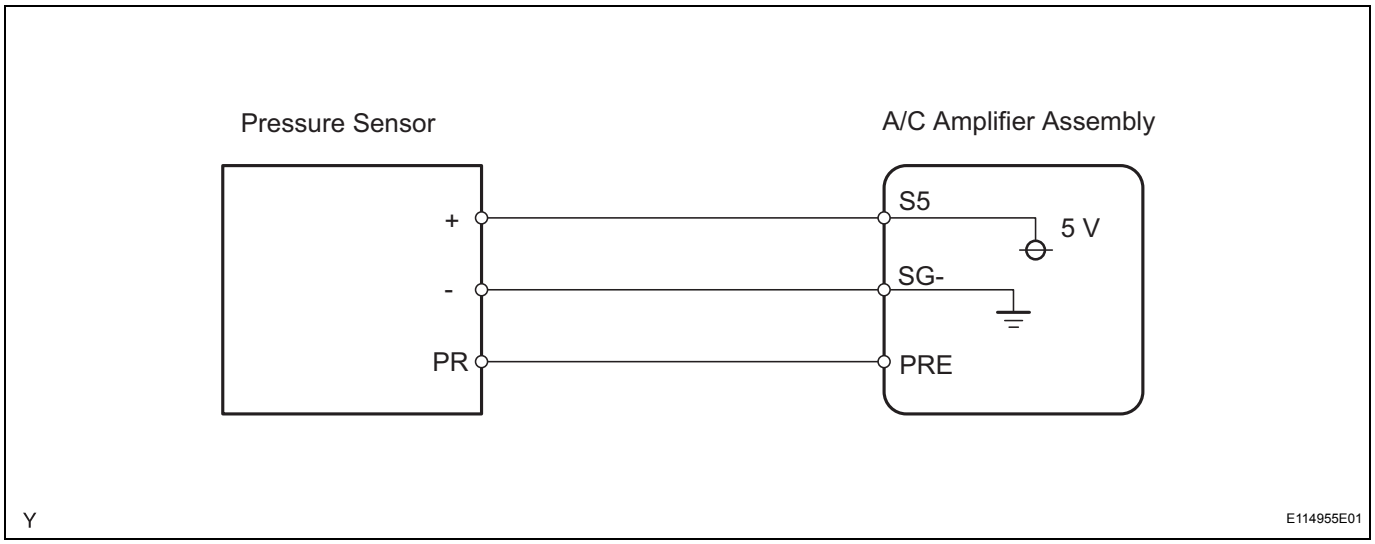
DTC	B1423	Pressure Switch Circuit

DESCRIPTION

This DTC is output when refrigerant pressure is extremely low (0.176 MPa (1.8 kgf/cm^2, 25 psi) or less) or extremely high (3.025 MPa (32.0 kgf/cm^2, 455 psi) or more). The pressure sensor, which is installed on the pipe of the high pressure side to detect refrigerant pressure, outputs refrigerant pressure signals to the A/C amplifier assembly. The A/C amplifier assembly converts the signals to pressure according to the sensor characteristics to control the compressor.

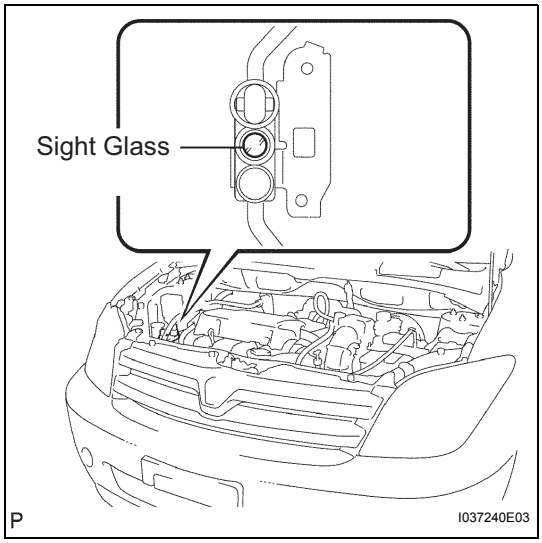
DTC No.	DTC Detection Condition	Trouble Area
B1423	When either condition below is met: • Open or short in pressure switch circuit • Abnormal refrigerant pressure Below 0.176 MPa (1.8 kgf/cm^2, 25 psi) Over 3.025 MPa (32.0 kgf/cm^2, 455 psi)	• Pressure sensor • Refrigerant line • Harness and connector between pressure sensor and A/C amplifier • A/C amplifier assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK REFRIGERANT VOLUME



(a) Check the sight glass on the liquid tube sub-assembly.
Test conditions:
- Engine is running at 1,500 rpm.
- Blower switch is at HI.
- A/C switch is ON.
- Air mix control knob is at the MAX COOL position.
- Doors are fully open.

Item	Symptom	Amount of Refrigerant	Corrective Procedures
1	Bubbles visible	Insufficient*	1. Check for gas leakage and repair if necessary 2. Add refrigerant until bubbles disappear
2	No bubbles visible	Empty, insufficient or too much	Refer to items 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	1. Check for gas leakage with gas leak detector and repair if necessary 2. Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet	Correct or too much	Refer to items 5 and 6
5	Immediately after A/C is turned OFF, refrigerant becomes clear	Too much	1. Drain or discharge refrigerant 2. Bleed air and supply proper amount of purified refrigerant
6	Immediately after A/C is turned OFF, refrigerant foams and then becomes clear	Correct	-

HINT:
*: If the ambient temperature is higher than usual but cooling is sufficient, bubbles in the sight glass are permissible.

NG → **CHARGE REFRIGERANT**

OK

2	READ VALUE OF INTELLIGENT TESTER (PRESSURE SENSOR)

(a) Start the engine.
(b) Turn the A/C switch ON.

AC

(c) Check the DATA LIST for proper functioning of the pressure sensor.

A/C amplifier assembly

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
REG PRESS SENS (Regulator pressure sensor)	Regulator Pressure Sensor / Min.: 0 kgf/cm2G, Max.: 38.19 kgf/cm2G	Actual regulator pressure is displayed	Open in circuit: 32.5 kgf/cm2G (continuous, regardless of actual temperature) Short in circuit: 0 kgf/cm2G (continuous, regardless of actual temperature)

OK:

The display is as specified in the normal condition.

Result

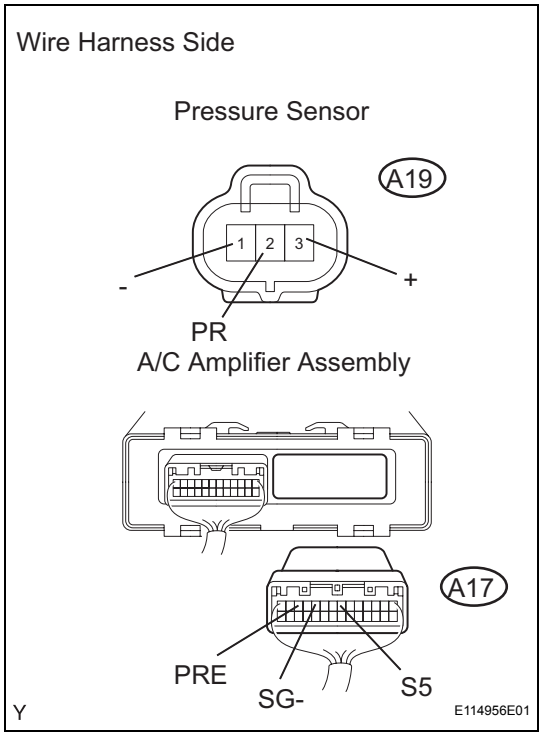
Result	Proceed to
NG	A
OK (when troubleshooting according to Problem Symptoms Table)	B
OK (when troubleshooting according to DTC Chart)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **CHECK INTERMITTENT PROBLEM**

A

3 CHECK WIRE HARNESS (PRESSURE SENSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A19 sensor connector.
(b) Disconnect the A17 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

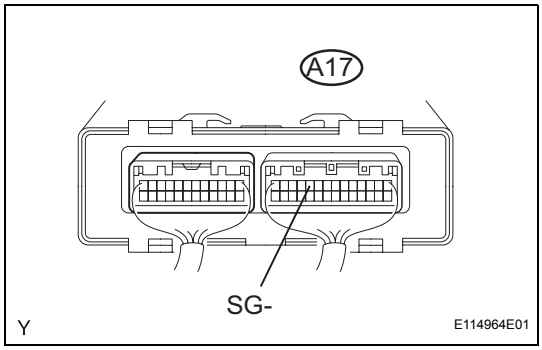
Standard resistance

Tester Connection	Specified Condition
A19-3 (+) - A17-7 (S5)	Below 1 Ω
A19-2 (PR) - A17-12 (PRE)	Below 1 Ω
A19-1 (-) - A17-10 (SG-)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY



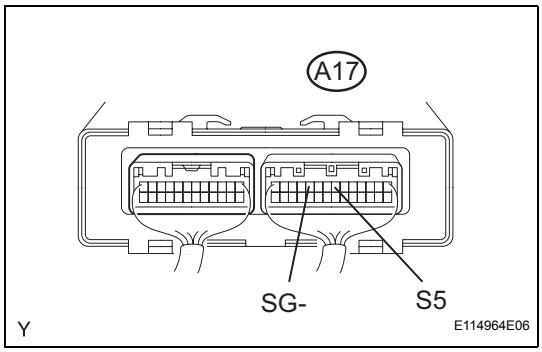
(a) Remove the A/C amplifier but do not disconnect the connectors.
(b) Measure the resistance of the connector.
Standard resistance

Tester Connection	Specified Condition
A17-10 (SG-) - Body ground	Below 1 Ω

NG → **REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY**

OK

5	CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY (S5 VOLTAGE)



(a) Remove the A/C amplifier but do not disconnect the connectors.
(b) Measure the voltage of the connector.
Standard voltage

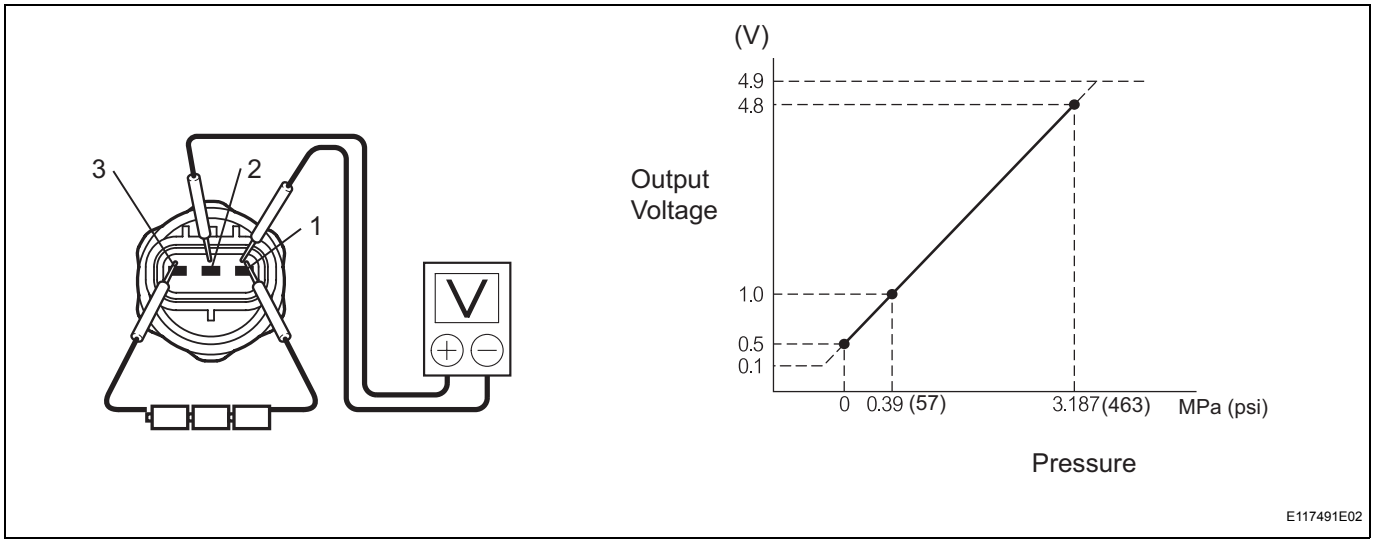
Tester Connection	Condition	Specified Condition
A17-7 (S5) - A17-10 (SG-)	Ignition switch ON	4.5 to 5.5 V
	Ignition switch OFF	Below 1 V

NG → **REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY**

OK

6	CHECK PRESSURE SENSOR

(a) Install the manifold gauge set.
(b) Connect the three 1.5 V dry cell batteries' positive (+) lead to terminal 3 and the negative (-) lead to terminal 1. Then connect the voltmeter's positive (+) lead to terminal 2 and the negative (-) lead to terminal 1. Measure the voltage.



OK:

The voltage changes according to refrigerant pressure, as shown in the graph.

HINT:

The graph shows the relationship between pressure and output voltage when the pressure sensor is used with an input voltage of 5 V. When using three 1.5 V dry cell batteries connected in series, the output voltage will be 90% of the output voltage in the 5 V input voltage case.

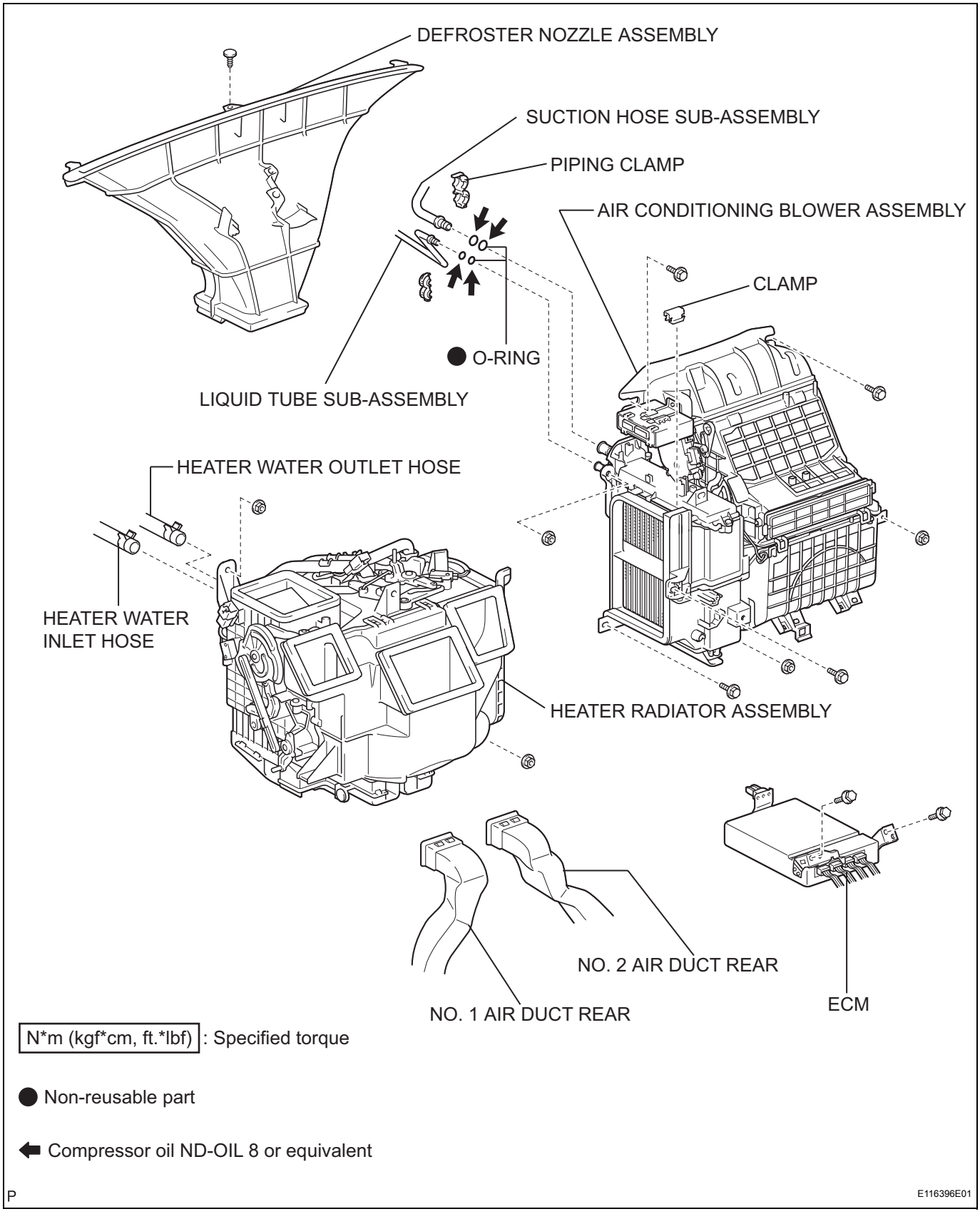
NG → **REPLACE LIQUID TUBE SUB-ASSEMBLY**

OK

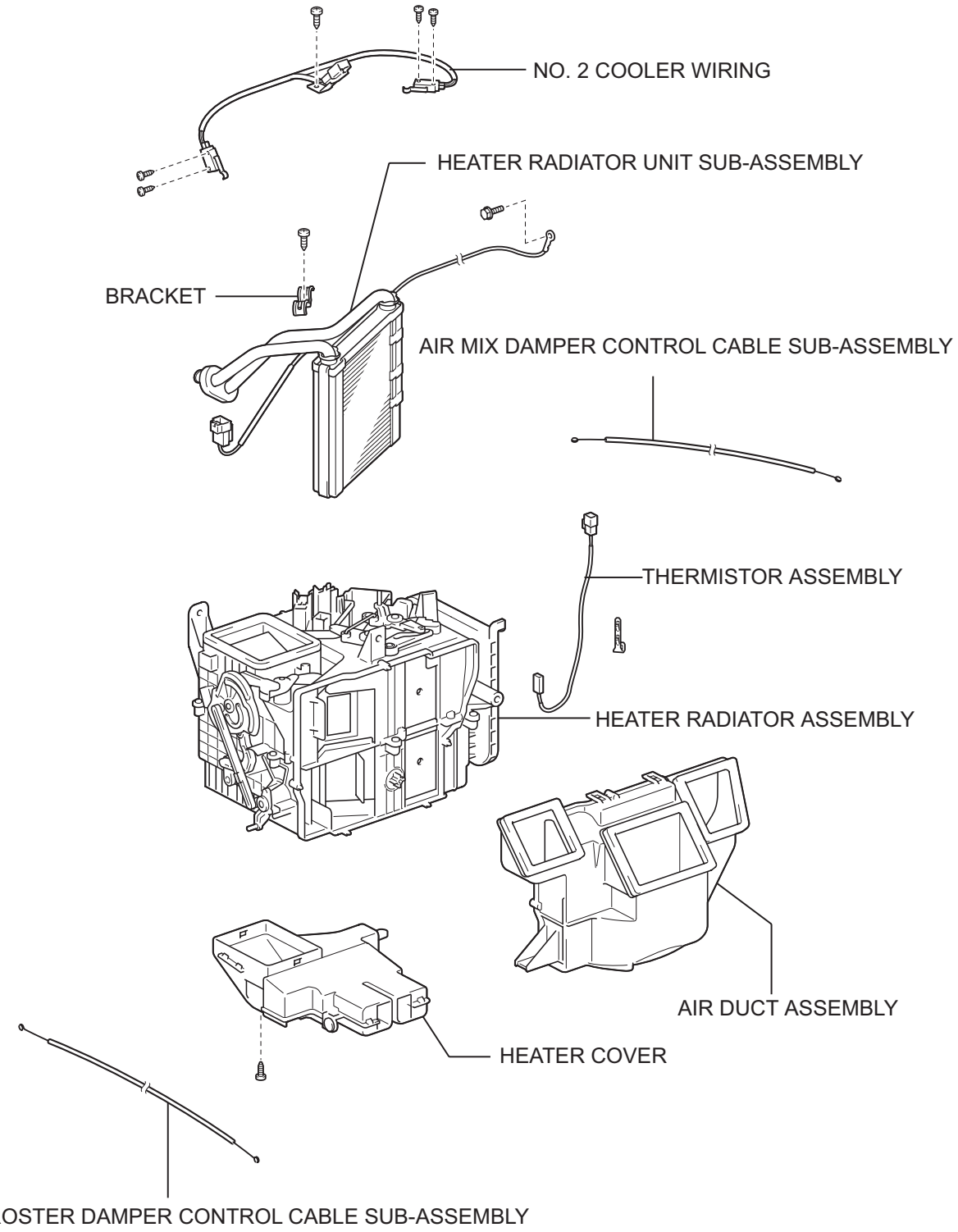
REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY

HEATER RADIATOR ASSEMBLY

COMPONENTS



AC



AC

P

E116397E01

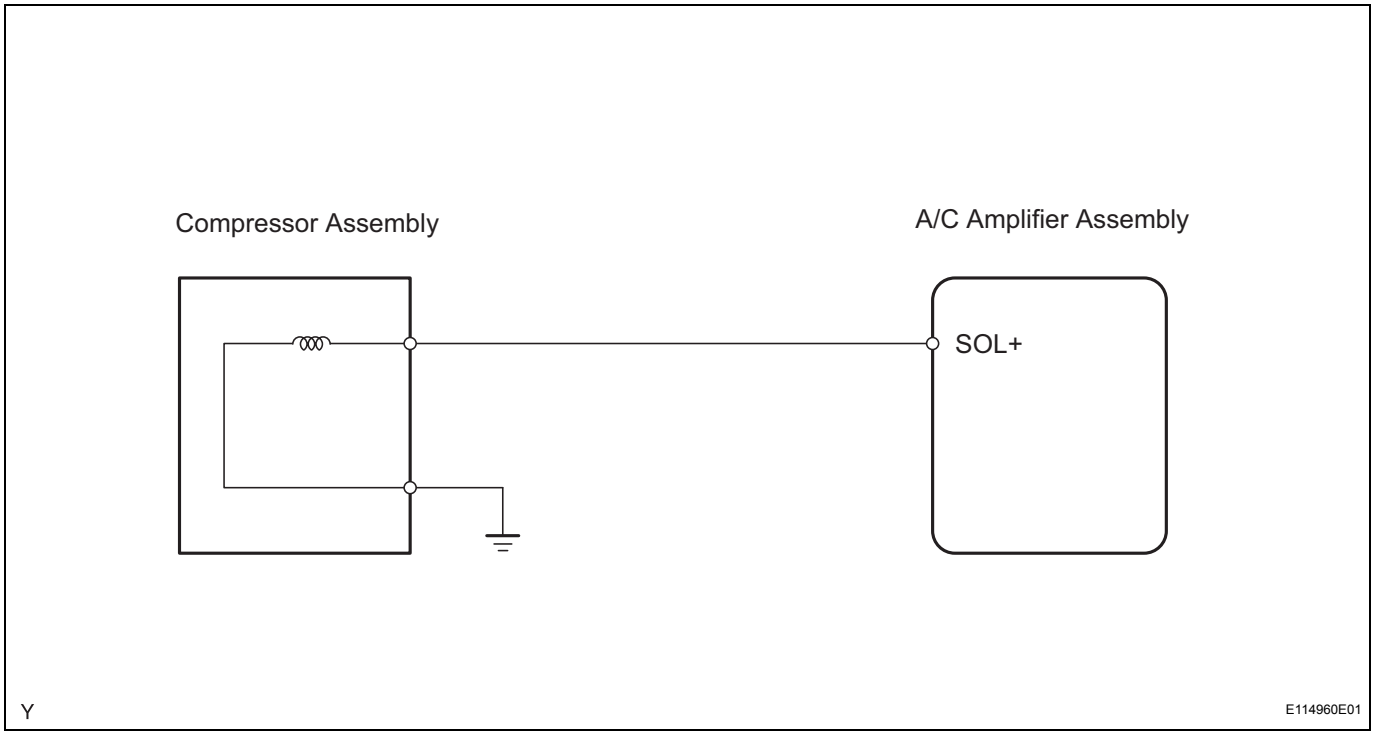
DTC	B1451	Compressor Solenoid Circuit

DESCRIPTION

The compressor assembly regulates the amount of refrigerant to discharge according to signals from the A/C amplifier assembly. The A/C amplifier assembly controls the compressor by using heat load variance and engine rpm variance data to determine the amount of refrigerant to discharge, and then converts the data to a signal.

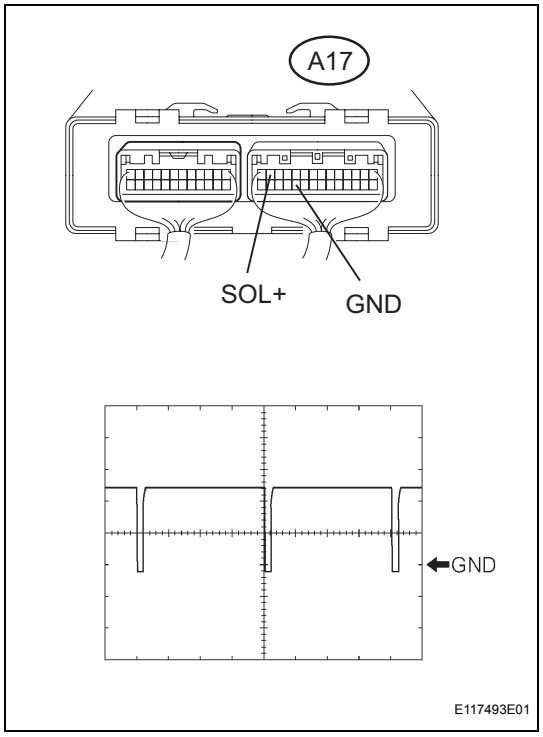
DTC No.	DTC Detection Condition	Trouble Area
B1451	Open or short in solenoid of the externally changeable compressor circuit	• Compressor assembly • Harness and connector between A/C amplifier and compressor • A/C amplifier assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY (SOLT VOLTAGE)



(a) Remove the A/C amplifier but do not disconnect the connectors.
(b) Start the engine.
(c) Turn the A/C switch ON and blower switch ON.
(d) Using an oscilloscope, check the waveform of the amplifier.

Item	Content
Tester Connection	SOL+ (A17-13) - GND (A17-24)
Tool Setting	5 V/DIV., 500μsec./DIV.
Conditions	Engine idling

OK:
Waveform is as shown in the illustration.

Result

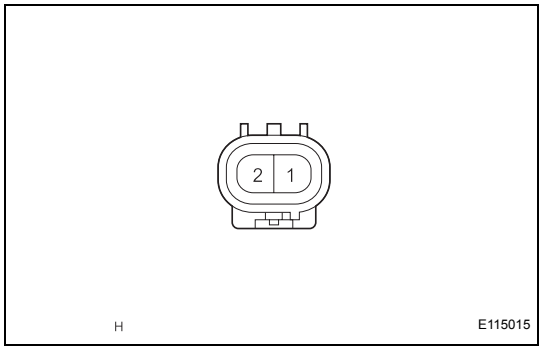
Result	Proceed to
NG	A
OK (when troubleshooting according to Problem Symptoms Table)	B
OK (when troubleshooting according to DTC Chart)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **CHECK INTERMITTENT PROBLEM**

A

2 INSPECT COMPRESSOR ASSEMBLY



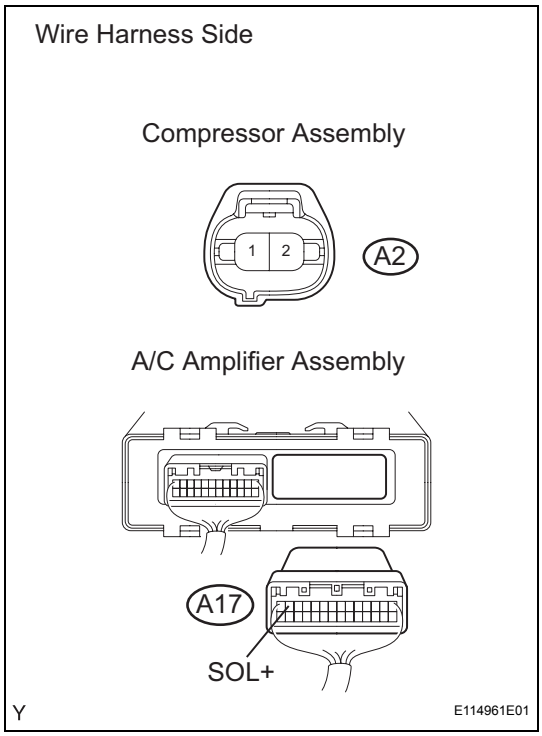
(a) Remove the compressor.
(b) Measure the resistance of the compressor.
Standard resistance

Tester Connection	Specified Condition
1 - 2	10.1 to 11.1 Ω

NG → **REPLACE COMPRESSOR ASSEMBLY**

OK

3	CHECK WIRE HARNESS (COMPRESSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A2 compressor connector.
(b) Disconnect the A17 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A2-2 - A17-13 (SOL+)	Below 1 Ω

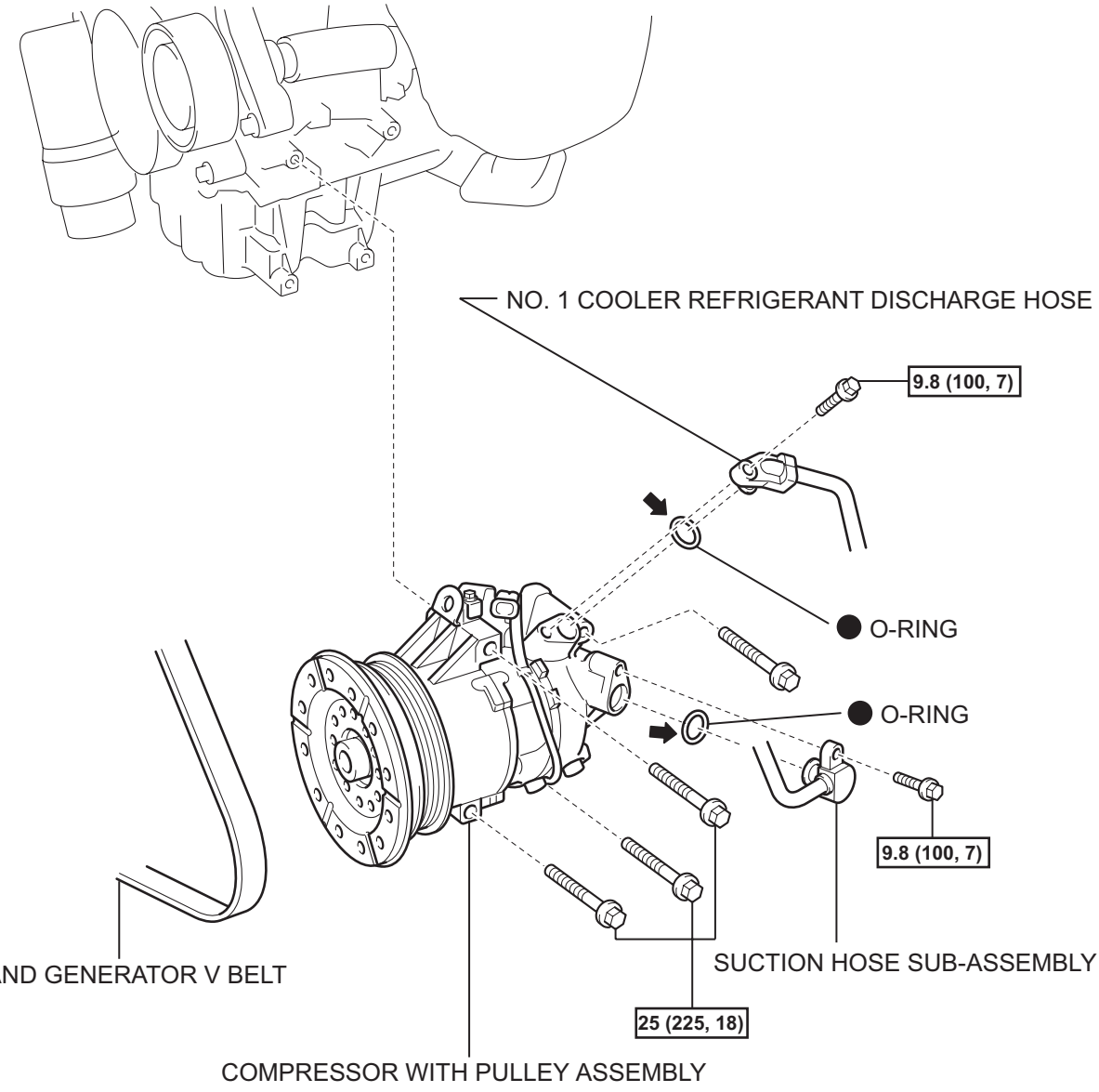
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY

COMPRESSOR AND PULLEY

COMPONENTS



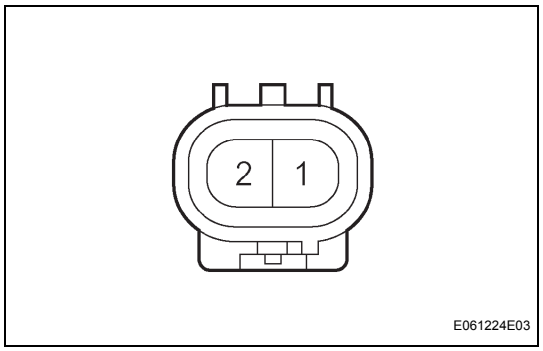
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ Compressor oil ND-OIL 8 or equivalent

T

E116408E01



ON-VEHICLE INSPECTION

1. CHECK COMPRESSOR WITH PULLEY ASSEMBLY

(a) Inspect compressor resistance.

(1) Disconnect the connector.

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
1 - 2	10.1 to 11.1 Ω

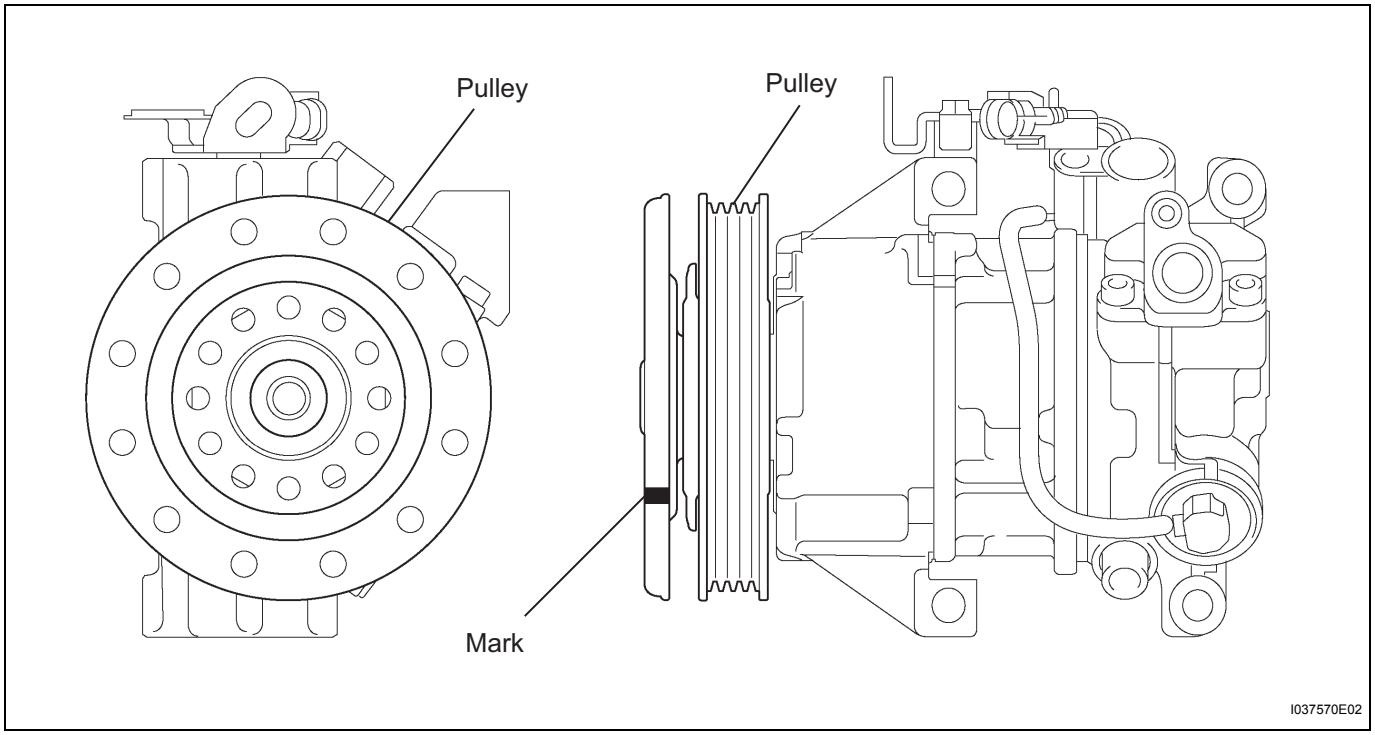
(b) Check the operation.

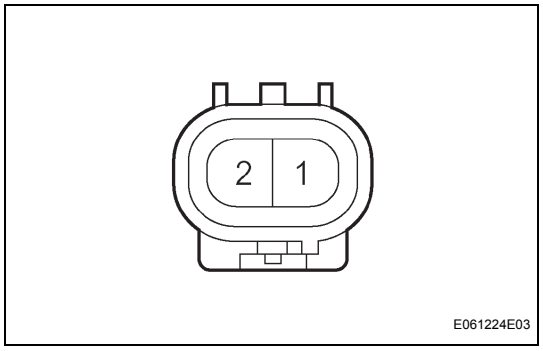
(1) Start the engine.

(2) Check the compressor pulley.

OK:

The compressor shaft rotates along with the pulley.

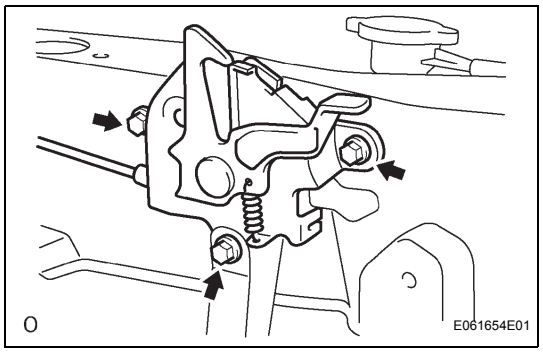




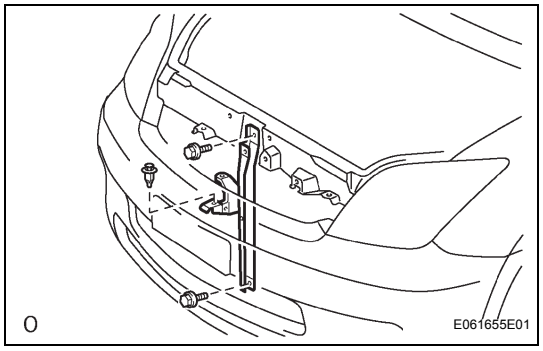
(3) When the refrigerant amount and congestion of A/C cycle cannot be checked by the condition of the sight glass and manifold gauge, connect the positive battery cable to terminal 1 of the connector and the negative battery cable to the terminal 2 of the connector. Then check if cold air comes out while setting the blower switch to the "LO" position.

REMOVAL

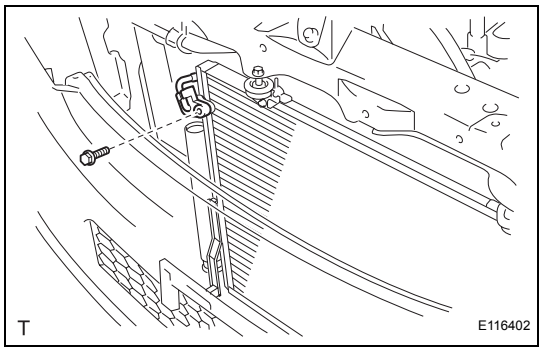
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-46)**
3. **REMOVE RADIATOR GRILLE (See page ET-13)**
4. **REMOVE LOW PITCHED HORN ASSEMBLY (See page HO-5)**
5. **REMOVE HIGH PITCHED HORN ASSEMBLY (See page HO-7)**
6. **REMOVE HOOD LOCK ASSEMBLY**
   (a) Remove the 3 bolts and hood lock.

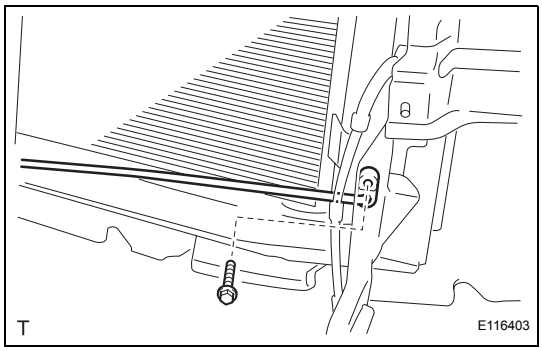


7. **REMOVE HOOD LOCK SUPPORT SUB-ASSEMBLY**
   (a) Remove the clip.
   (b) Remove the 2 bolts and hood lock support.



8. **DISCONNECT NO. 1 COOLER REFRIGERANT DISCHARGE HOSE**
   (a) Remove the bolt and disconnect the cooler refrigerant discharge hose from the condenser.
   (b) Remove the O-ring from the cooler refrigerant discharge hose.
   NOTICE:
   Seal the opening of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.





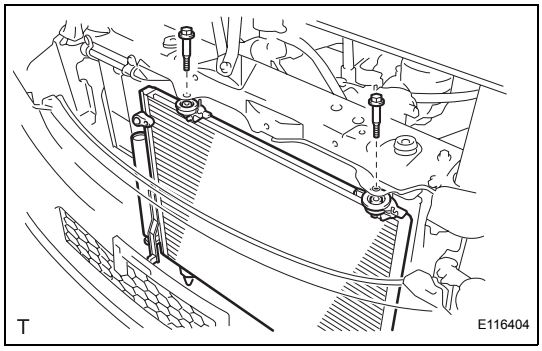
9. DISCONNECT LIQUID TUBE SUB-ASSEMBLY

(a) Remove the bolt and liquid tube from the condenser.

(b) Remove the O-ring from the liquid tube.

NOTICE:

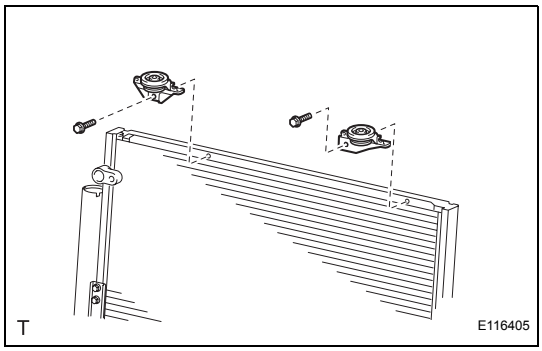
Seal the opening of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.



10. REMOVE CONDENSER WITH RECEIVER ASSEMBLY

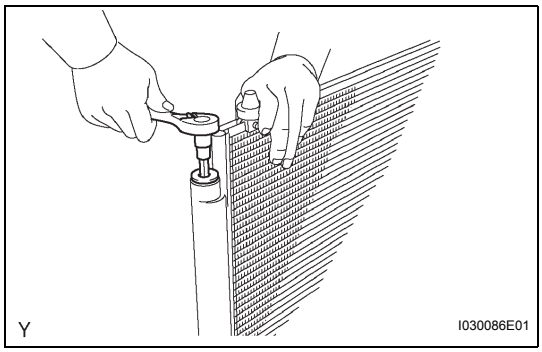
(a) Remove the 2 bolts and condenser.

DISASSEMBLY



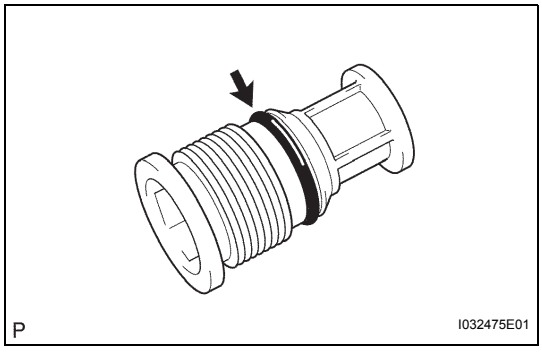
1. REMOVE NO. 1 CONDENSER BRACKET COLLAR

(a) Remove the 2 bolts and 2 condenser bracket collars.

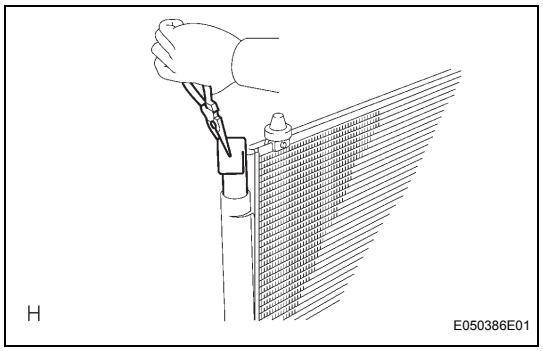


2. REMOVE COOLER DRYER

(a) Using a 14 mm socket hexagon wrench, remove the cap from the modulator.

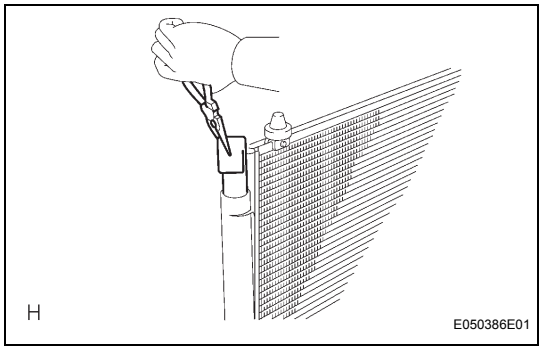


(b) Remove the O-ring from the cap.



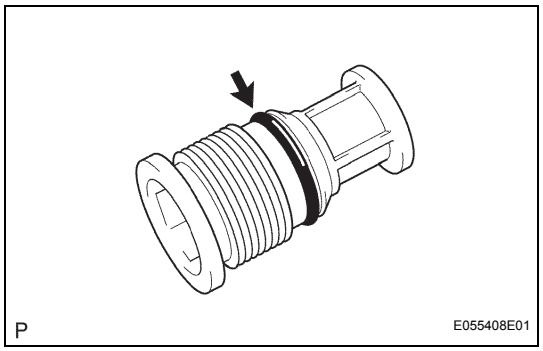
(c) Using pliers, remove the cooler dryer.

REASSEMBLY



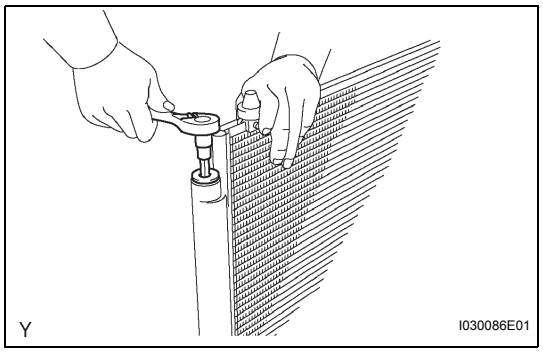
1. INSTALL COOLER DRYER

(a) Using pliers, install the cooler dryer.

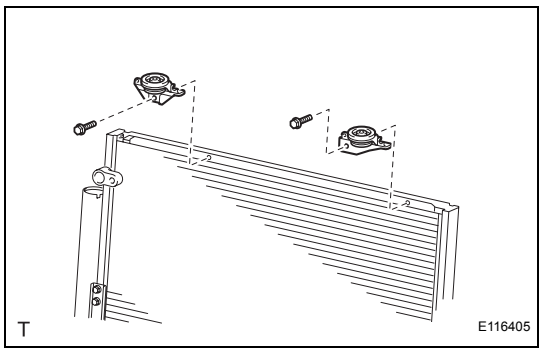


(b) Apply a sufficient amount of compressor oil to the contact surfaces of a new O-ring and the cap.
Compressor oil:
ND-OIL 8 or equivalent

(c) Install the O-ring to the cap.

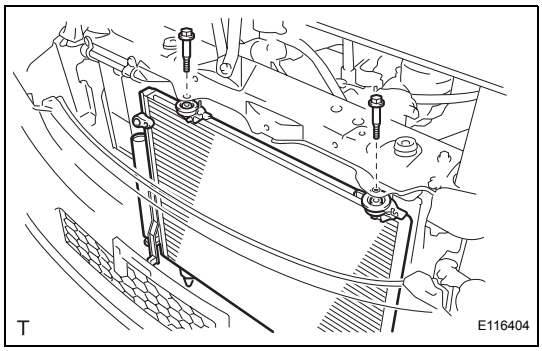


(d) Using a 14 mm socket hexagon wrench, install the cap to the modulator.
Torque: 2.9 N*m (29 kgf*cm, 25 in.*lbf)



2. INSTALL NO.1 CONDENSER BRACKET COLLAR

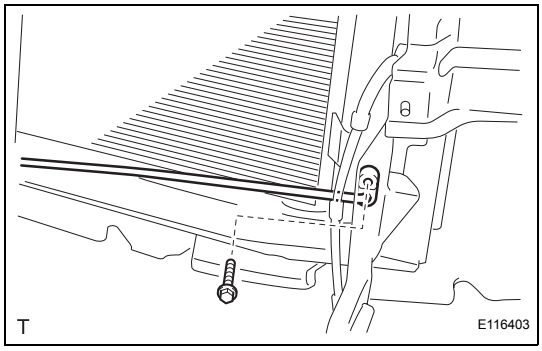
(a) Install the 2 condenser bracket collars with the 2 bolts.
Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)



INSTALLATION

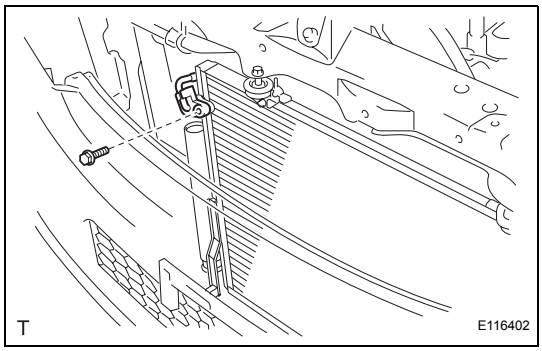
1. INSTALL CONDENSER WITH RECEIVER ASSEMBLY

(a) Install the condenser w/ receiver with the 2 bolts.
Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)



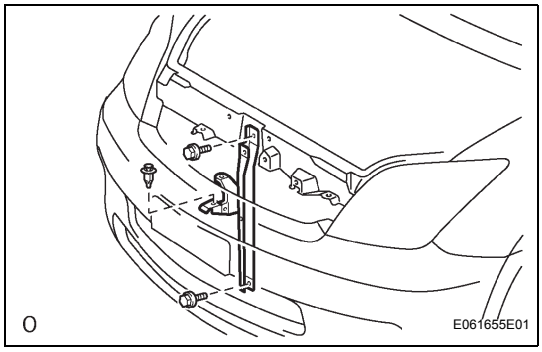
2. CONNECT LIQUID TUBE SUB-ASSEMBLY

(a) Remove the vinyl tape attached to the liquid tube and condenser.
(b) Sufficiently apply compressor oil to a new O-ring and liquid tube.
Compressor oil:
ND-OIL 8 or equivalent
(c) Install the O-ring to the liquid tube.
(d) Install the liquid tube sub-assembly to the condenser with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



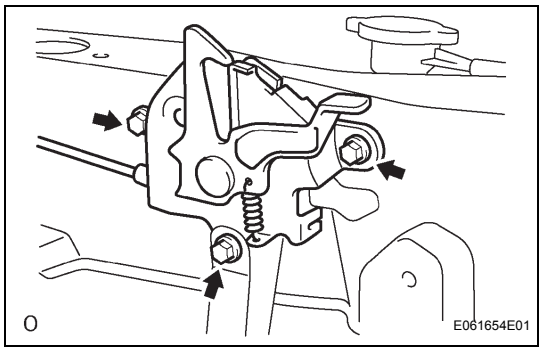
3. CONNECT NO. 1 COOLER REFRIGERANT DISCHARGE HOSE

(a) Remove the vinyl tape attached to the hose and condenser.
(b) Sufficiently apply compressor oil to a new O-ring and hose joint.
Compressor oil:
ND-OIL 8 or equivalent
(c) Install the O-ring to the cooler refrigerant discharge hose.
(d) Connect the No. 1 cooler refrigerant discharge hose to the condenser with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



4. INSTALL HOOD LOCK SUPPORT SUB-ASSEMBLY

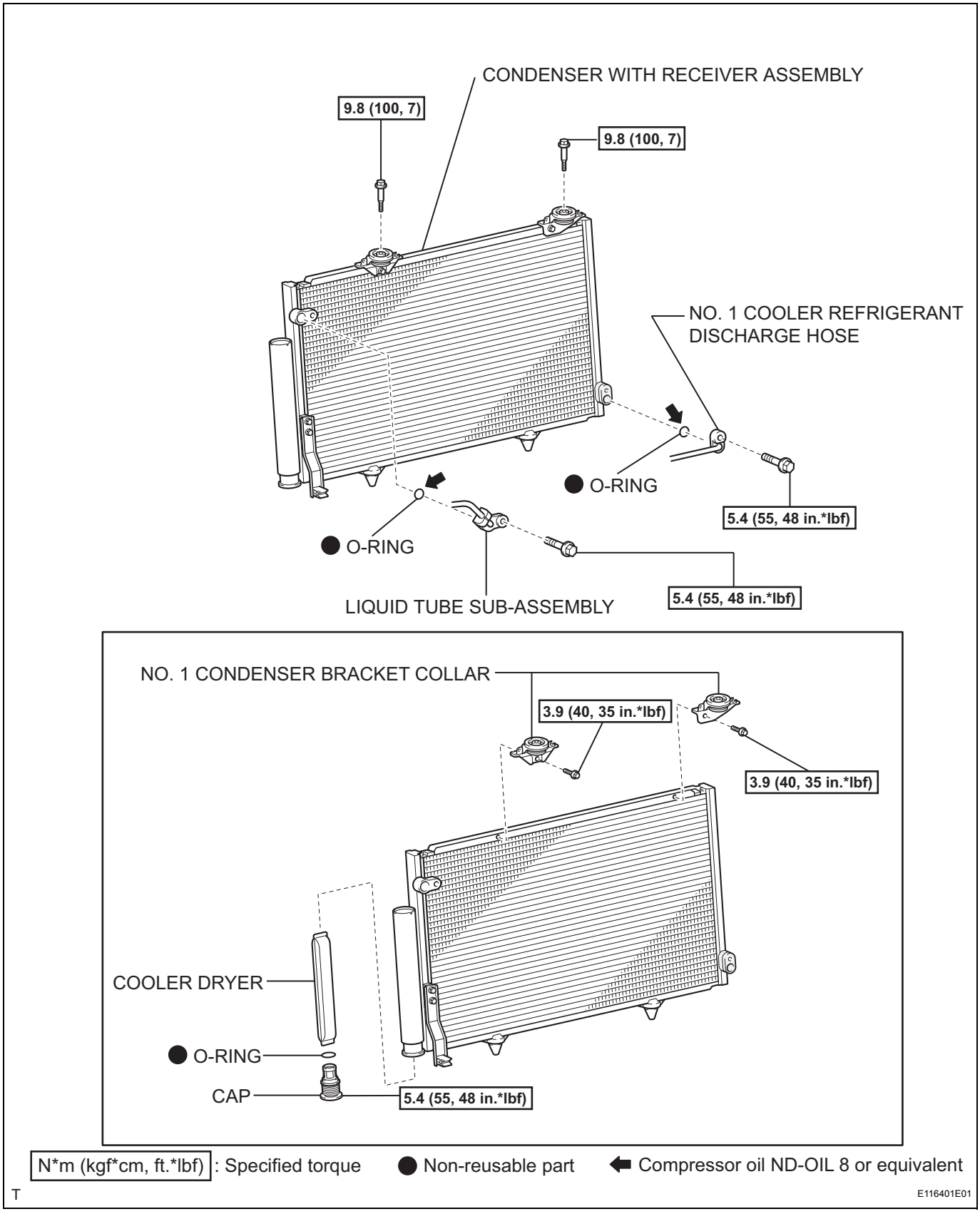
(a) Install the hood lock support with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(b) Install the clip.



5. **INSTALL HOOD LOCK ASSEMBLY**
   (a) Install the hood lock with the 3 bolts.
6. **INSTALL HIGH PITCHED HORN ASSEMBLY (See page HO-8)**
7. **INSTALL LOW PITCHED HORN ASSEMBLY (See page HO-6)**
8. **INSTALL RADIATOR GRILLE**
9. **ADJUST HOOD SUB-ASSEMBLY**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
12. **CHARGE REFRIGERANT (See page AC-46)**
13. **WARM UP ENGINE (See page AC-47)**
14. **CHECK FOR LEAKAGE OF REFRIGERANT (See page AC-47)**

CONDENSER

COMPONENTS



ON-VEHICLE INSPECTION

1. INSPECT CONDENSER WITH RECEIVER ASSEMBLY

(a) If the fins of the condenser are dirty, clean them with water. Dry the fins with compressed air.
NOTICE:
Be careful not to damage the condenser.

(b) If a fin of the condenser is bent, use a screwdriver or pliers to straighten it.

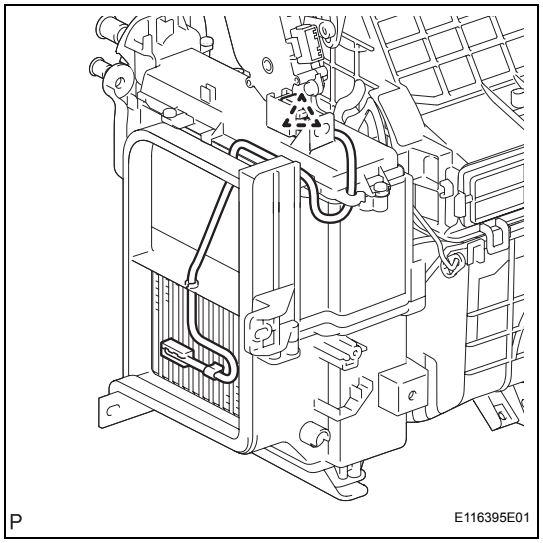
2. CHECK CONDENSER FOR LEAKAGE OF REFRIGERANT

(a) Using a gas leak detector, check the pipe joints for gas leakage.
If gas leakage is detected in a joint, check the torque of the joint.

REMOVAL

1. **REMOVE AIR CONDITIONING BLOWER ASSEMBLY**
   (a) Remove the A/C blower (see page AC-52).

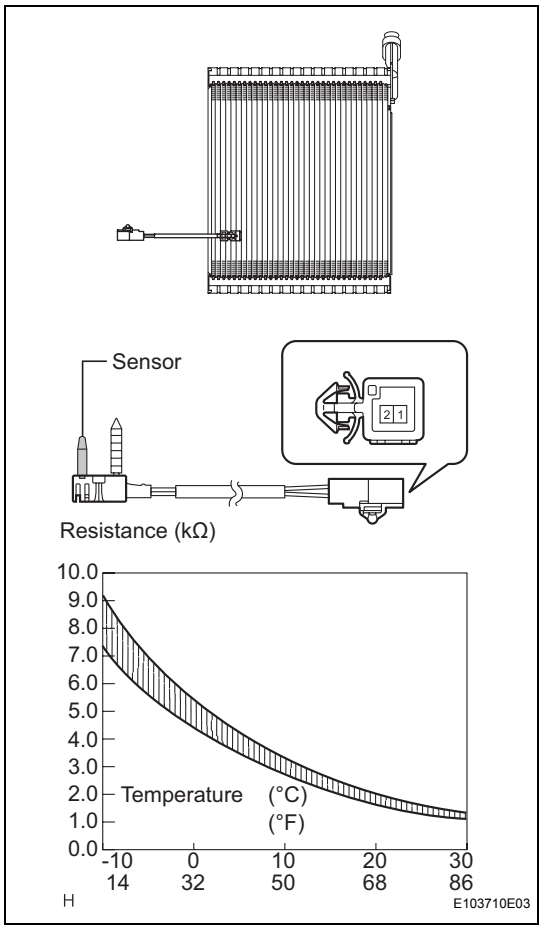
2. **REMOVE COOLER THERMISTOR**
   (a) Detach the clamp and remove the cooler thermistor.
   NOTICE:
   Do not damage the packing when removing the thermistor.



INSPECTION

1. **INSPECT COOLER THERMISTOR**
   (a) Measure the resistance of the thermistor.
   Standard resistance

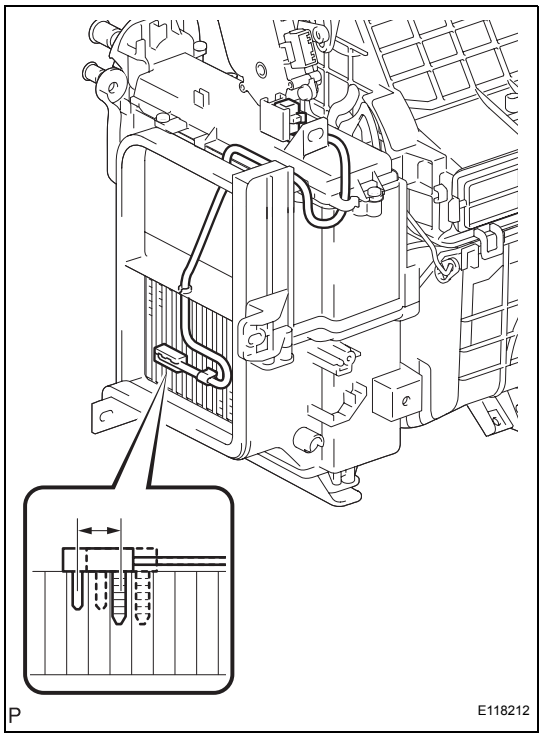
Tester Connection	Condition	Specified Condition
1 - 2	-10°C (14°F)	7.40 to 9.20 kΩ
1 - 2	-5°C (23°F)	5.65 to 7.00 kΩ
1 - 2	0°C (32°F)	4.35 to 5.40 kΩ
1 - 2	5°C (41°F)	3.40 to 4.20 kΩ
1 - 2	10°C (50°F)	2.68 to 3.30 kΩ
1 - 2	15°C (59°F)	2.10 to 2.60 kΩ
1 - 2	20°C (68°F)	1.66 to 2.10 kΩ
1 - 2	25°C (77°F)	1.32 to 1.66 kΩ
1 - 2	30°C (86°F)	1.05 to 1.35 kΩ



NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be almost the same as the ambient temperature.**

HINT:
As the temperature increases, the resistance decreases (see the graph). If the resistance value is not as specified, replace the sensor.



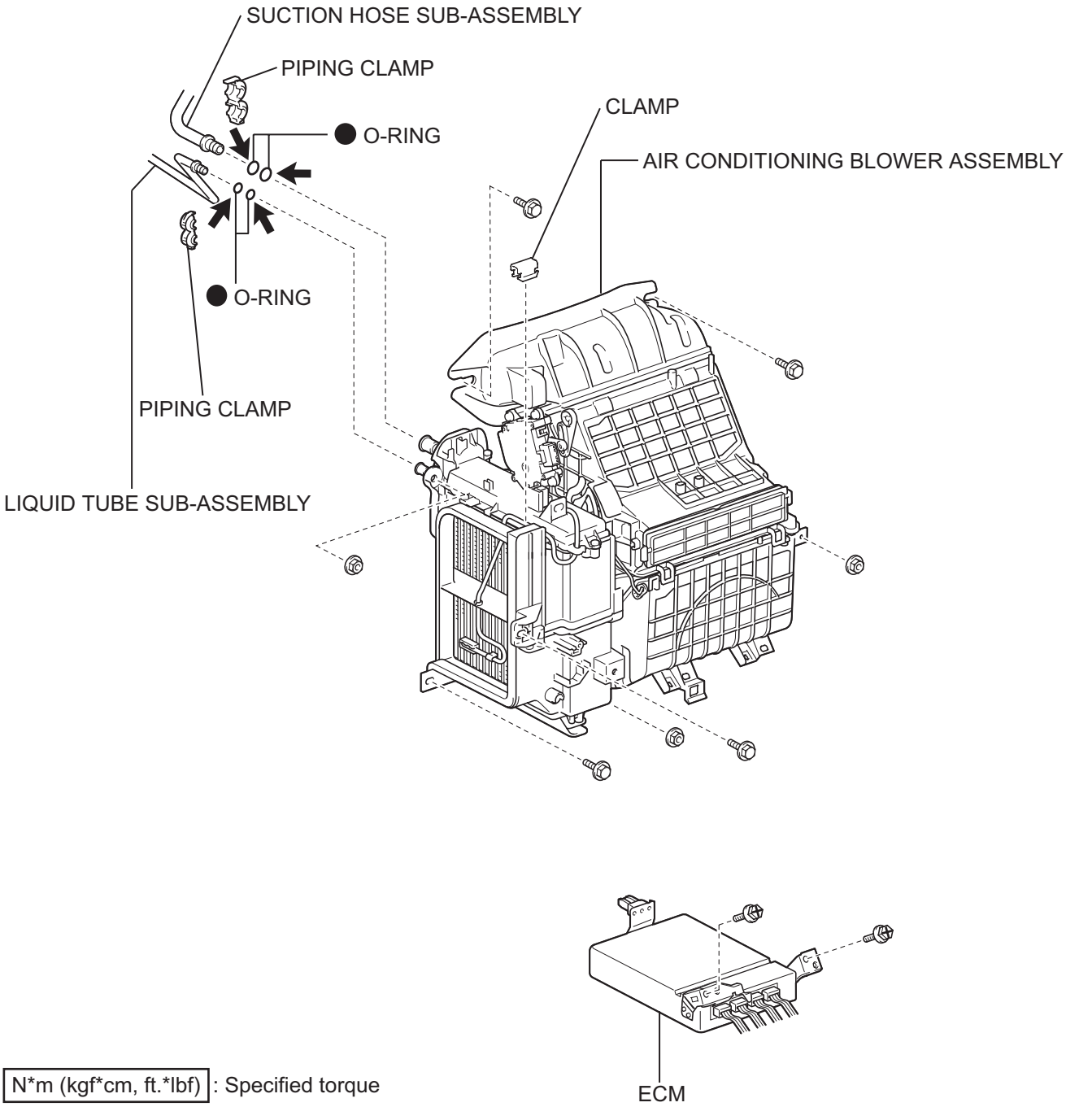
INSTALLATION

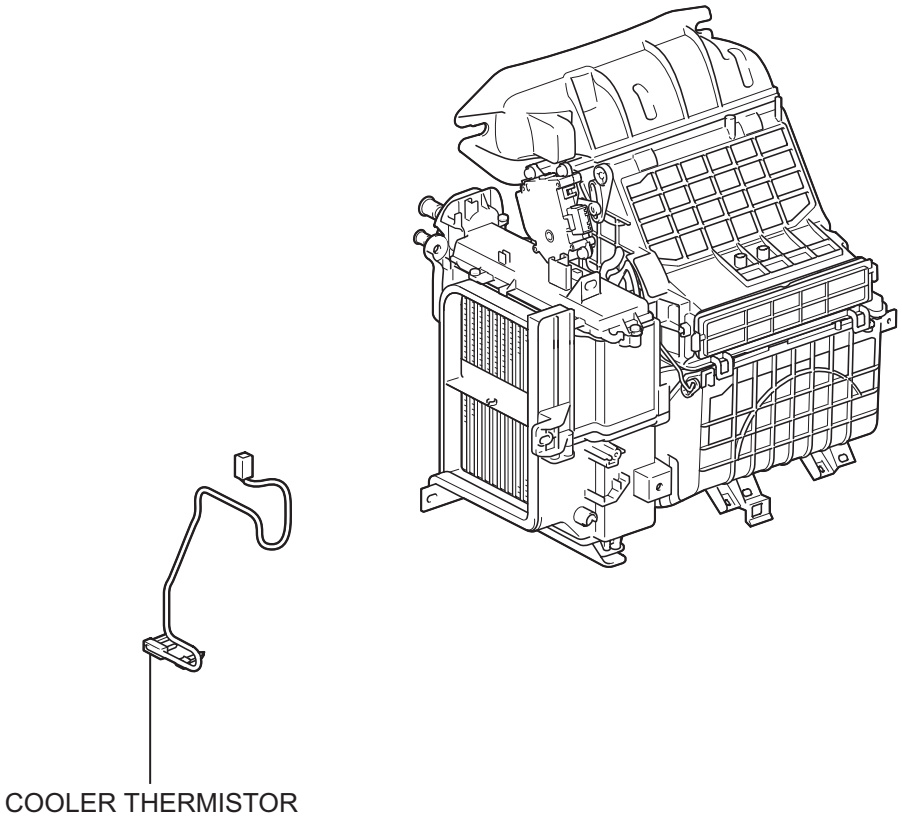
1. **INSTALL COOLER THERMISTOR**
   (a) Install the cooler thermistor and attach the clamp.
   NOTICE:
   - **When installing the thermistor, move it one fin horizontally toward the front of the vehicle from its former position. Do not install it to its former position, as that fin may be bent and the thermistor may not function properly.**
   - **Do not install the thermistor to a position that is horizontally toward the rear of the vehicle.**

2. **INSTALL AIR CONDITIONING BLOWER ASSEMBLY**
   (a) Install the A/C blower (see page AC-60).

EVAPORATOR TEMPERATURE SENSOR

COMPONENTS





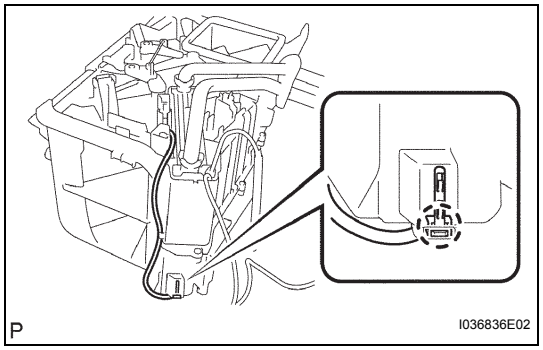
P

E116415E01

REMOVAL

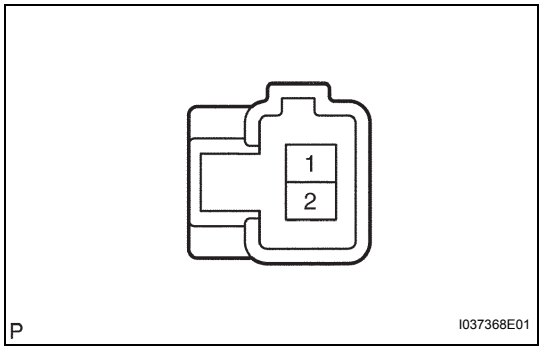
1. **REMOVE HEATER RADIATOR ASSEMBLY**
   (a) Remove the heater radiator (see page AC-71).

2. **REMOVE THERMISTOR ASSEMBLY**
   (a) Detach the claw and remove the clamp.
   (b) Remove the thermistor.



INSPECTION

1. **INSPECT THERMISTOR ASSEMBLY**
   (a) Measure the resistance between terminals 1 and 2 of thermistor.
   Standard resistance



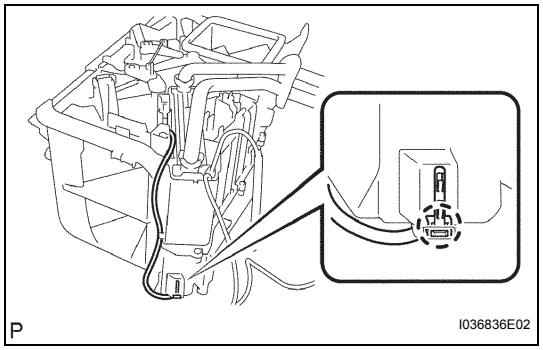
Condition	Specified Condition
Approx. -30°C (-86°F)	80 to 100 kΩ
Approx. 25°C (77°F)	4.8 to 5.2 kΩ
Approx. 40°C (104°F)	2.507 to 2.807 kΩ
Approx. 100°C (212°F)	0.3 to 0.37 kΩ

If the result is not as specified, replace the thermistor.

INSTALLATION

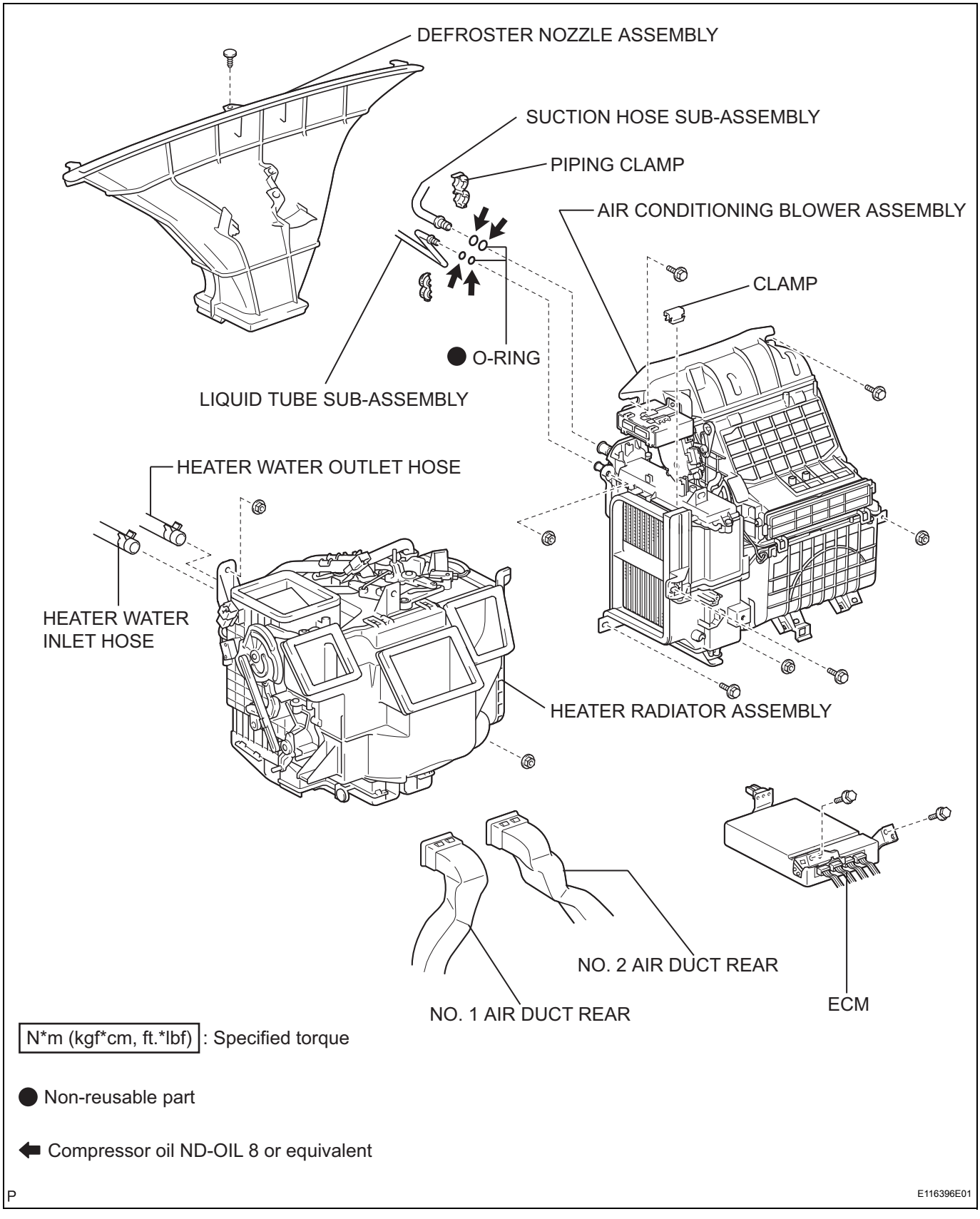
1. **INSTALL THERMISTOR ASSEMBLY**
   (a) Install the thermistor.
   (b) Install the clamp and attach the claw.

2. **INSTALL HEATER RADIATOR ASSEMBLY**
   (a) Install the heater radiator (see page AC-75).

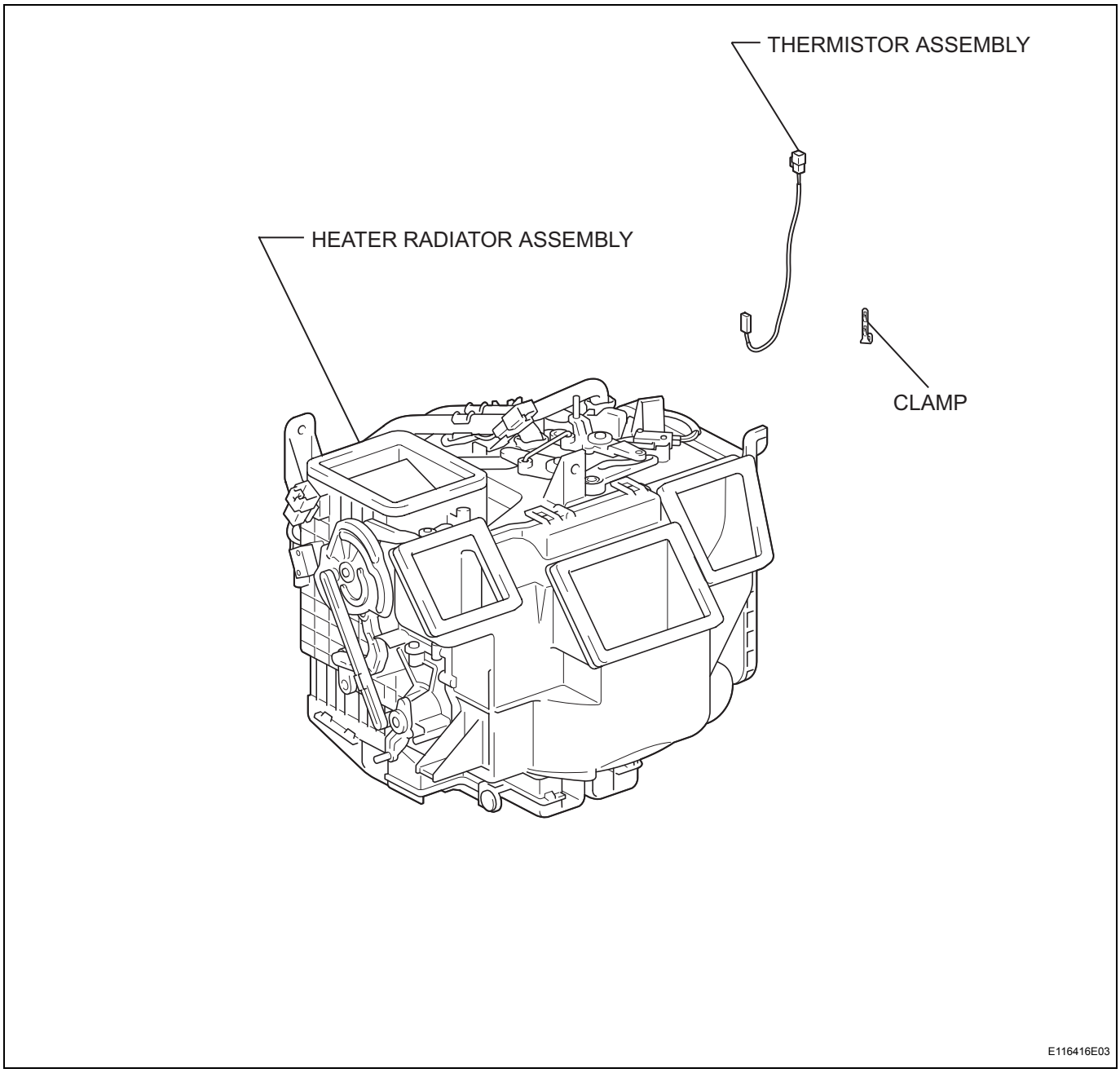


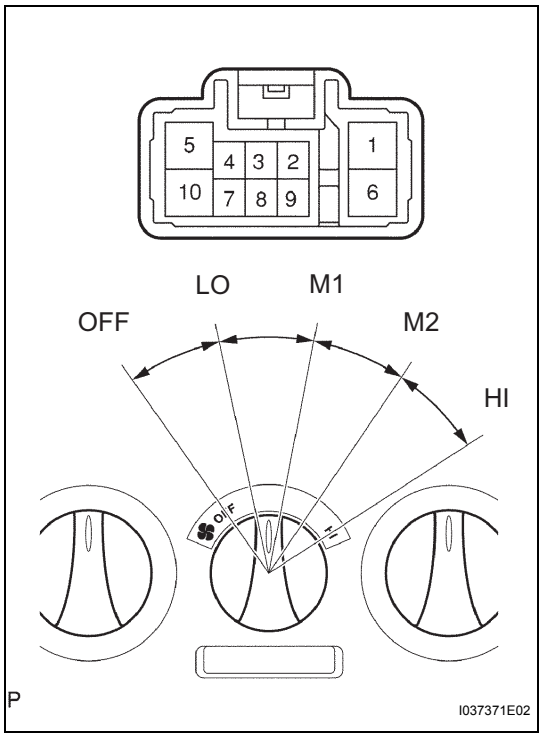
THERMISTOR ASSEMBLY

COMPONENTS



AC


THERMISTOR ASSEMBLY
HEATER RADIATOR ASSEMBLY
CLAMP
E116416E03



INSPECTION

1. INSPECT CENTER CLUSTER MODULE SWITCH

(a) Inspect the blower switch resistance.

(1) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2 - 6 - 7 - 10	OFF	10 kΩ or higher
1 - 2	LO	Below 1 Ω
1 - 2 - 7	LO to M1	Below 1 Ω
1 - 2 - 7	M1	Below 1 Ω
1 - 2 - 7 - 6	M1 to M2	Below 1 Ω
1 - 2 - 6	M2	Below 1 Ω
1 - 2 - 6 - 10	M2 to HI	Below 1 Ω
1 - 2 - 10	HI	Below 1 Ω

If the result is not as specified, replace the center cluster module switch.

(b) Inspect the illumination operation.

Connect the positive (+) lead from the battery to terminal 4 and negative (-) lead to terminal 5, then check that the illuminations come on.

If there is a bulb that does not come on, replace the bulb.

(c) Inspect the A/C switch resistance.

(1) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
3 - 2	ON	Below 1 Ω
3 - 2	OFF	10 kΩ or higher

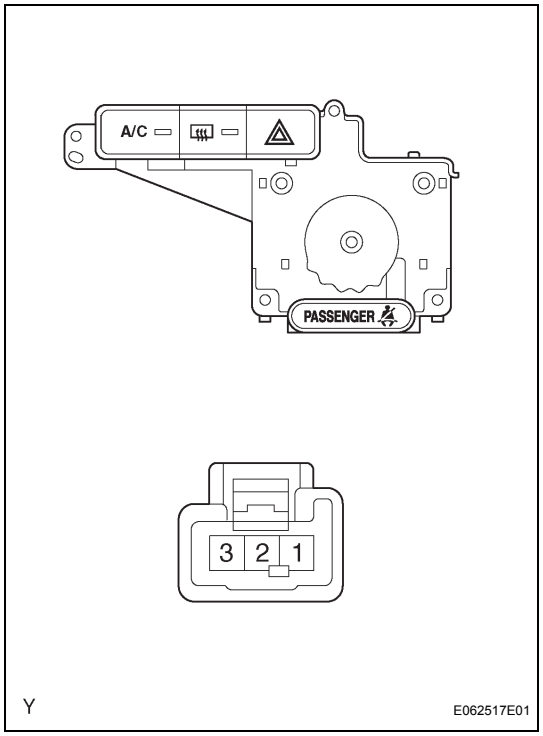
If the result is not as specified, replace the A/C switch.

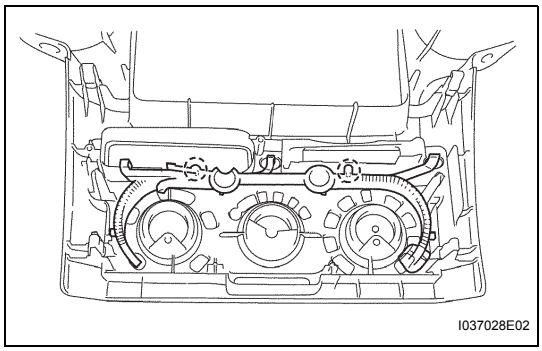
(d) Inspect the indicator operation.

(1) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 1.

(2) Push the A/C switch and then check that the indicator comes on.

If the result is not as specified, replace the A/C switch.

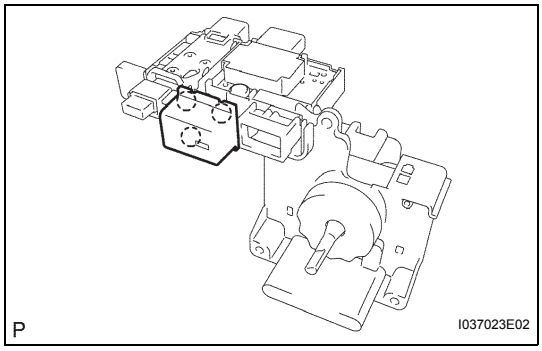




REASSEMBLY

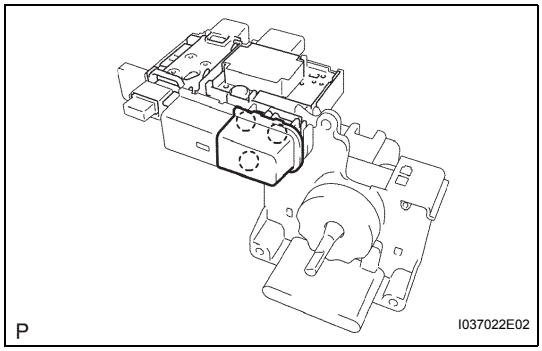
1. INSTALL CENTER CLUSTER MODULE INDICATOR LENS ASSEMBLY

(a) Attach the 2 claws to install the center cluster module indicator lens.



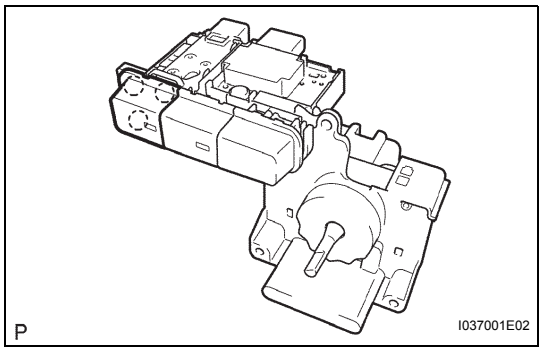
2. INSTALL NO. 6 CENTER CLUSTER MODULE KNOB

(a) Attach the 3 claws to install the center cluster module knob.



3. INSTALL NO. 5 CENTER CLUSTER MODULE KNOB

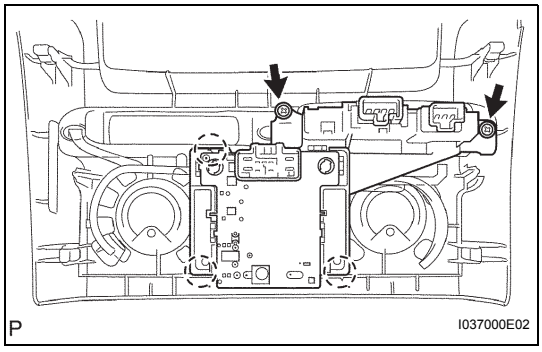
(a) Attach the 3 claws to install the center cluster module knob.



4. INSTALL NO. 7 CENTER CLUSTER MODULE KNOB

(a) Attach the 3 claws to install the center cluster module knob.

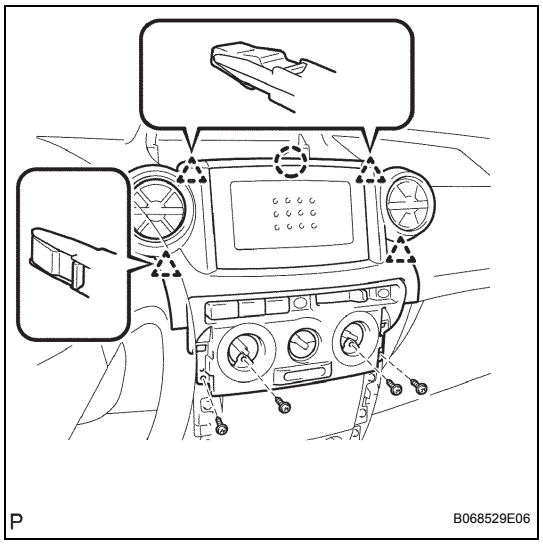
INSTALLATION



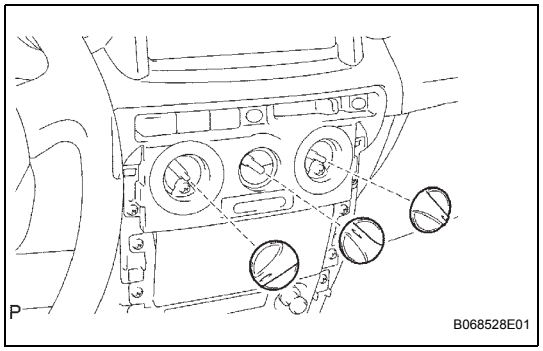
1. INSTALL CENTER CLUSTER MODULE SWITCH

(a) Attach the 3 claws to install the center cluster module switch.

(b) Install the 2 screws.



2. **INSTALL INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER**
   (a) Connect the connectors.
   (b) Attach the 4 clips and claw to install the instrument cluster finish panel.
   (c) Install the 4 screws.



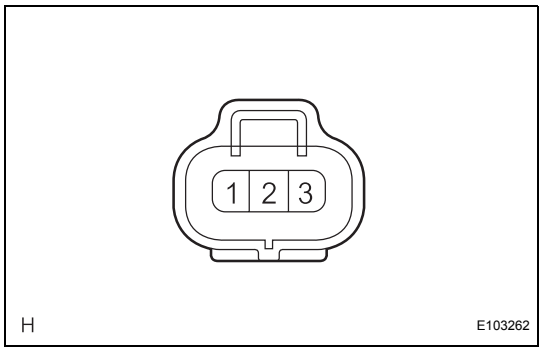
3. **INSTALL HEATER CONTROL KNOB**
   (a) Install the 3 heater control knobs.

4. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**

5. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.



AIR CONDITIONING PRESSURE SENSOR

ON-VEHICLE INSPECTION

1. CHECK PRESSURE SENSOR

(a) Check the wire harness.

(1) Disconnect the connector from the pressure sensor.

(2) Measure the resistance of the wire harness side connector.

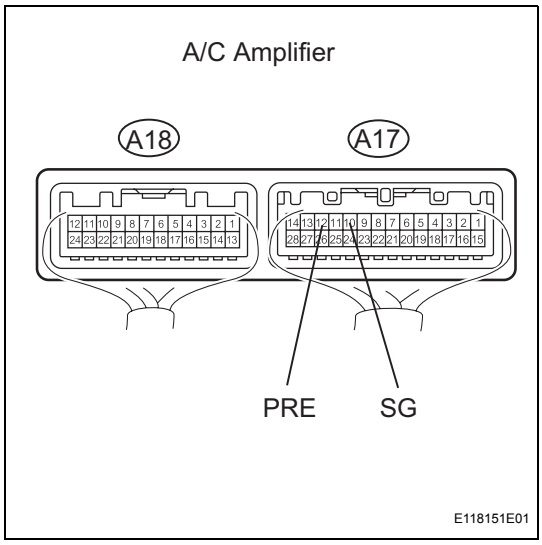
Standard resistance

Tester Connection	Specified Condition
1 - Body ground	Below 1 Ω

(3) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Specified Condition
1 - 3	10 to 14 V



(b) Check the pressure sensor.

(1) Set the manifold gauge.

(2) Connect the connector to the pressure sensor.

(3) Warm up the engine.

(4) Turn the A/C switch ON.

(5) Measure the voltage of the sensor connector.

Standard voltage

Tester Connection	Condition	Specified Condition
A17-12 (PRE) - A17-10 (SG-1)	0.176 to 3.025 MPa (1.8 to 32 kgf/cm^2, 25 to 455 psi)	0.76 to 4.74 V

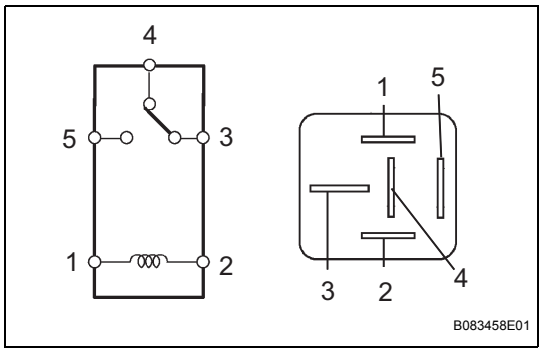
If the result is not as specified, replace the sensor.

HEATER BLOWER MOTOR RELAY

ON-VEHICLE INSPECTION

1. REMOVE HEATER BLOWER MOTOR RELAY (Marking: HEATER)

(a) Remove the relay from the instrument panel junction block.



2. INSPECT HEATER BLOWER MOTOR RELAY

(a) Measure the resistance of the relay.
Standard resistance

Tester Connection	Specified Condition
3 - 4	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

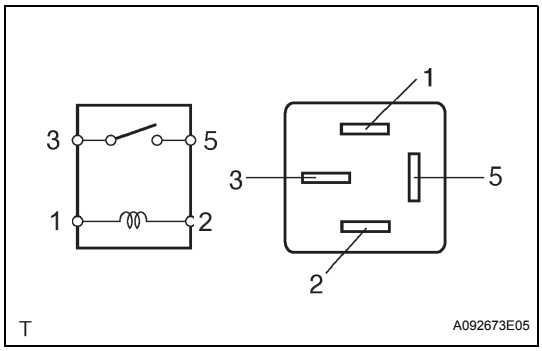
3. INSTALL HEATER BLOWER MOTOR RELAY

PTC HEATER RELAY

ON-VEHICLE INSPECTION

1. REMOVE PTC HEATER RELAY (Marking: HTR SUB1)

(a) Remove the heater relay from the engine room relay block.



2. INSPECT PTC HEATER RELAY

(a) Measure the resistance of the relay.

Standard resistance

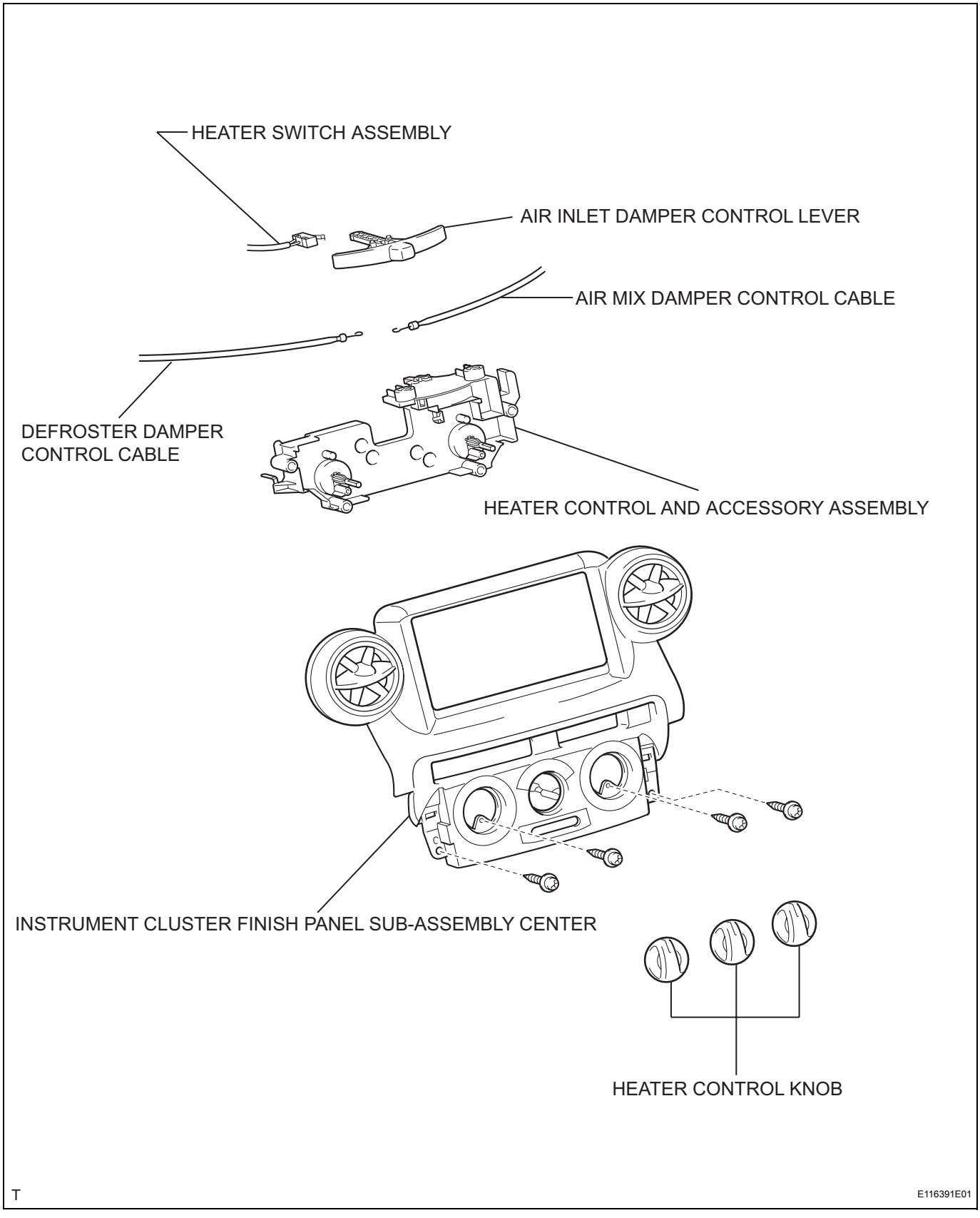
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the value is not as specified, replace the PTC heater relay.

3. INSTALL PTC HEATER RELAY

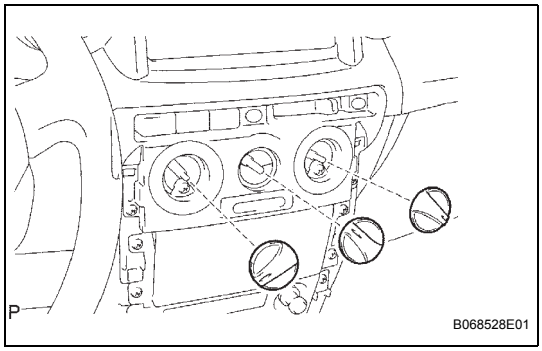
HEATER CONTROL ASSEMBLY

COMPONENTS

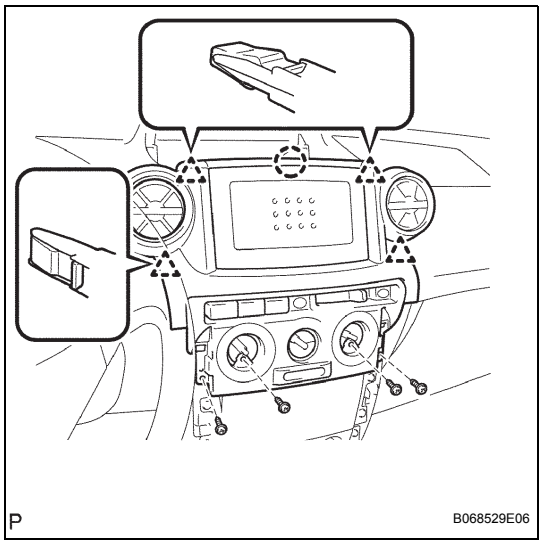


REMOVAL

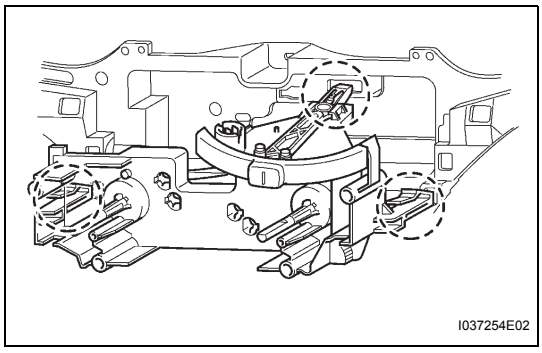
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
4. **REMOVE HEATER CONTROL KNOB**
   (a) Remove the 3 heater control knobs.

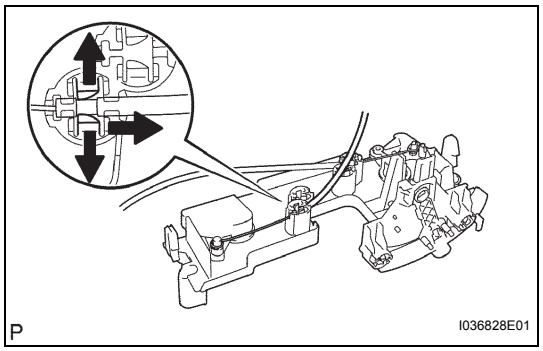


5. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER**
   (a) Remove the 4 screws.
   (b) Detach the 4 clips and claw, and then remove the instrument cluster finish panel.
   (c) Disconnect the connectors.



6. **REMOVE HEATER CONTROL AND ACCESSORY ASSEMBLY**
   (a) Detach the 3 screws and disconnect the heater control and accessory assembly.
   (b) Disconnect the connector.





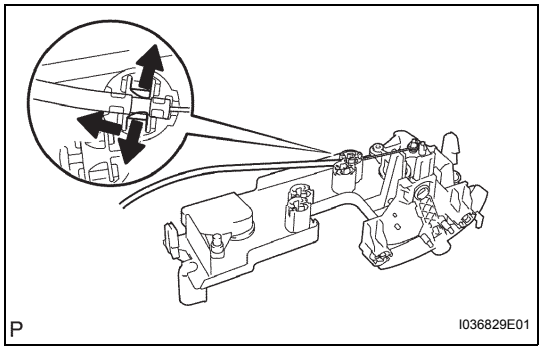
(c) Using a screwdriver, detach the claw of the cable clamp and disconnect the defroster damper control cable.

NOTICE:

- **Be careful not to bend the cable wire.**
- **If the cable wire bends, the defroster damper control cable operation may be affected.**

HINT:

Tape the screwdriver tip before use.



(d) Using a screwdriver, detach the claw of the cable clamp and disconnect the air mix damper control cable.

NOTICE:

- **Be careful not to bend the cable wire.**
- **If the cable wire bends, the air mix damper control cable operation may be affected.**

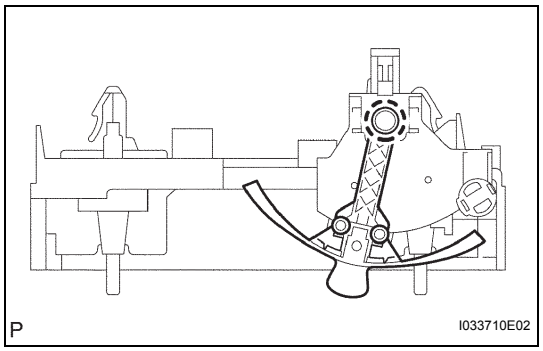
HINT:

Tape the screwdriver tip before use.

(e) Remove the heater control and accessory assembly.

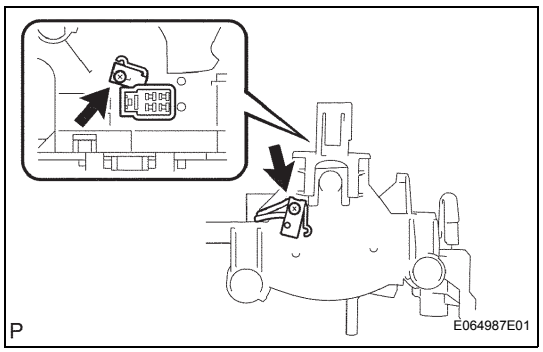
7. REMOVE AIR INLET DAMPER CONTROL LEVER

(a) Detach the claw, and remove the air inlet damper control lever.



8. REMOVE HEATER SWITCH ASSEMBLY

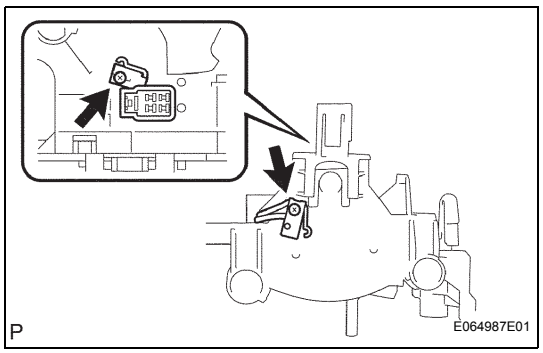
(a) Remove the 2 screws and heater switch.

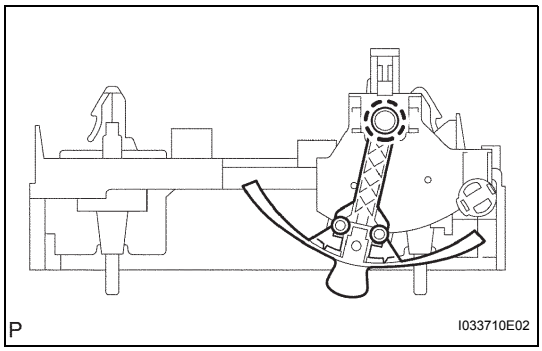


INSTALLATION

1. INSTALL HEATER SWITCH ASSEMBLY

(a) Install the heater switch with the 2 screws.



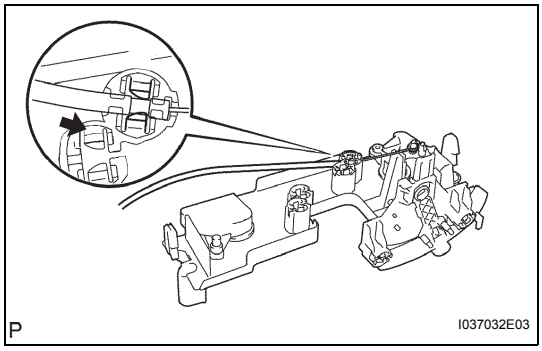


2. INSTALL AIR INLET DAMPER CONTROL LEVER

(a) Attach the claw to install the air inlet damper control lever.

3. INSTALL HEATER CONTROL AND ACCESSORY ASSEMBLY

(a) Connect the inner cable end of the air mix damper control cable on the heater control and accessory assembly.



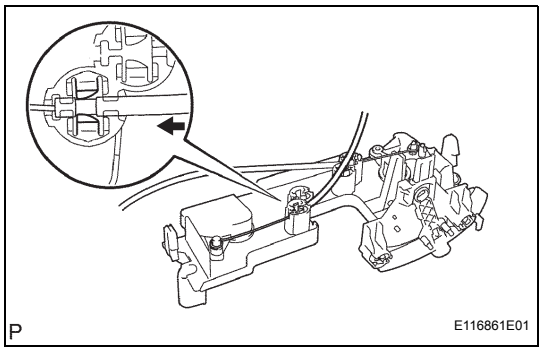
(b) Connect the outer cable of the air mix damper control cable on the cable clamp.

NOTICE:

- **Be careful not to bend the cable wire.**
- **If the cable wire bends, the air mix damper control cable operation may be affected.**

HINT:

- Operating the heater control knob, check that it properly stops at both ends of MAX. COOL and MAX. HOT, and no recoil is identified.
- Check that the outer cable is not detached (moved) from the heater control and accessory assembly when the cable is pulled.



(c) Connect the inner cable end of the defroster damper control cable on the heater control and accessory assembly.

(d) Connect the outer cable of the defroster damper control cable on the cable clamp.

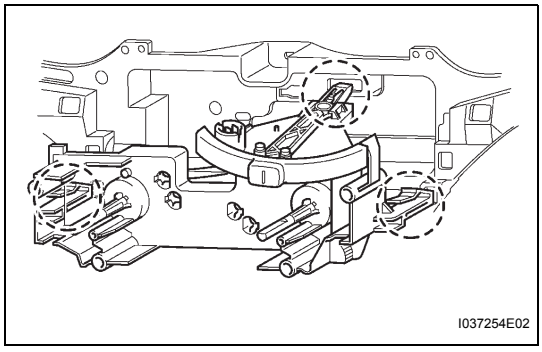
NOTICE:

- **Be careful not to bend the cable wire.**
- **If the cable wire bends, the heater control and accessory assembly operation may be affected.**

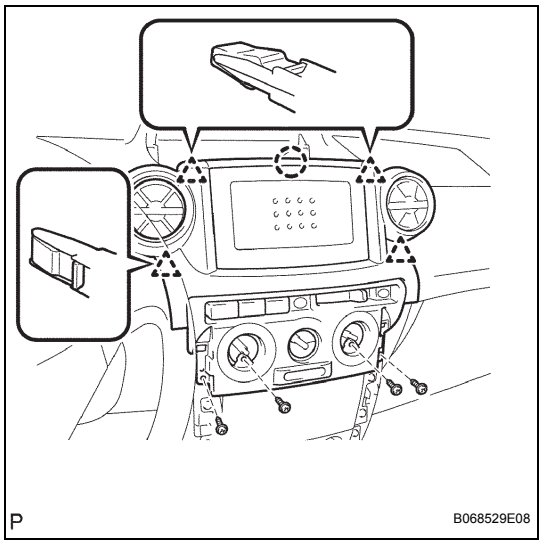
HINT:

- Operating the heater control knob, check that it properly stops at both ends of FACE and DEF, and no recoil is identified.
- Check that the outer cable is not detached (moved) from the heater control and accessory assembly when the cable is pulled.

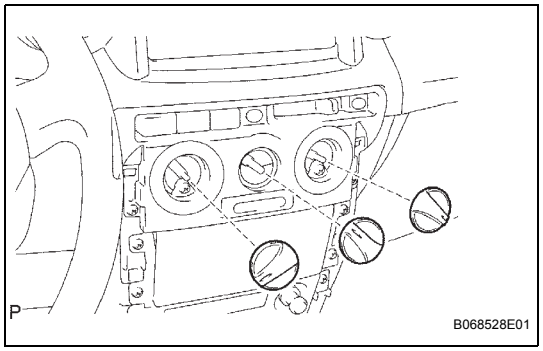
(e) Connect the connector and install the heater control and accessory assembly.



(f) Connect the heater control and accessory assembly, and attach the 3 screws.



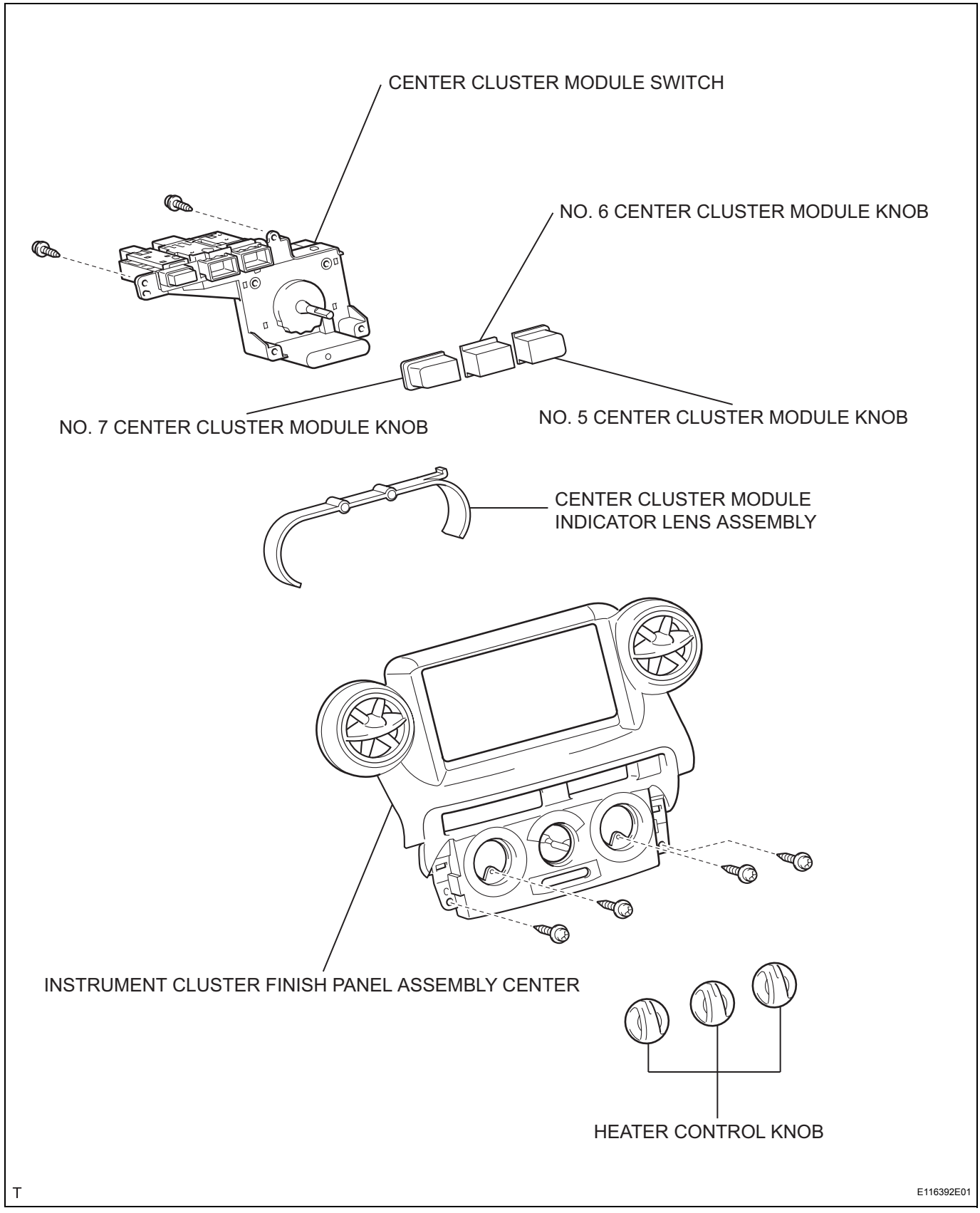
4. **INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER**
   (a) Connect the connectors.
   (b) Attach the 4 clips and claw to install the instrument cluster finish panel.
   (c) Install the 4 screws.



5. **INSTALL HEATER CONTROL KNOB**
   (a) Install the 3 heater control knobs.
6. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**
7. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

CENTER CLUSTER MODULE SWITCH

COMPONENTS

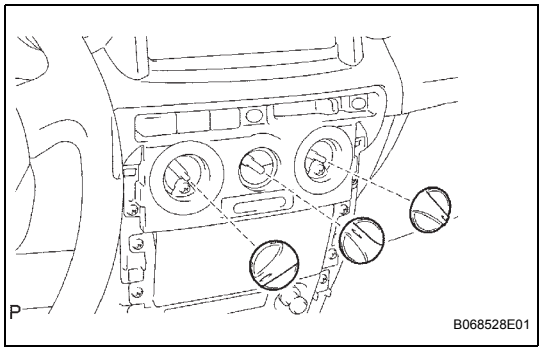


AC

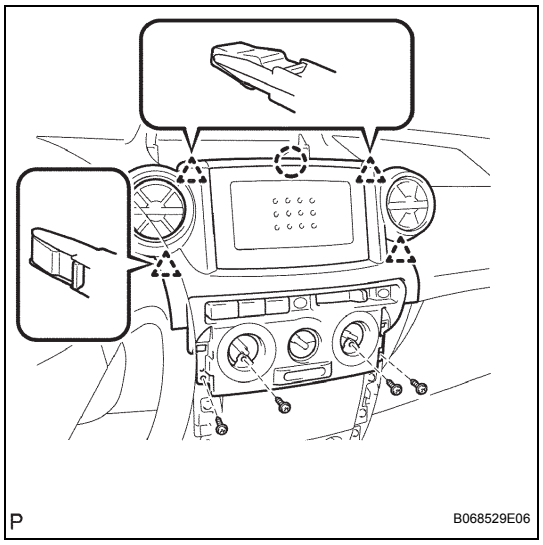
T

REMOVAL

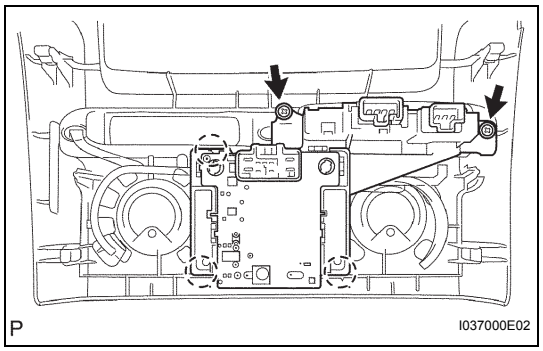
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
4. **REMOVE HEATER CONTROL KNOB**
   (a) Remove the 3 heater control knobs.

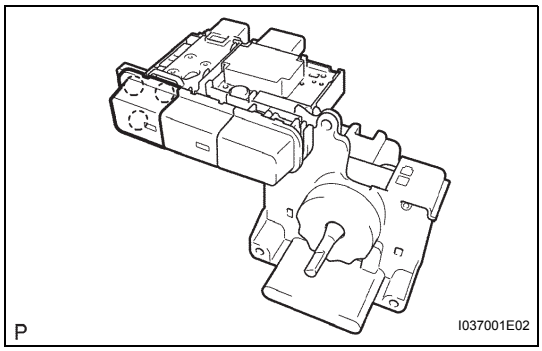


5. **REMOVE INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER**
   (a) Remove the 4 screws.
   (b) Detach the 4 clips and claw, and then remove the instrument cluster finish panel.
   (c) Disconnect the connectors.



6. **REMOVE CENTER CLUSTER MODULE SWITCH**
   (a) Remove the 2 screws.
   (b) Detach the 3 claws and remove the center cluster module switch.

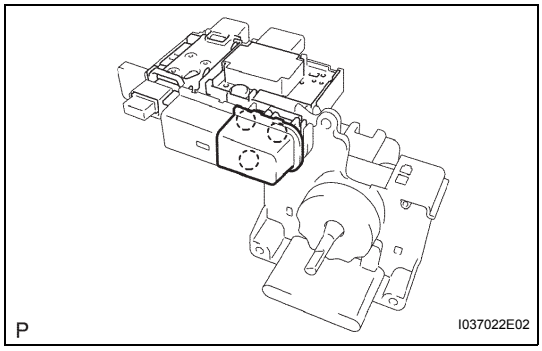




DISASSEMBLY

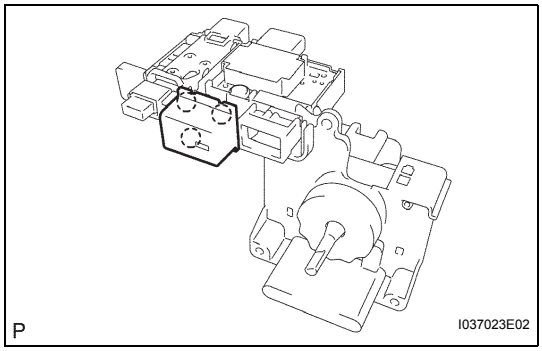
1. REMOVE NO. 7 CENTER CLUSTER MODULE KNOB

(a) Detach the 3 claws and remove the center cluster module knob.



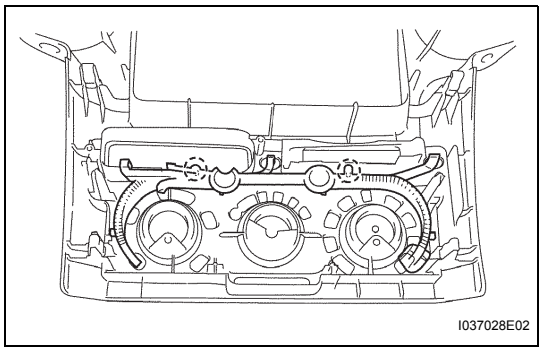
2. REMOVE NO. 5 CENTER CLUSTER MODULE KNOB

(a) Detach the 3 claws and remove the center cluster module knob.



3. REMOVE NO. 6 CENTER CLUSTER MODULE KNOB

(a) Detach the 3 claws and remove the center cluster module knob.

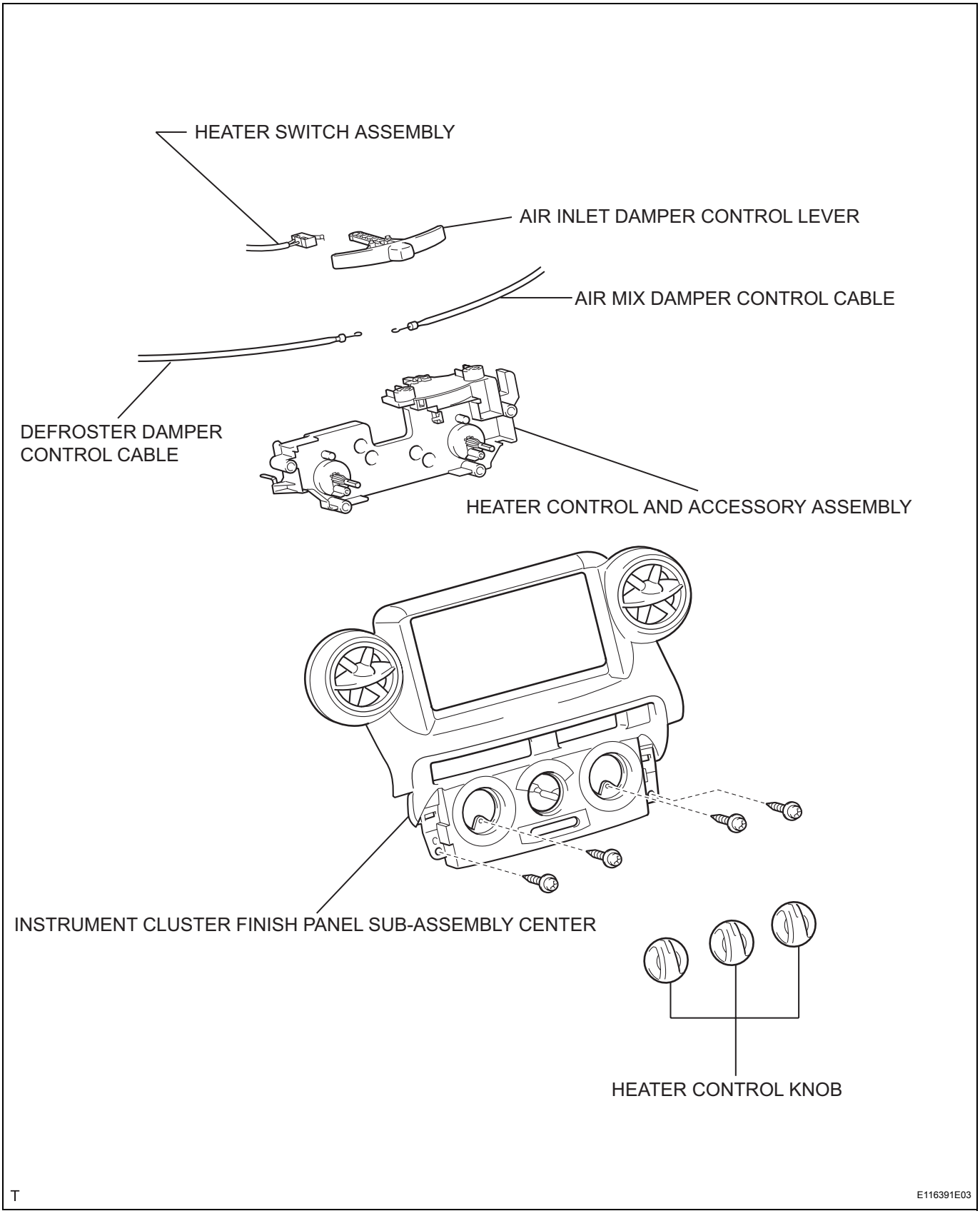


4. REMOVE CENTER CLUSTER MODULE INDICATOR LENS ASSEMBLY

(a) Detach the 2 claws, and then remove the center cluster module indicator lens.

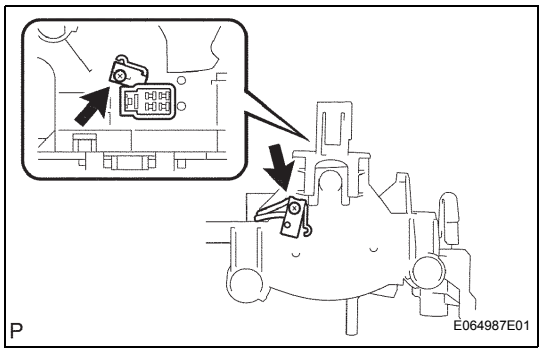
HEATER SWITCH

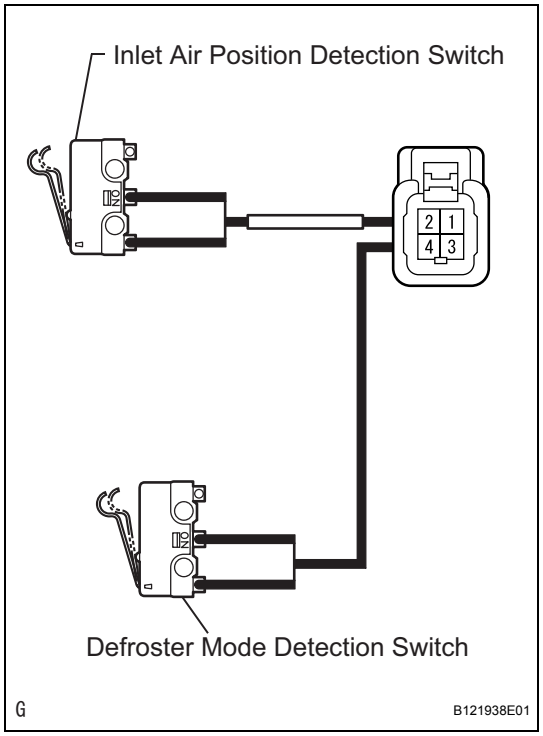
COMPONENTS



REMOVAL

1. **REMOVE HEATER CONTROL AND ACCESSORY ASSEMBLY**
   (a) Remove the heater control and accessory (see page AC-100).
2. **REMOVE HEATER SWITCH ASSEMBLY**
   (a) Remove the 2 screws and heater switch.





INSPECTION

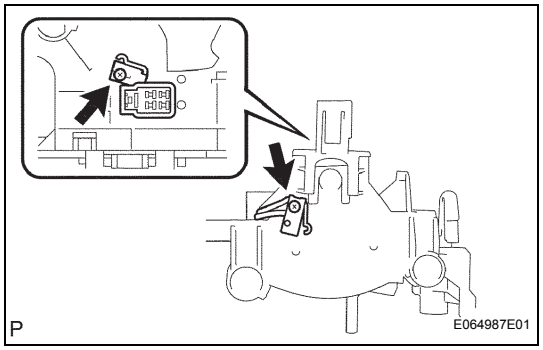
1. **INSPECT HEATER SWITCH ASSEMBLY**
   (a) Measure the resistance of the switch.
   Standard resistance

Tester Connection		Switch Condition	Specified Condition
Inlet Air Position Detection Switch	1 - 2	OFF	10 kΩ or higher
	1 - 2	ON	Below 1 Ω
Defroster Mode Detection Switch	3 - 4	OFF	10 kΩ or higher
	3 - 4	ON	Below 1 Ω

If the result is not as specified, replace the heater switch.

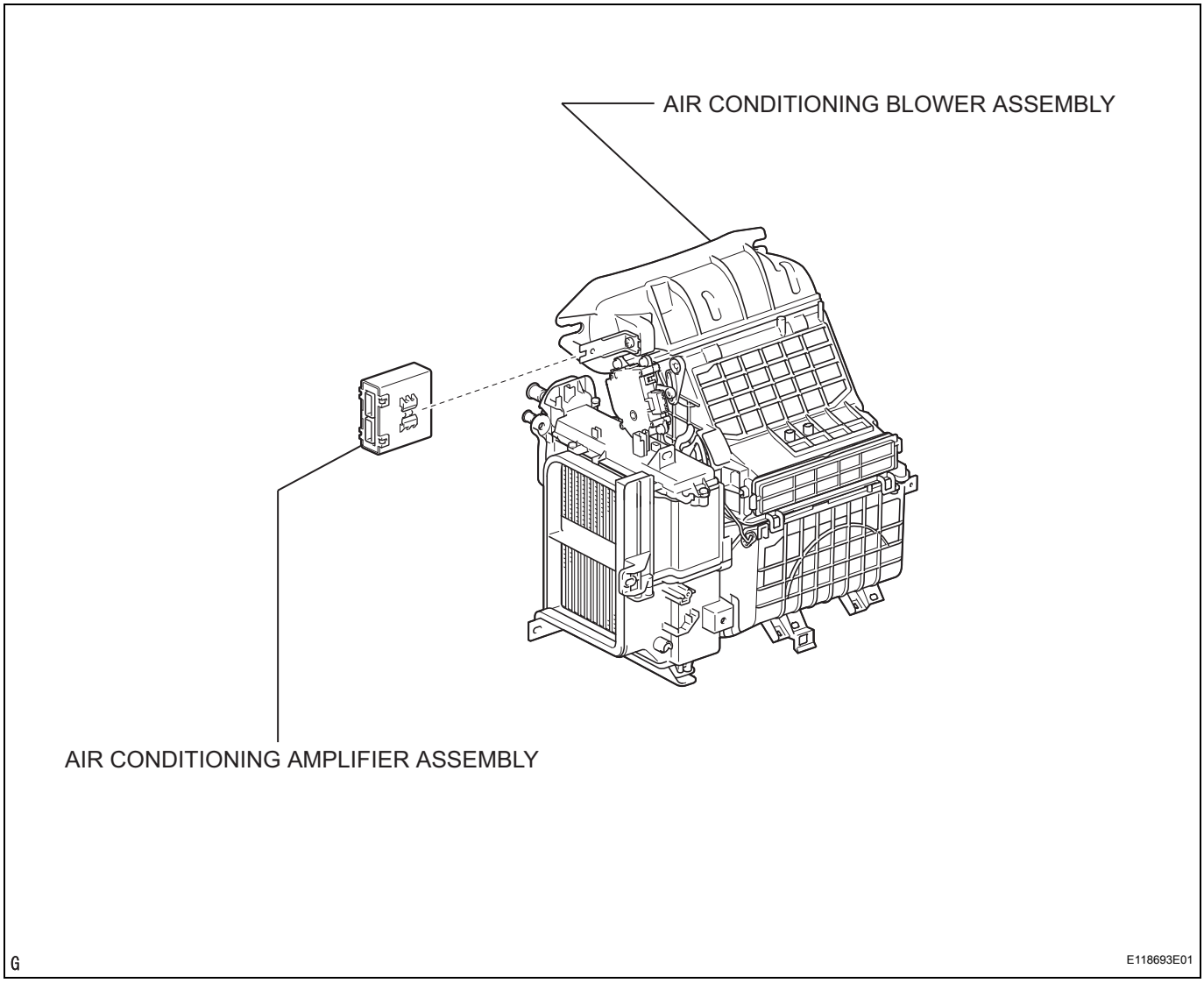
INSTALLATION

1. **INSTALL HEATER SWITCH ASSEMBLY**
   (a) Install the heater switch with the 2 screws.
2. **INSTALL HEATER CONTROL AND ACCESSORY ASSEMBLY**
   (a) Install the heater control and accessory (see page AC-101).



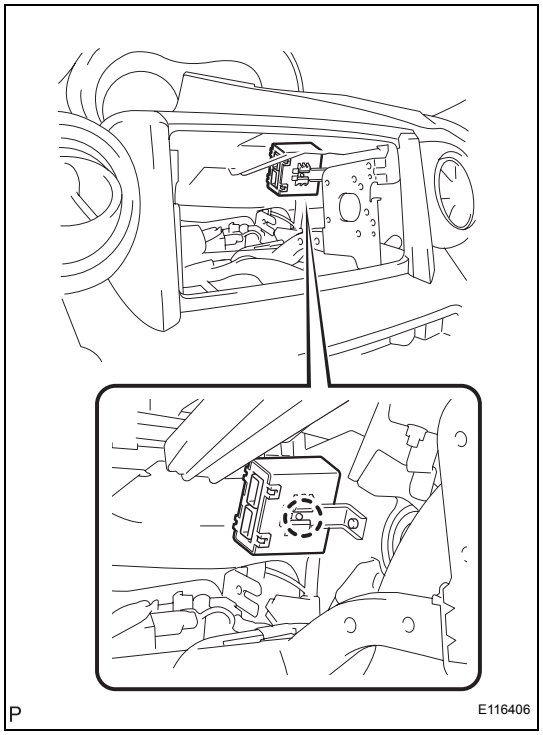
AIR CONDITIONING AMPLIFIER

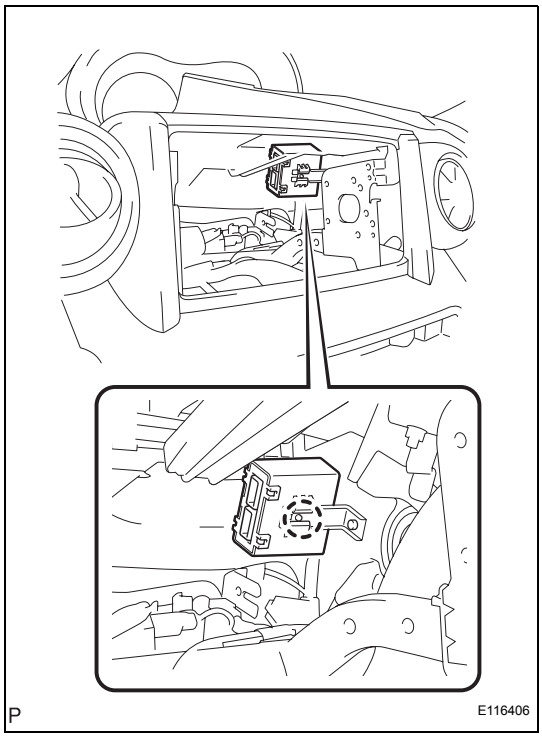
COMPONENTS



REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
4. **REMOVE HEATER CONTROL KNOB (See page AC-105)**
5. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER (See page AC-105)**
6. **REMOVE RADIO RECEIVER ASSEMBLY**
7. **REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY**
   (a) Disconnect the connector.
   (b) Detach the claw and remove the A/C amplifier.

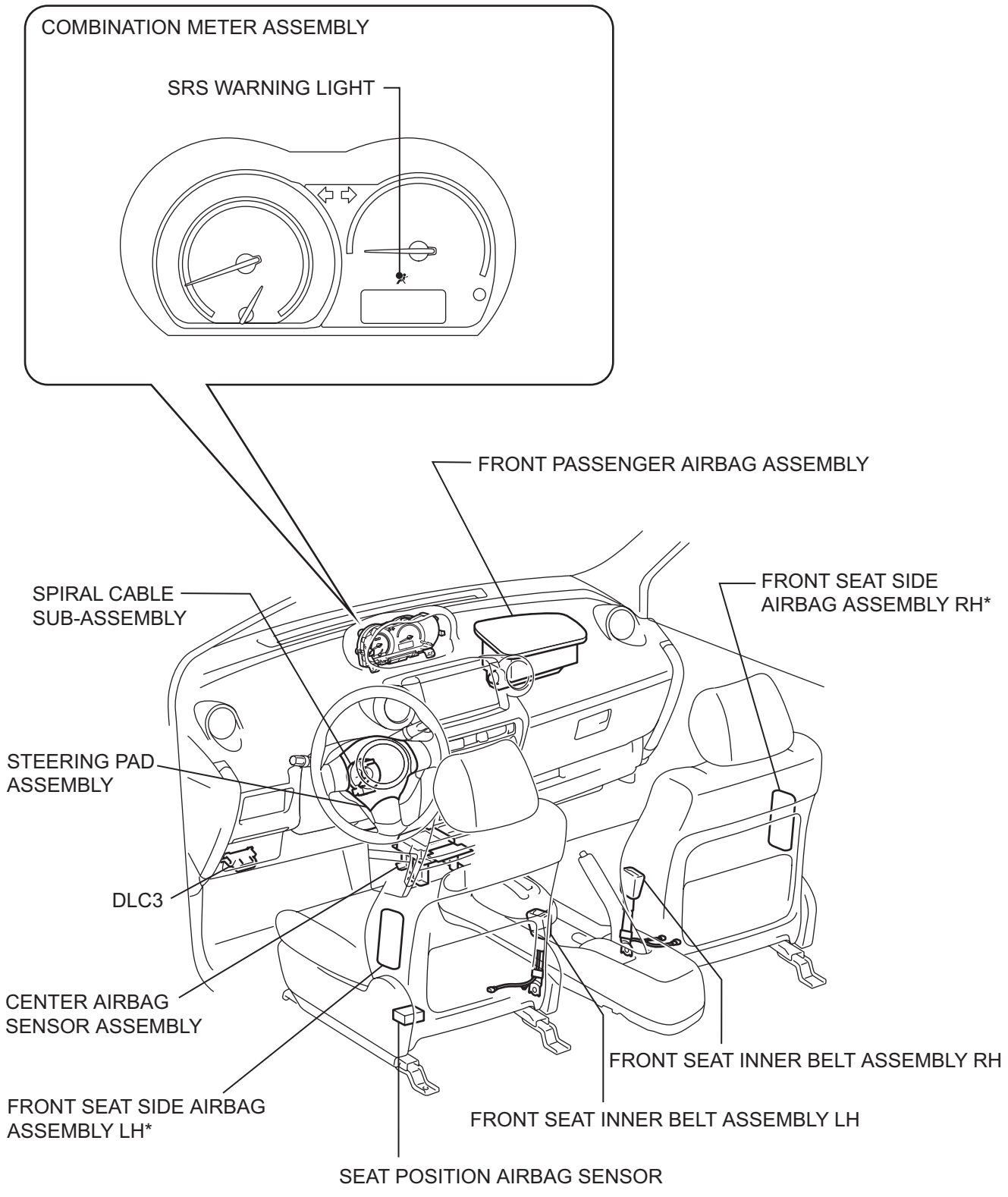




INSTALLATION

1. **INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY**
   (a) Attach the claw to install the A/C amplifier.
   (b) Connect the connector.
2. **INSTALL RADIO RECEIVER ASSEMBLY**
3. **INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER (See page AC-109)**
4. **INSTALL HEATER CONTROL KNOB (See page AC-109)**
5. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**
6. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**
7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
8. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

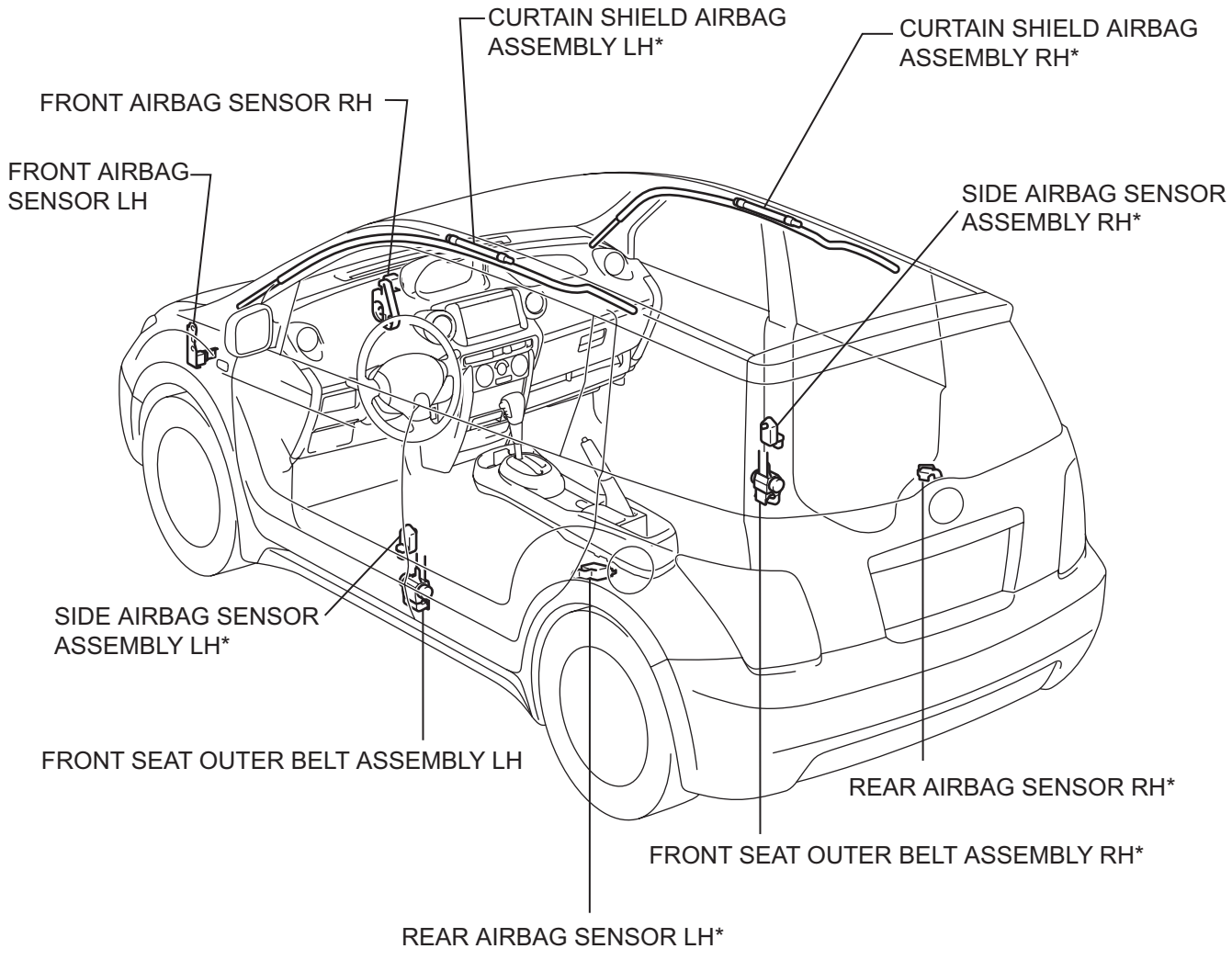
PARTS LOCATION



*: w/ Side Airbag

H

H101103E06



*: w/ Side Airbag

H

H101104E06

RS

SYSTEM DIAGRAM

1. RELEASE METHOD OF ACTIVATION PREVENTION MECHANISM

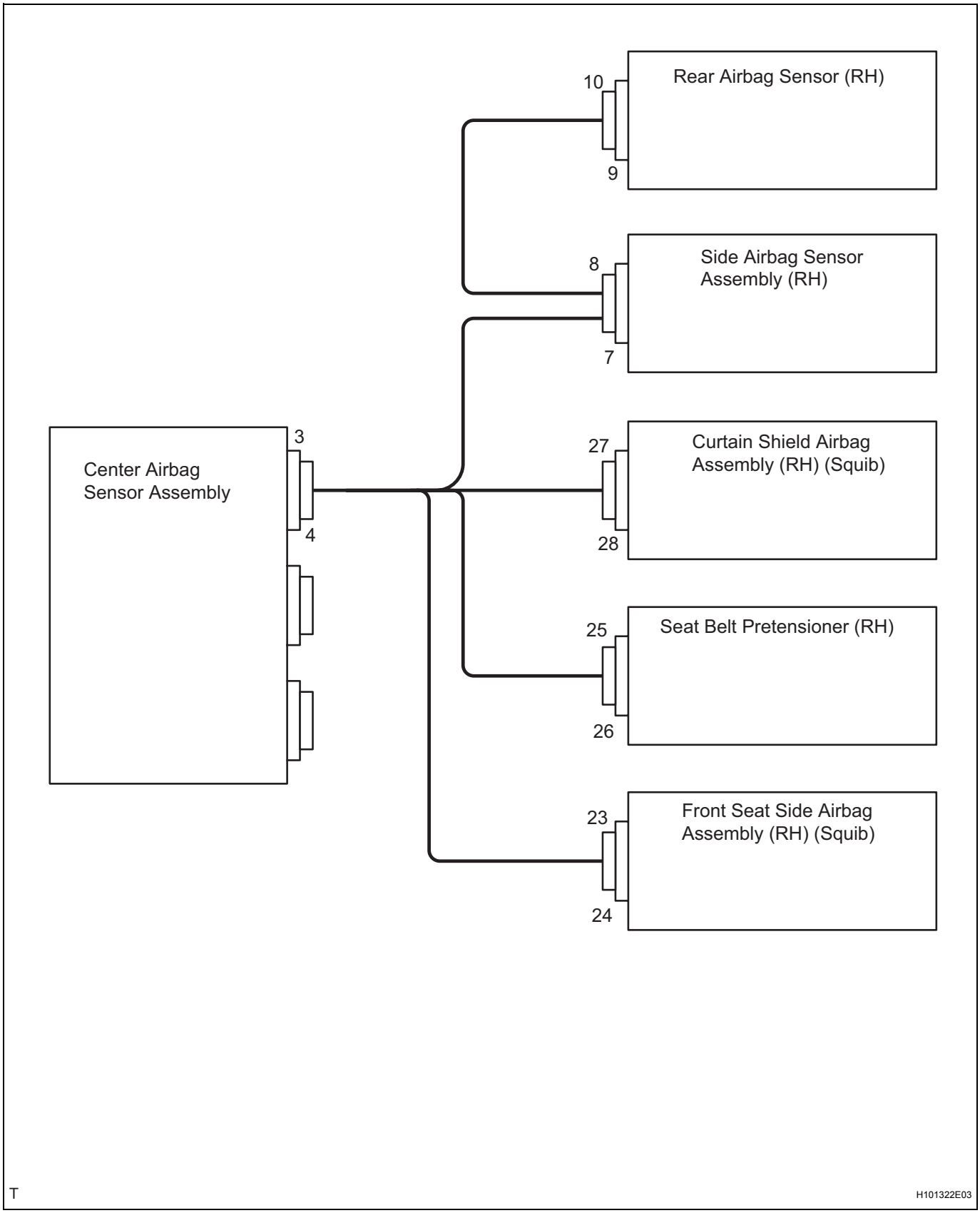
(a) The activation prevention mechanism is built into the connector for the squib circuit of the SRS. As explained in the troubleshooting section, insert a piece of paper that is the same thickness as the male terminal between the terminal and the short spring to release it (refer to illustrations below).

CAUTION:

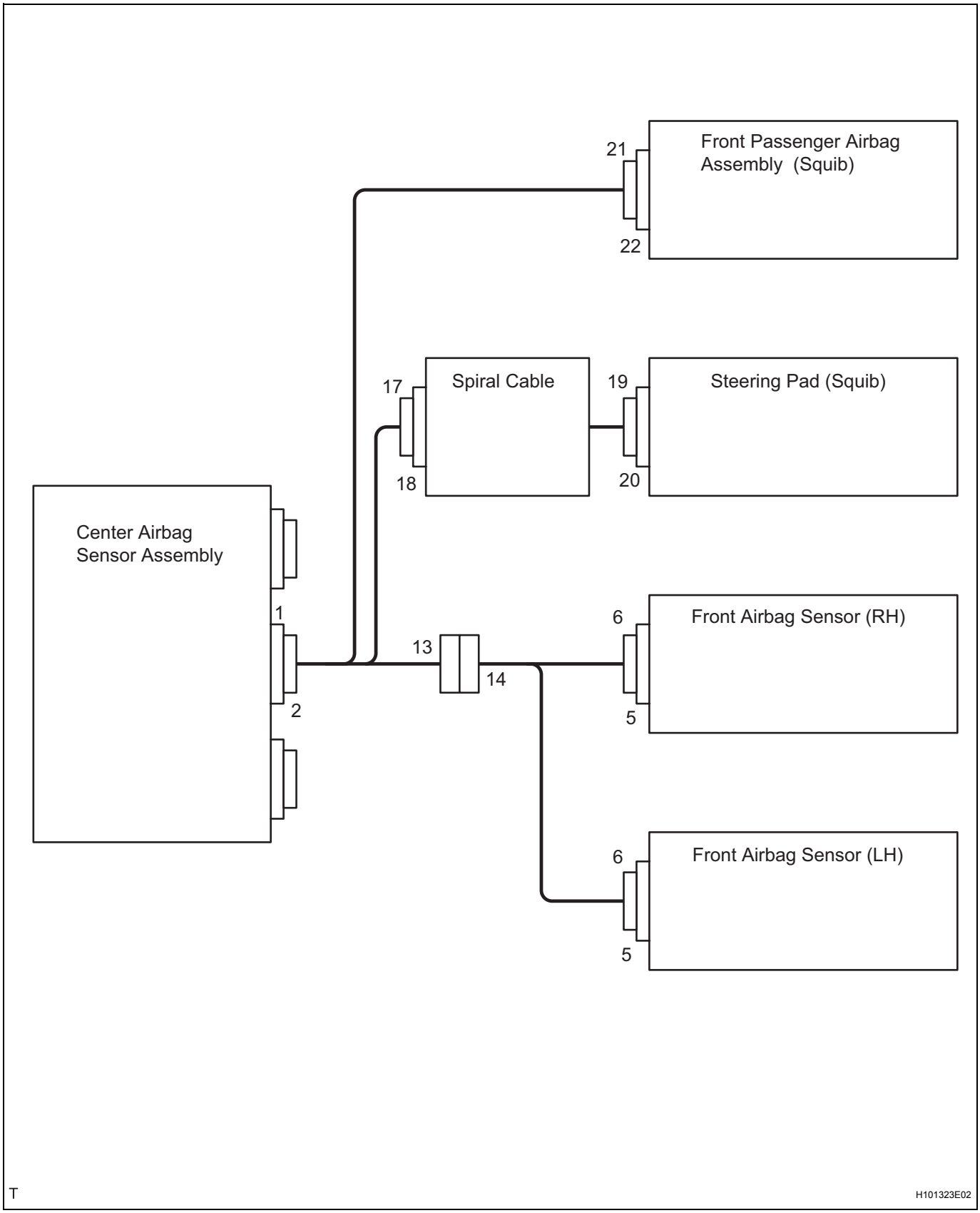
Never release the activation prevention mechanism on the squib connector.

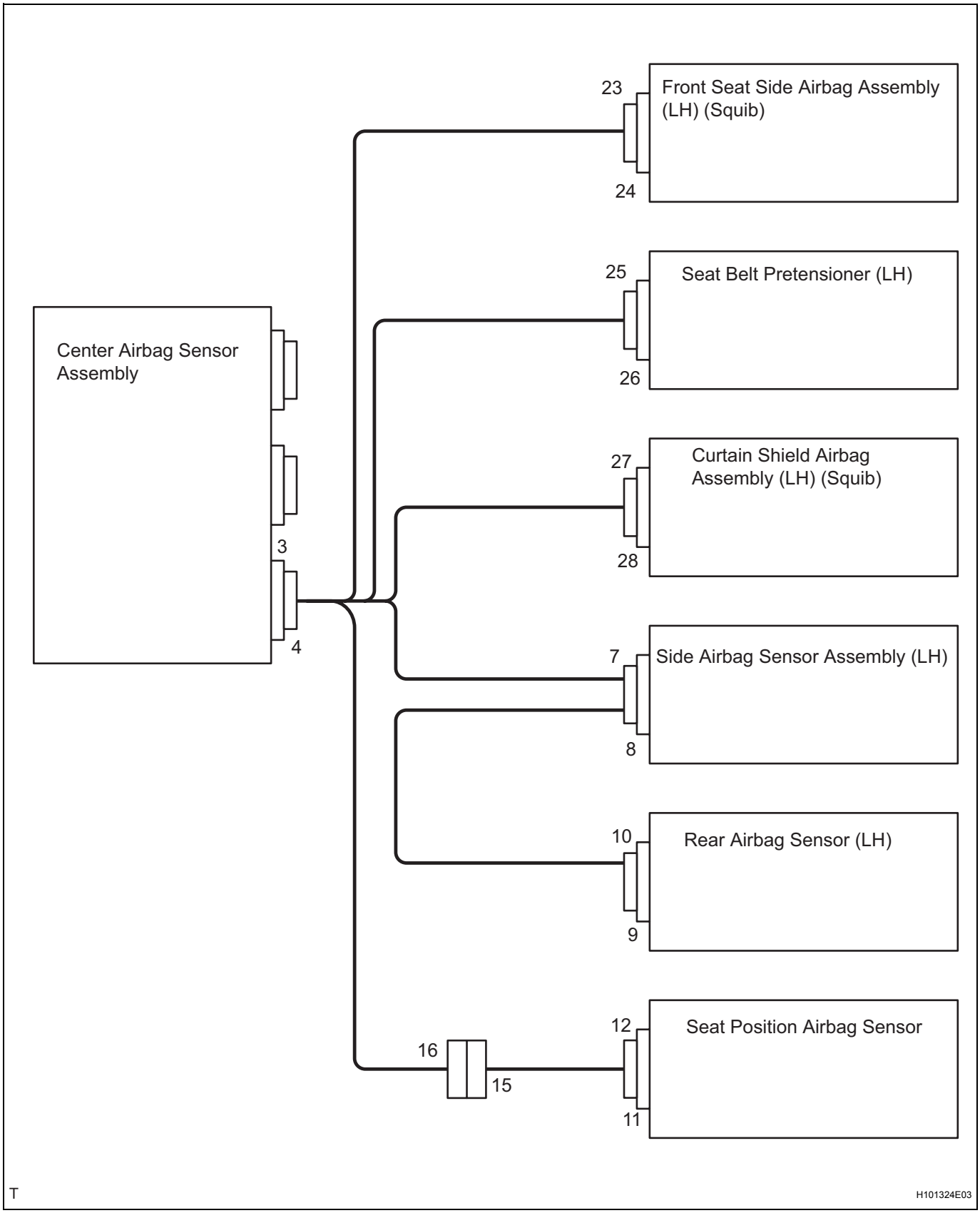
NOTICE:

- **Do not release the activation prevention mechanism unless specially directed by the troubleshooting procedure.**
- **To prevent the terminal and the short spring from becoming damaged, always use a piece of paper that is the same thickness as the male terminals.**


Rear Airbag Sensor (RH)
10
9
Side Airbag Sensor Assembly (RH)
8
7
Curtain Shield Airbag Assembly (RH) (Squib)
27
28
Seat Belt Pretensioner (RH)
25
26
Front Seat Side Airbag Assembly (RH) (Squib)
23
24
Center Airbag Sensor Assembly
3
4
T
H101322E03

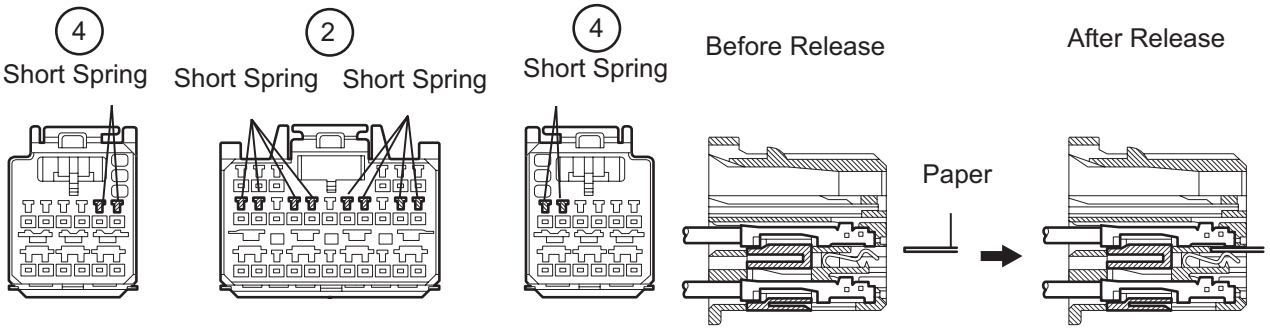
RS


Front Passenger Airbag Assembly (Squib)
21
22
Spiral Cable
17
18
Steering Pad (Squib)
19
20
Center Airbag Sensor Assembly
1
2
13
14
Front Airbag Sensor (RH)
6
5
Front Airbag Sensor (LH)
6
5
T
H101323E02

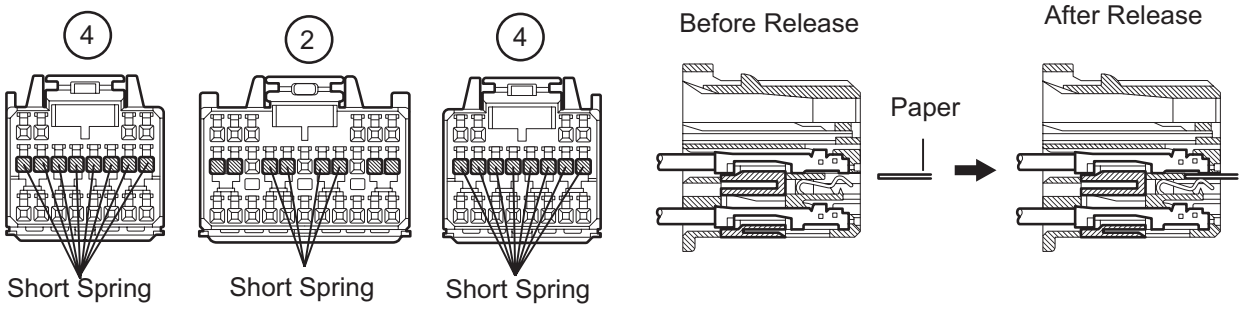

Center Airbag Sensor Assembly
3
4
23
24
Front Seat Side Airbag Assembly (LH) (Squib)
25
26
Seat Belt Pretensioner (LH)
27
28
Curtain Shield Airbag Assembly (LH) (Squib)
7
8
Side Airbag Sensor Assembly (LH)
10
9
Rear Airbag Sensor (LH)
16
15
12
11
Seat Position Airbag Sensor
T
H101324E03

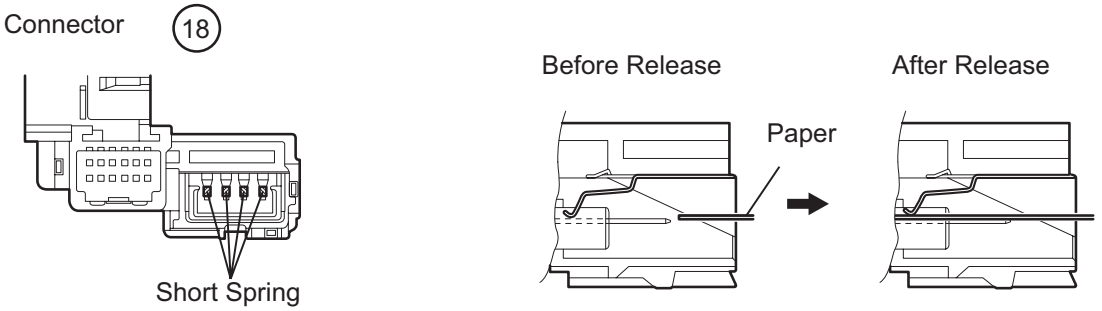
RS

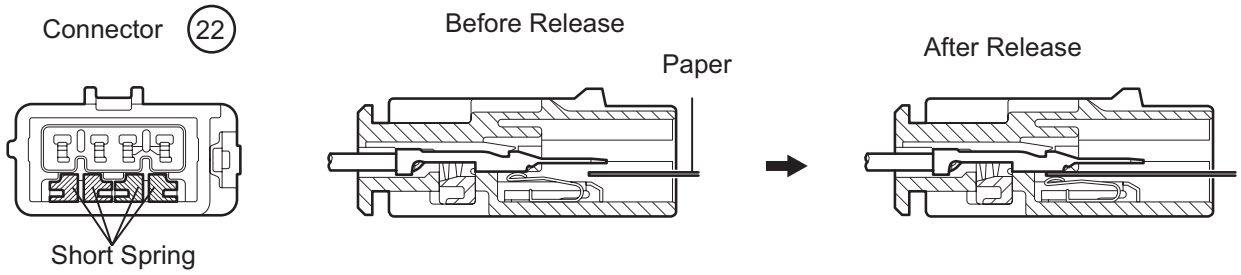
Center Airbag Sensor Assembly Connector (w/o Side Airbag)

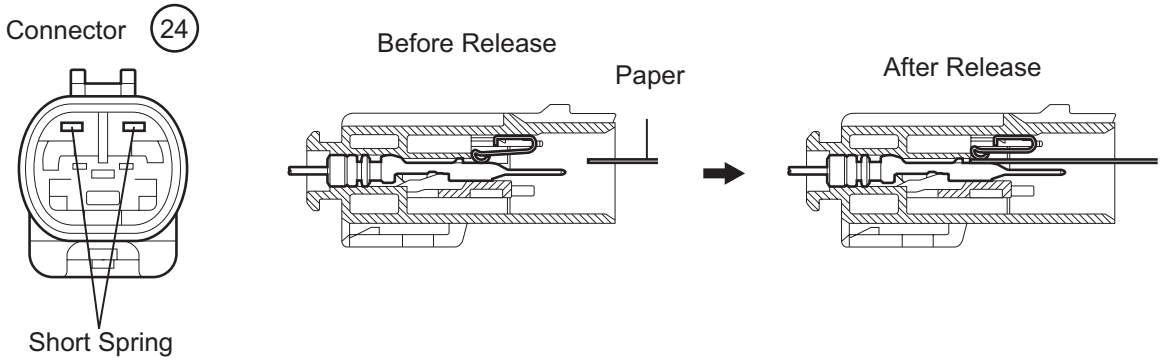


Center Airbag Sensor Assembly Connector (w/ Side Airbag)









T

H101318E02

SYSTEM DESCRIPTION

1. SUPPLEMENTAL RESTRAINT SYSTEM

(a) In the Supplemental Restraint System, the center airbag sensor assembly installed on the floor under the A/C unit determines whether or not to deploy the SRS airbag, and activates the seat belt pretensioner by receiving the information signal of the collision impact from each sensor. The driver airbag and front passenger airbag deploy in the 2nd step. The center airbag sensor assembly controls the 2nd step deployment of the airbags around the driver's seat according to the collision impact force, seat position and seat belt ON / OFF. The center airbag sensor assembly controls the 2nd step of the airbags around the passenger seat according to the collision impact force, seat position and seat belt ON / OFF. When the system has trouble, the SRS warning light on the combination meter assembly comes on and blinks to inform the driver of the trouble.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

RS

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	WARNING LIGHT CHECK

NEXT

4	CHECK FOR DTC*

(a) Check for DTCs and note any codes that are output (see page RS-30).
(b) Delete the DTCs.
(c) Recheck for DTCs. Based on the DTC output above, try to force output of the same SFI or airbag system DTC by simulating the symptoms indicated by the DTC.

Result

Result	Proceed to
DTC does not reoccur	A
SFI system DTC reoccurs	B
Airbag system DTC reoccurs	C

B → Go to SFI system

C → Go to step 7

A

5	PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 7

A

6	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) DATA LIST / ACTIVE TEST (see page RS-33).
(b) Terminals of ECU (see page RS-25).

NEXT

7	ADJUST, REPAIR OR REPLACE

NEXT

8	CONFIRMATION TEST

NEXT

END

DTC	B0106/54	Open in Front Passenger Side Squib Circuit

DESCRIPTION

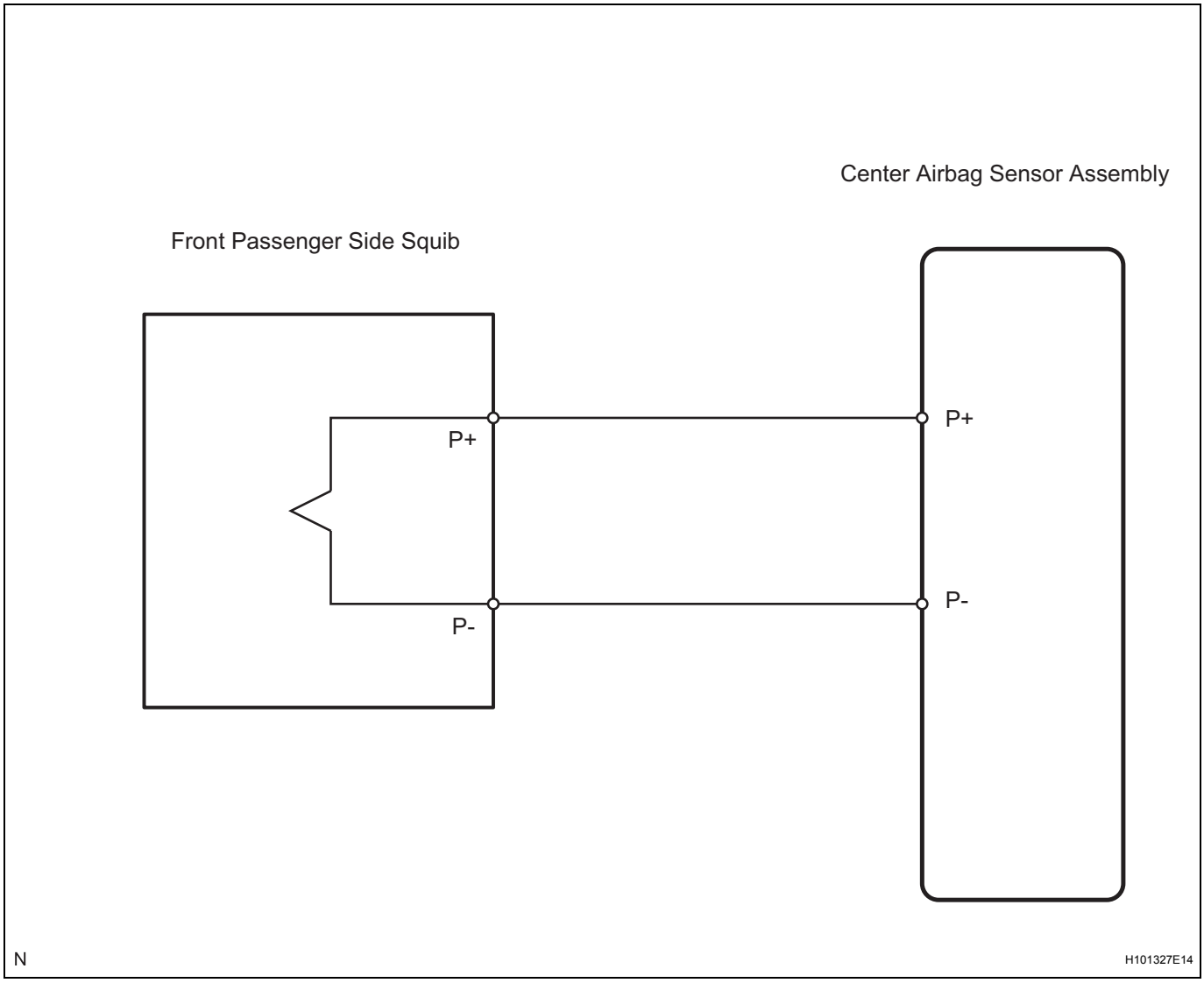
The front passenger side squib circuit consists of the center airbag sensor and the front passenger airbag. The circuit instructs the SRS to deploy when deployment conditions are met.

RS

DTC B0106/54 is recorded when an open is detected in the front passenger side squib circuit.

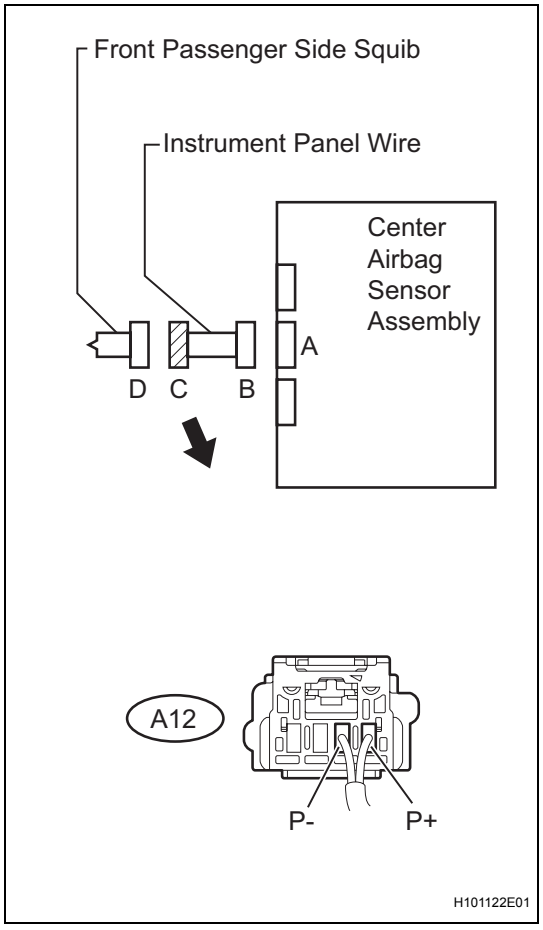
DTC No.	DTC Detection Condition	Trouble Area
B0106/54	• Open in front passenger side squib circuit (to B+) • Front passenger side squib malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib) • Center airbag sensor assembly • Instrument panel wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL WIRE (FRONT PASSENGER SIDE SQUIB CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front passenger airbag.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

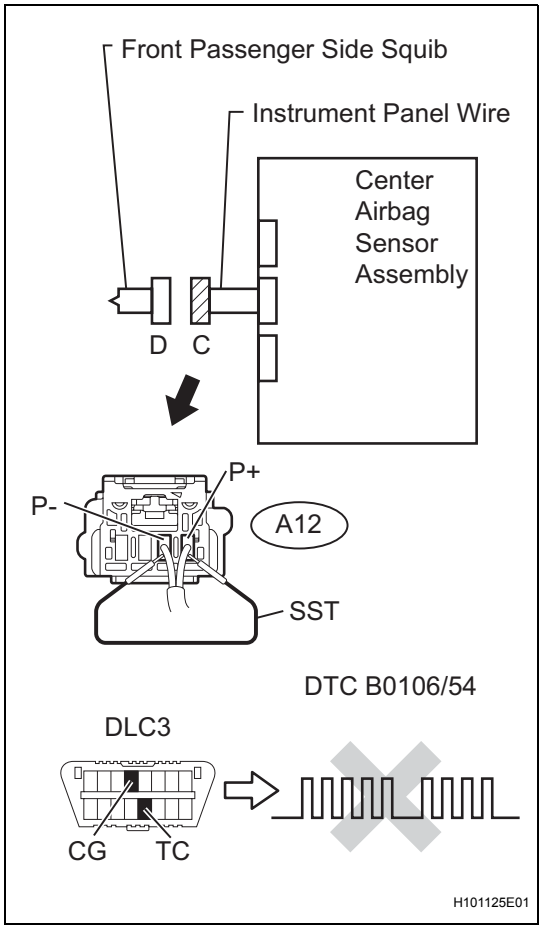
Tester Connection (Connector "C")	Specified Condition
A12-1 (P+) - A12-2 (P-)	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using SST, connect terminal P+ and P- of connector "C".
SST 09843-18040

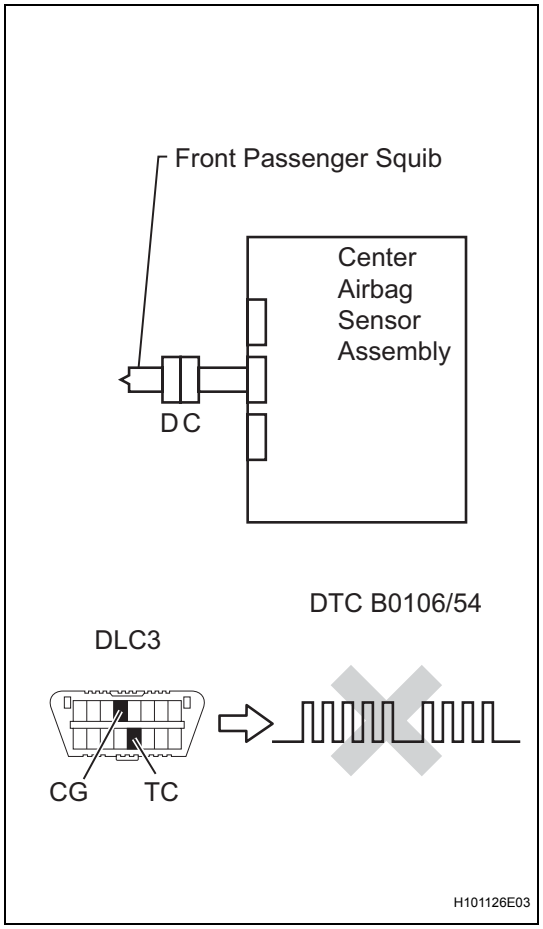
NOTICE:
Do not forcibly insert SST into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0106/54 is not output.
HINT:
Codes other than code B0106/54 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the SST from the connector "C".
(d) Connect the connector to the front passenger airbag.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0106/54 is not output.

HINT:

Codes other than code B0106/54 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0107/51	Short to GND in Front Passenger Side Squib Circuit

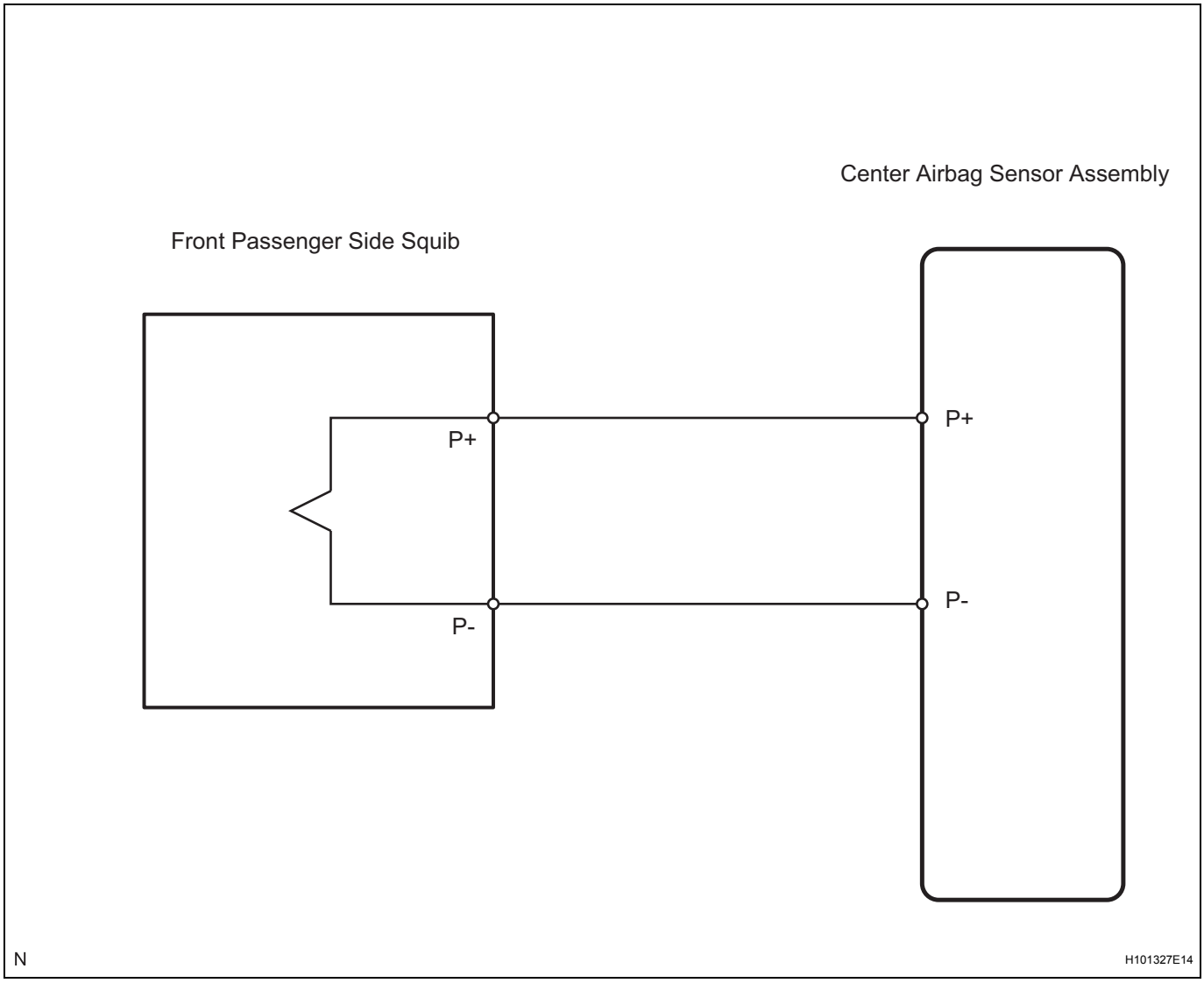
DESCRIPTION

The front passenger side squib circuit consists of the center airbag sensor and the front passenger airbag. The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B0107/51 is recorded when a ground short is detected in the front passenger side squib circuit.

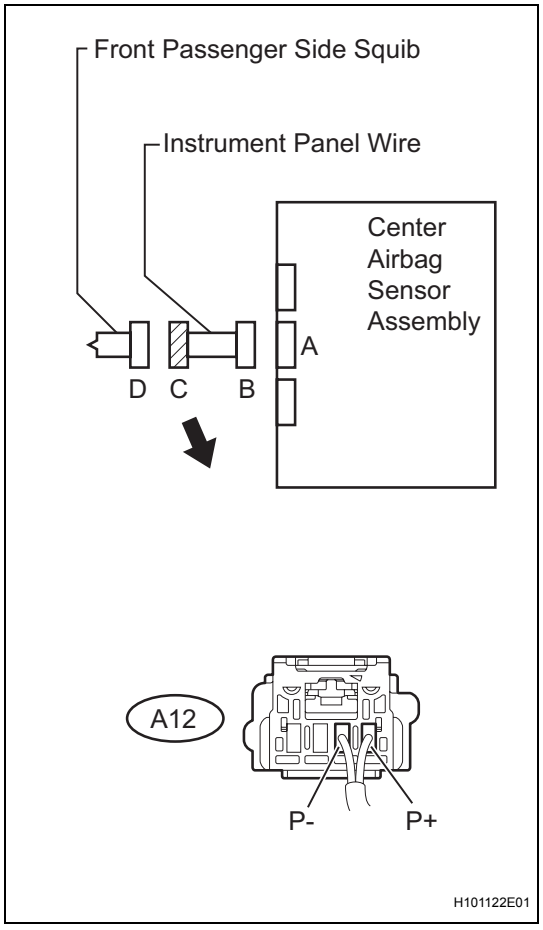
DTC No.	DTC Detection Condition	Trouble Area
B0107/51	• Short in front passenger side squib circuit (to ground) • Front passenger side squib malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib) • Center airbag sensor assembly • Instrument panel wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL WIRE (FRONT PASSENGER SIDE SQUIB CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front passenger airbag.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

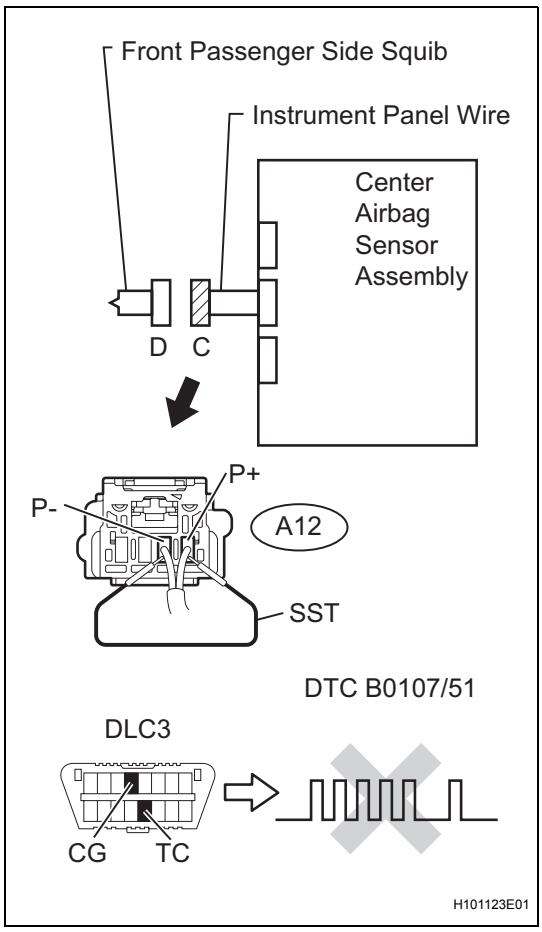
Tester Connection (Connector "C")	Specified Condition
A12-1 (P+) - Body ground	1 MΩ or higher
A12-2 (P-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using SST, connect terminals P+ and P- of connector "C".

SST 09843-18040

NOTICE:
Do not forcibly insert SST into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

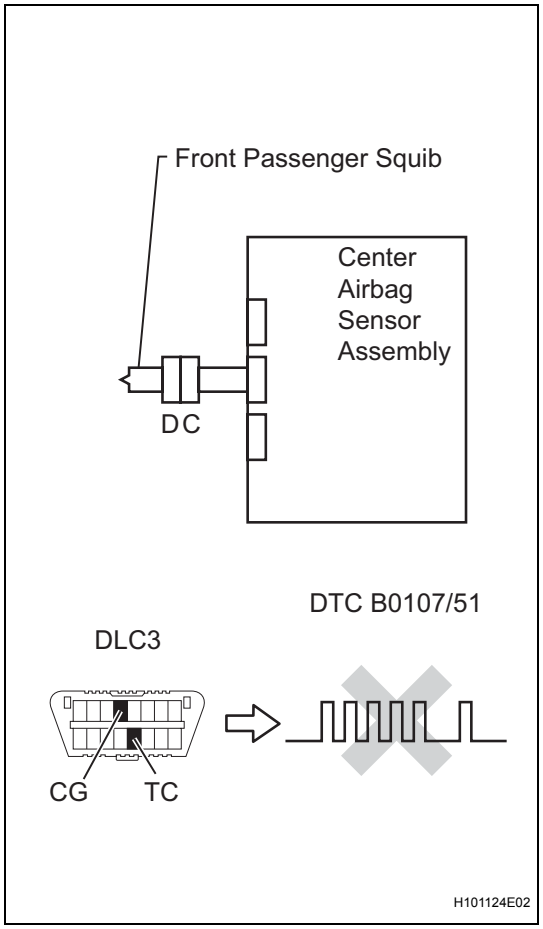
OK:
DTC B0107/51 is not output.

HINT:
Codes other than code B0107/51 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the SST from the connector "C".
(d) Connect the connector to the instrument panel passenger airbag.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 10 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0107/51 is not output.

HINT:

Codes other than code B0107/51 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

AIRBAG SYSTEM

PRECAUTION

CAUTION:

- **The vehicle is equipped with a Supplemental Restraint System (SRS), which consists of a steering pad, front passenger airbag, curtain shield airbag, front seat side airbag, seat belt pretensioner, center airbag sensor, front airbag sensor, side airbag sensor, rear airbag sensor and seat position airbag sensor. Failure to carry out service procedures in the correct sequence could cause SRS parts to unexpectedly deploy and possibly lead to serious injuries. Furthermore, if a mistake is made when service SRS parts, they may fail to operate when required. Before performing servicing (including installation/removal, inspection and replacement of parts), be sure to read the following precautions.**
- **Before starting work, wait at least 90 seconds after the ignition switch is turned OFF and after the cable of the negative (-) battery terminal is disconnected. (SRS parts are equipped with a backup power source. If work is started within 90 seconds of turning the ignition switch OFF and disconnecting the cable from the negative (-) battery terminal, SRS parts may deploy.)**
- **Do not expose SRS parts directly to hot air or flames.**

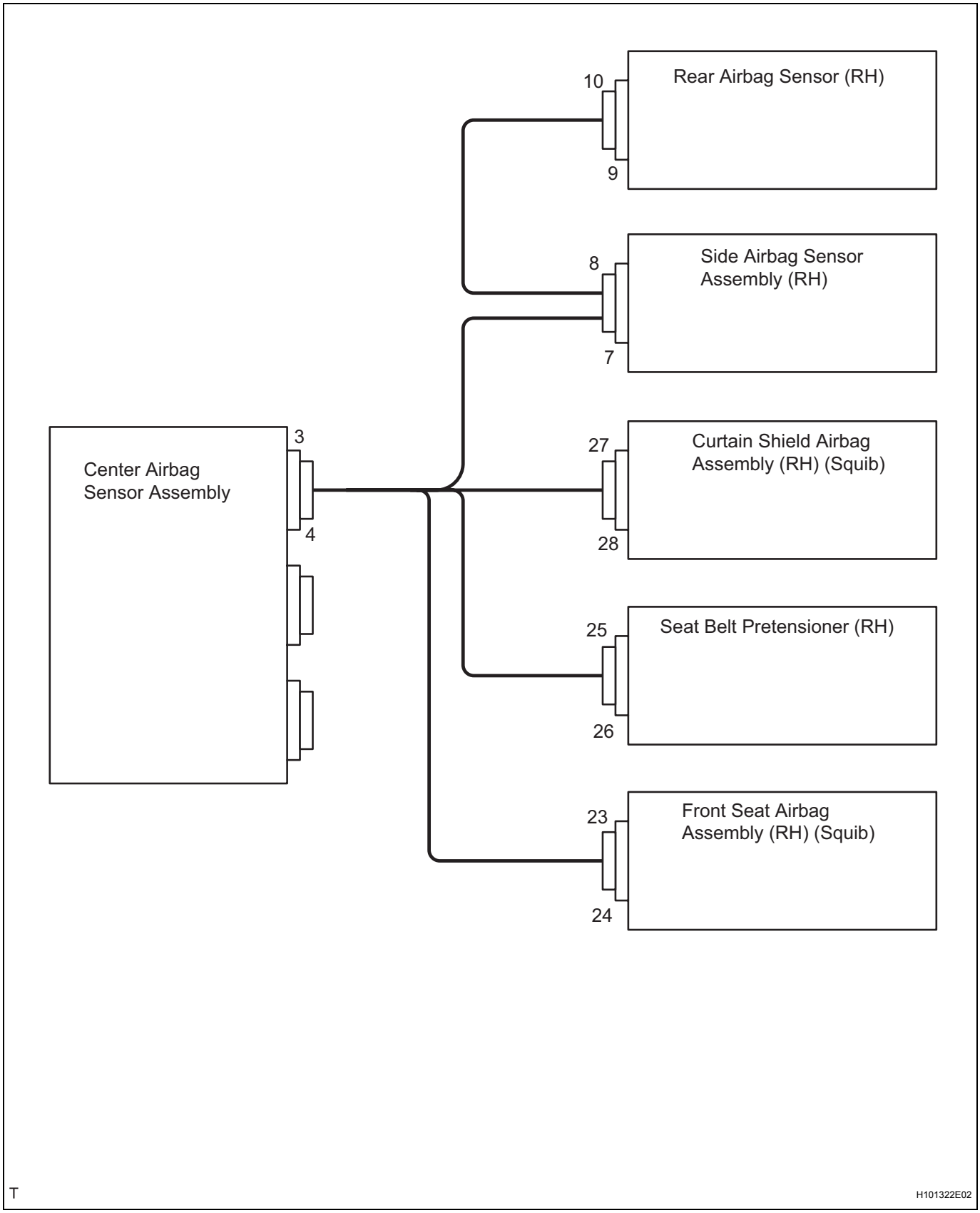
NOTICE:

- **Malfunction symptoms of SRS parts are difficult to confirm. DTCs are the most important source of information when troubleshooting. During troubleshooting, always confirm DTCs before disconnecting the cable from the negative (-) battery terminal.**
- **For minor collisions where SRS parts do not deploy, always inspect the SRS parts.**
- **Before repair work, remove airbag sensors as necessary if any kind of impact is likely to occur to an airbag sensor during the operation.**
- **Never use SRS parts from another vehicle. When replacing SRS parts, replace them with new ones.**
- **Never disassemble or attempt to repair SRS parts.**
- **If an SRS part has been dropped, or if there are any cracks, dents or other defects in the case, bracket or connector, replace the SRS part with a new one.**
- **Use an ohmmeter/voltmeter with high impedance (10 kΩ/V minimum) for troubleshooting the electrical circuits.**
- **Information labels are attached to the periphery of SRS parts. Follow the cautions and instructions on the labels.**
- **After work on SRS parts is completed, perform the SRS warning light check (see page RS-28).**

- **When the cable is disconnected from the negative (-) battery terminal, the memory settings of each system will be cleared. Because of this, be sure to write down the settings of each system before starting work. When work is finished, reset the settings of each system as before. Never use a backup power supply from outside the vehicle to avoid erasing the memory in a system.**
- **If the vehicle is equipped with a mobile communication system, refer to the precautions in the INTRODUCTION section (see page IN-1).**
- **When disconnecting the cable from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.**

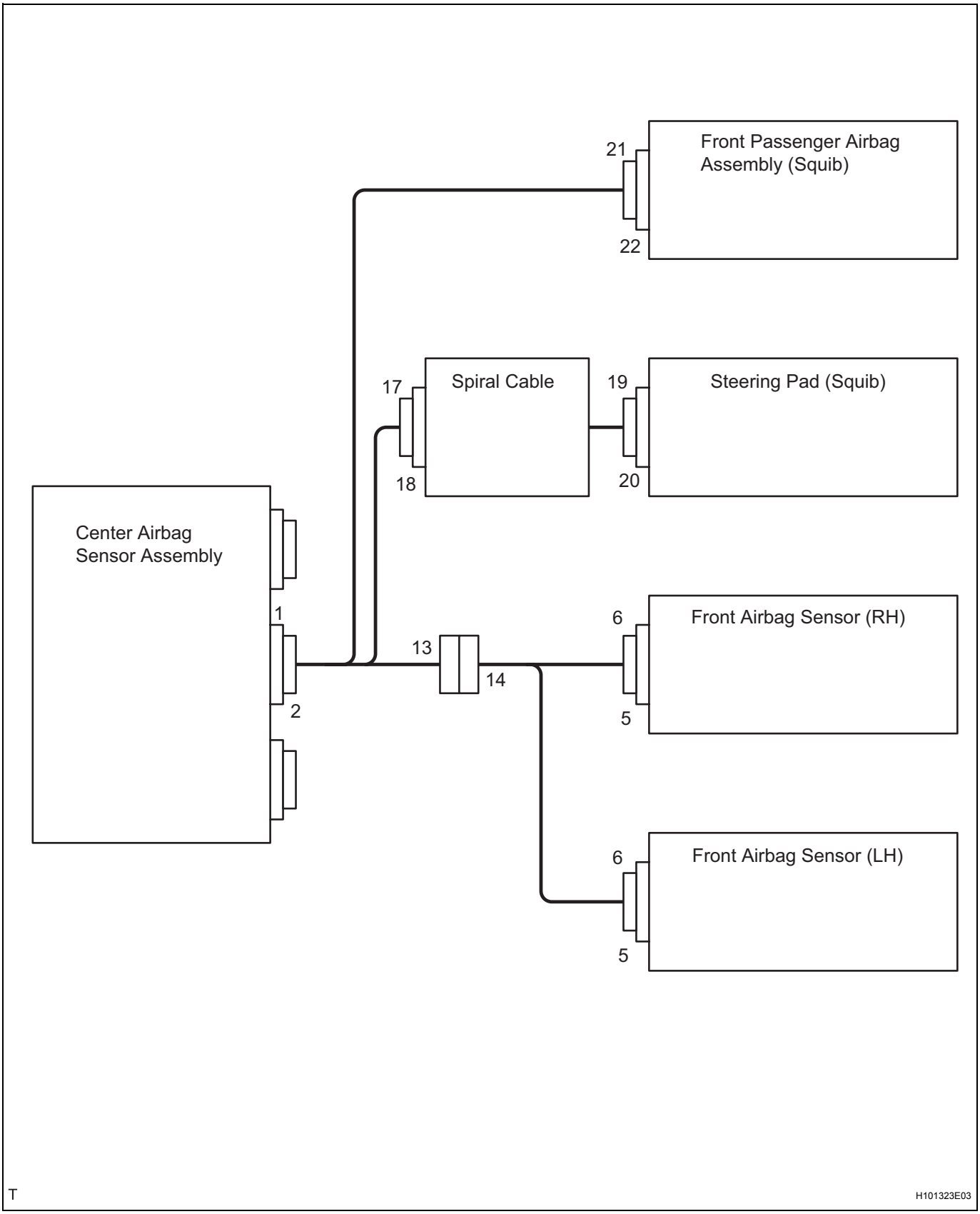
System Name	See Procedure
Sliding Roof System	IN-23

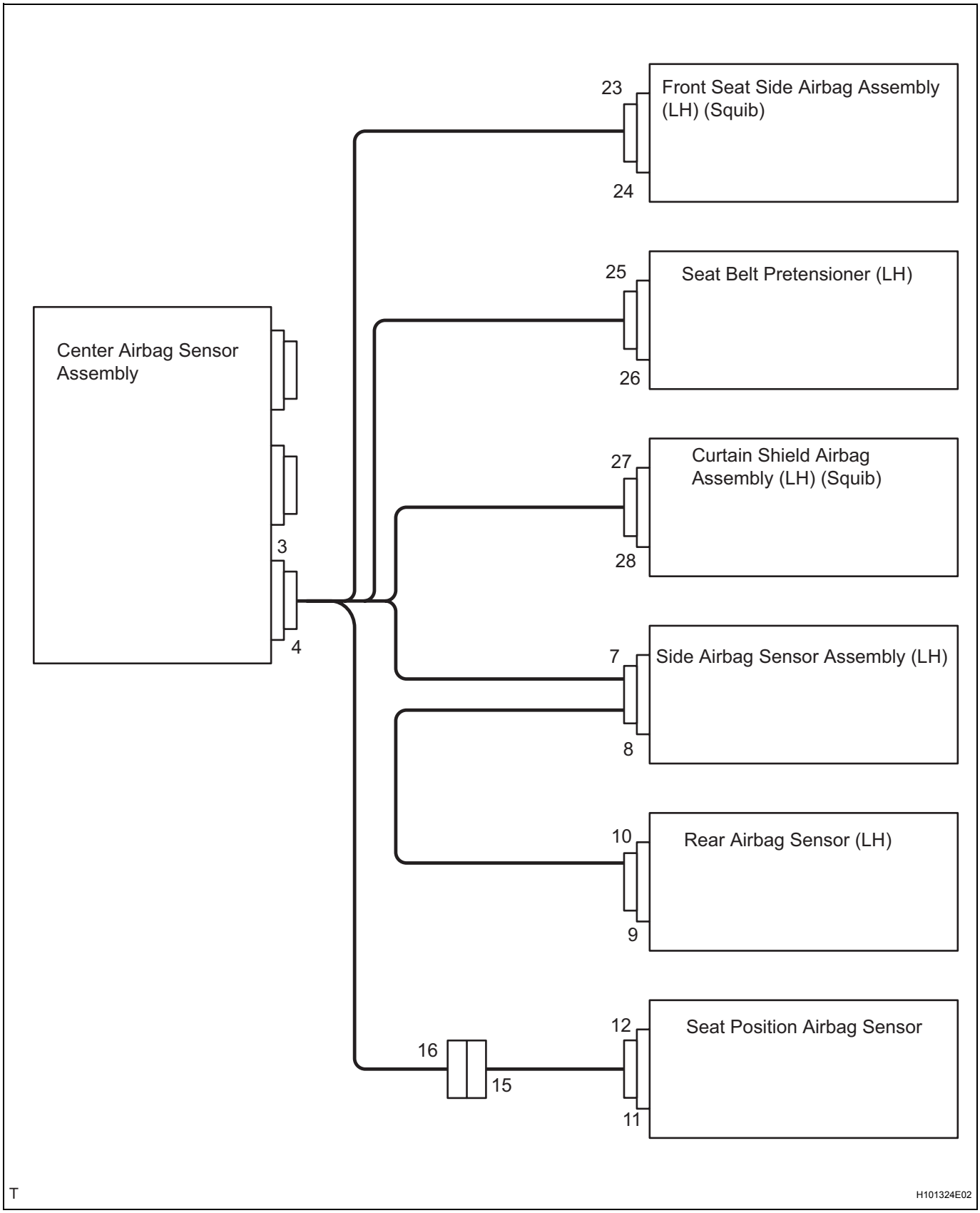
1. SRS CONNECTORS



RS

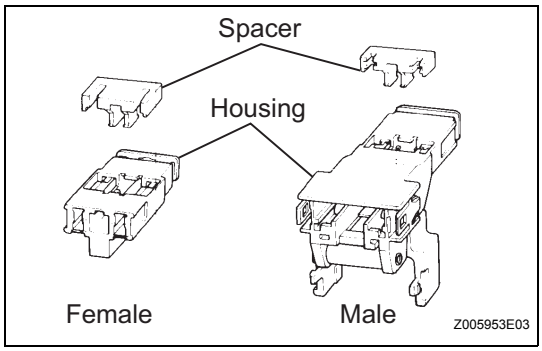
RS


21
Front Passenger Airbag
Assembly (Squib)
22
17
Spiral Cable
19
Steering Pad (Squib)
18
20
Center Airbag
Sensor Assembly
1
6
Front Airbag Sensor (RH)
13
14
2
5
6
Front Airbag Sensor (LH)
5
T
H101323E03



Item	Application
Terminal Twin-lock Mechanism	Connectors 2, 4, 6, 8, 10, 12, 13, 14, 15, 16, 17, 21, 23, 24
Activation Prevention Mechanism	Connectors 2, 4, 18, 20, 22, 24, 26, 28
Electrical Connection Check Mechanism	Connectors 1, 2, 3, 4

Item	Application
Half Connection Prevention Mechanism	Connectors 8, 10, 14, 17, 21
Connector Lock Mechanism	Connectors 19, 25, 27
Connector Position Assurance Mechanism	Connector 6

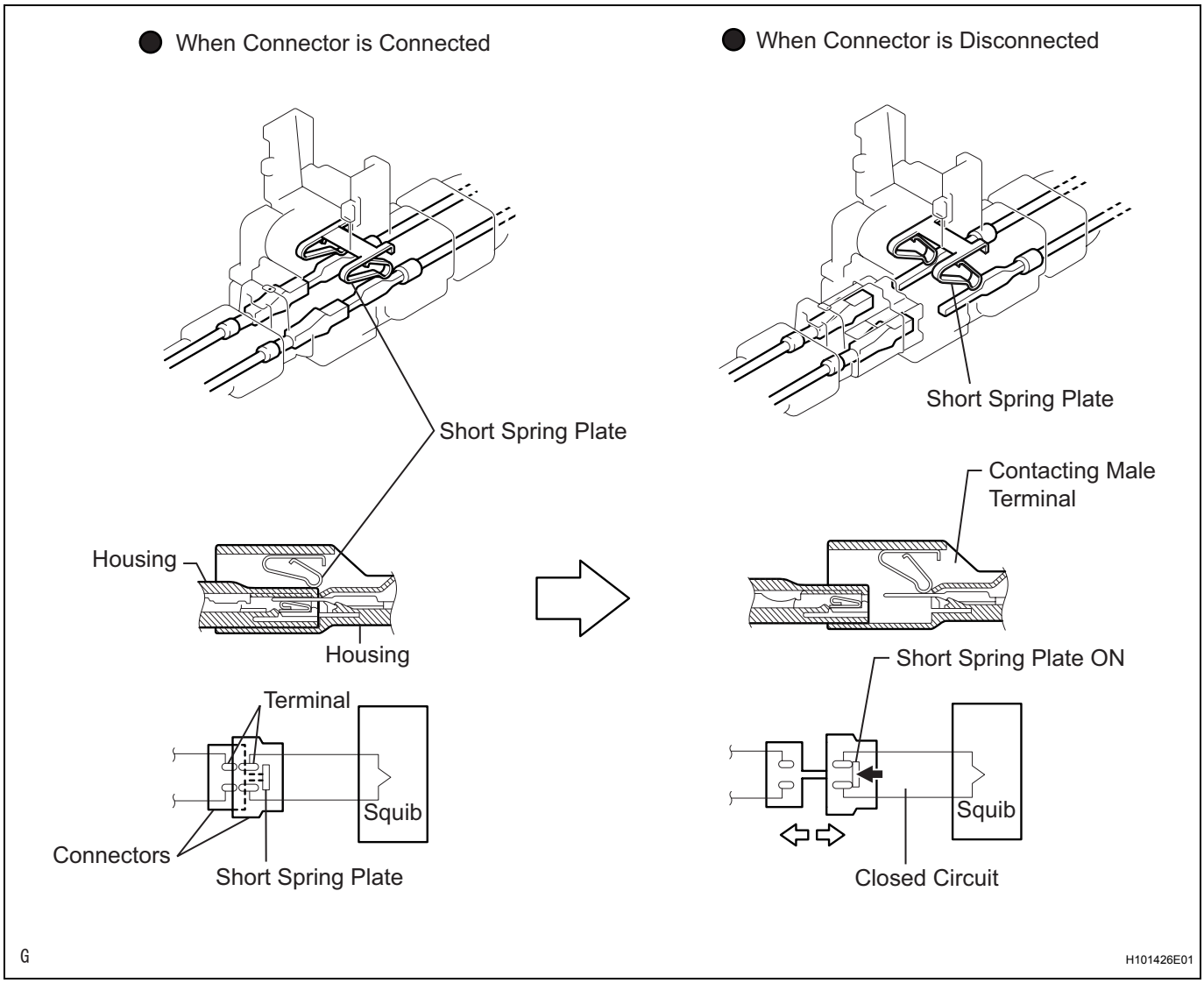


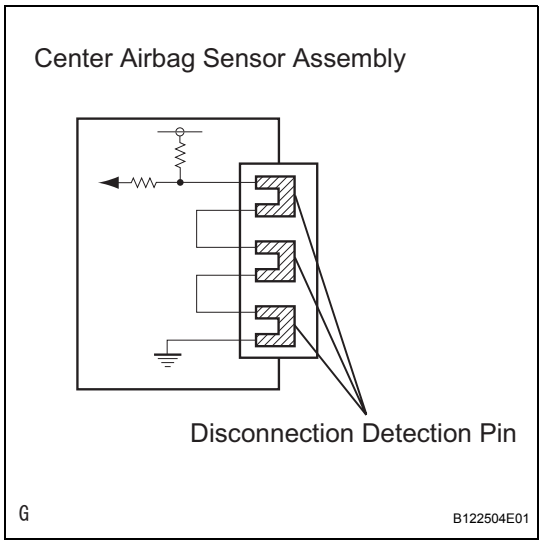
(a) All connectors in the SRS are yellow (to distinguish them from other connectors). Some connectors have special functions and are specially designed for the SRS. These connectors use durable gold-plated terminals, and are located as shown above to ensure high reliability.

(1) Terminal twin-lock mechanism:

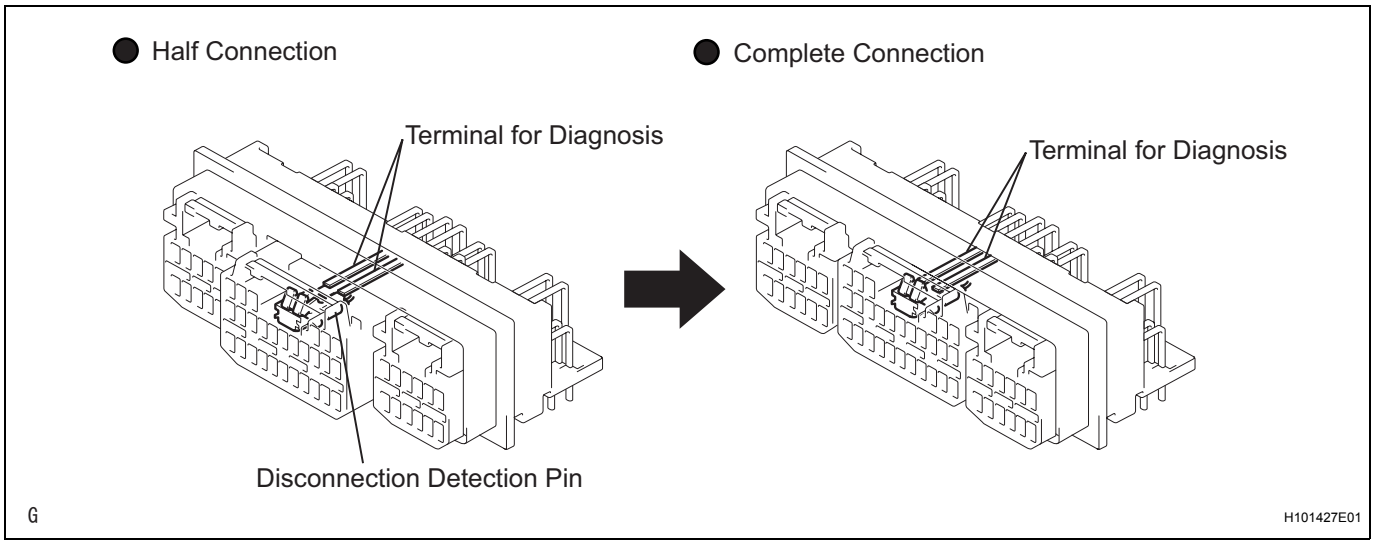
Each connector has a two-piece component consisting of a housing and spacer. This design enables the terminal to be locked securely by 2 locking devices (the retainer and lance) to prevent terminals from becoming unseated.

(2) Activation prevention mechanism:
Each connector contains a short spring plate. When the connector is disconnected, the short spring plate automatically connects the positive (+) terminal and negative (-) terminal of the squib.

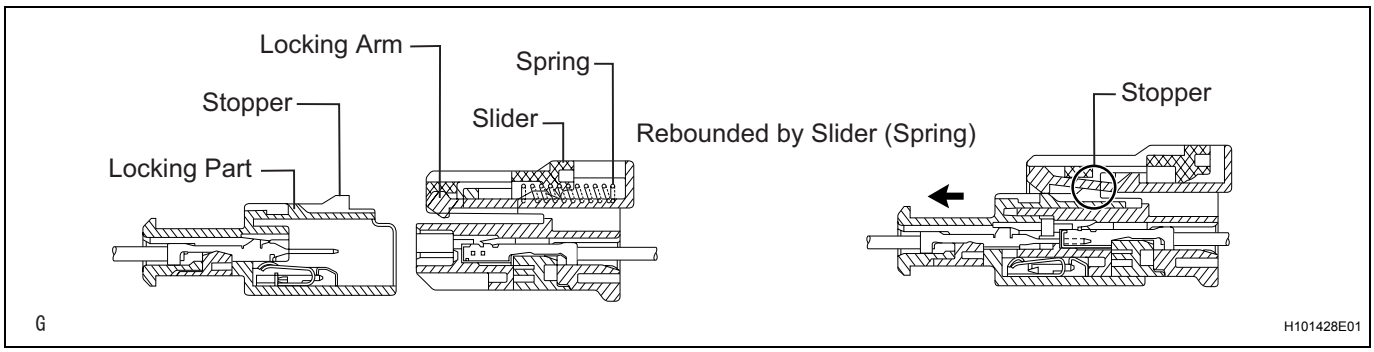




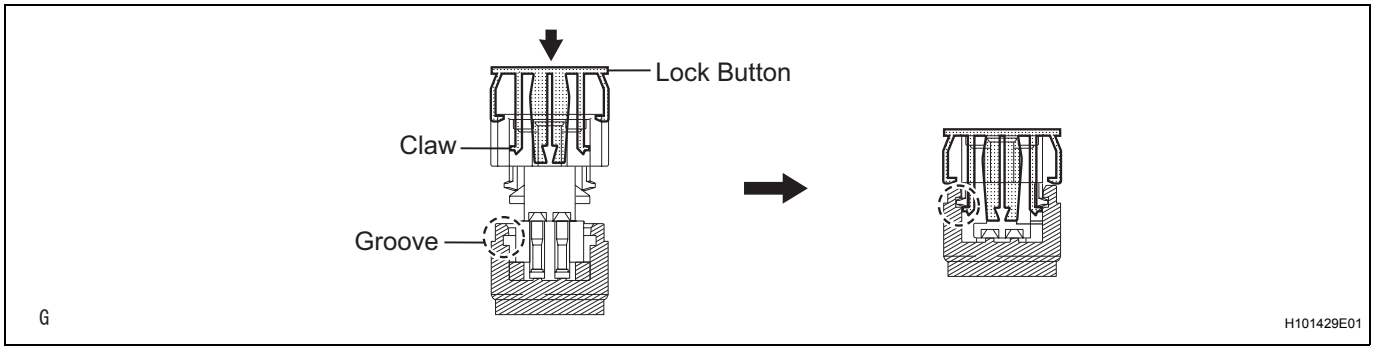
(3) Electrical connection check mechanism:
This mechanism electrically checks that the connectors are connected correctly and completely. The electrical connection check mechanism is designed so that the disconnection detection pin connects with the diagnosis terminals when the connector housing lock is locked.



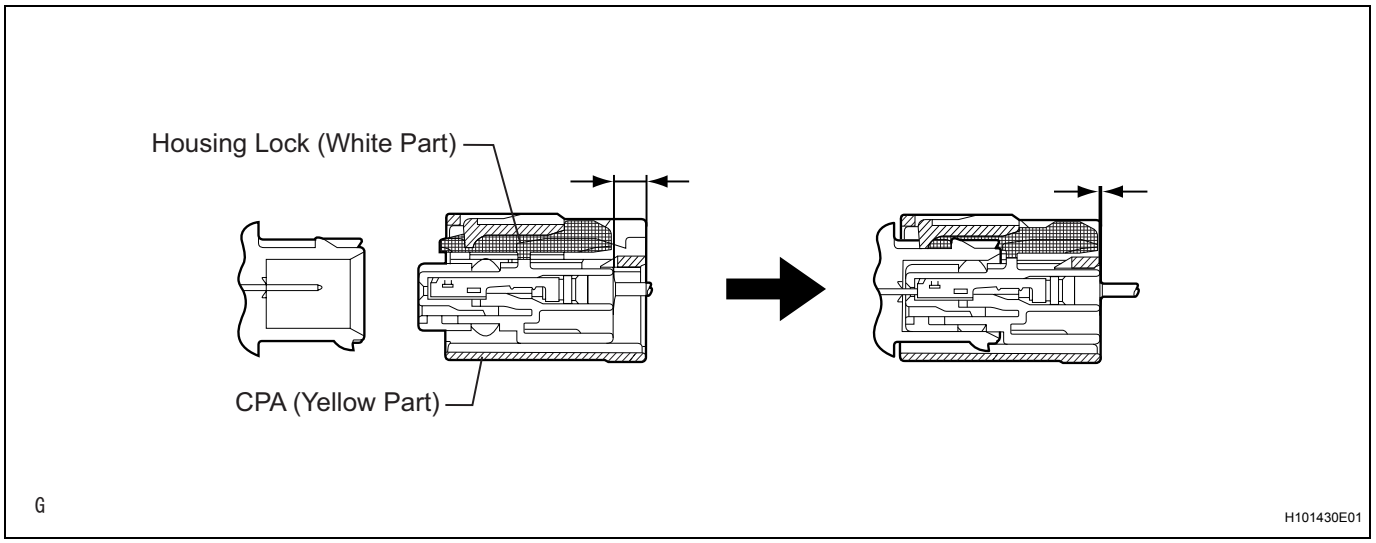
(4) Half connection prevention mechanism:
If the connector is not completely connected, the connector is disconnected by the spring.



(5) Connector lock mechanism:
Locking the connector lock button connects the connector securely.

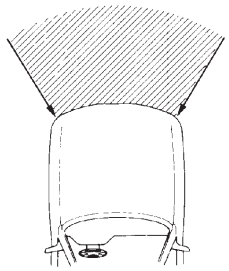


(6) Connector position assurance mechanism:
Only when the housing lock (white part) is completely engaged, the CPA (yellow part) slides, which completes the connector engagement.



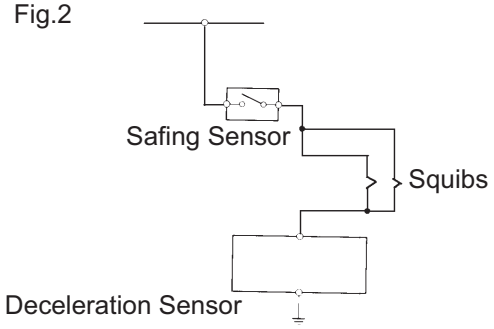
RS

Fig.1



Power Source

Fig.2



(b) When the vehicle is involved in a frontal collision in the hatched area (Fig. 1) and the shock is larger than the predetermined level, the SRS is activated automatically. The safing sensor is designed to go on at a smaller deceleration rate than the airbag sensor. As illustrated in Fig. 2, ignition is caused when current flows to the squib, which happens when the safing sensor and the deceleration sensor go on simultaneously. When a deceleration force acts on the sensors, 2 squibs in the driver airbag and front passenger airbag ignite and generate gas. The gas discharging into the driver airbag and front passenger airbag rapidly increases the pressure inside the bags, breaking the steering pad assembly and instrument panel. The deployment of the bags then end, and the bags deflate as the gas is discharged through discharge holes at the bag's rear or side.

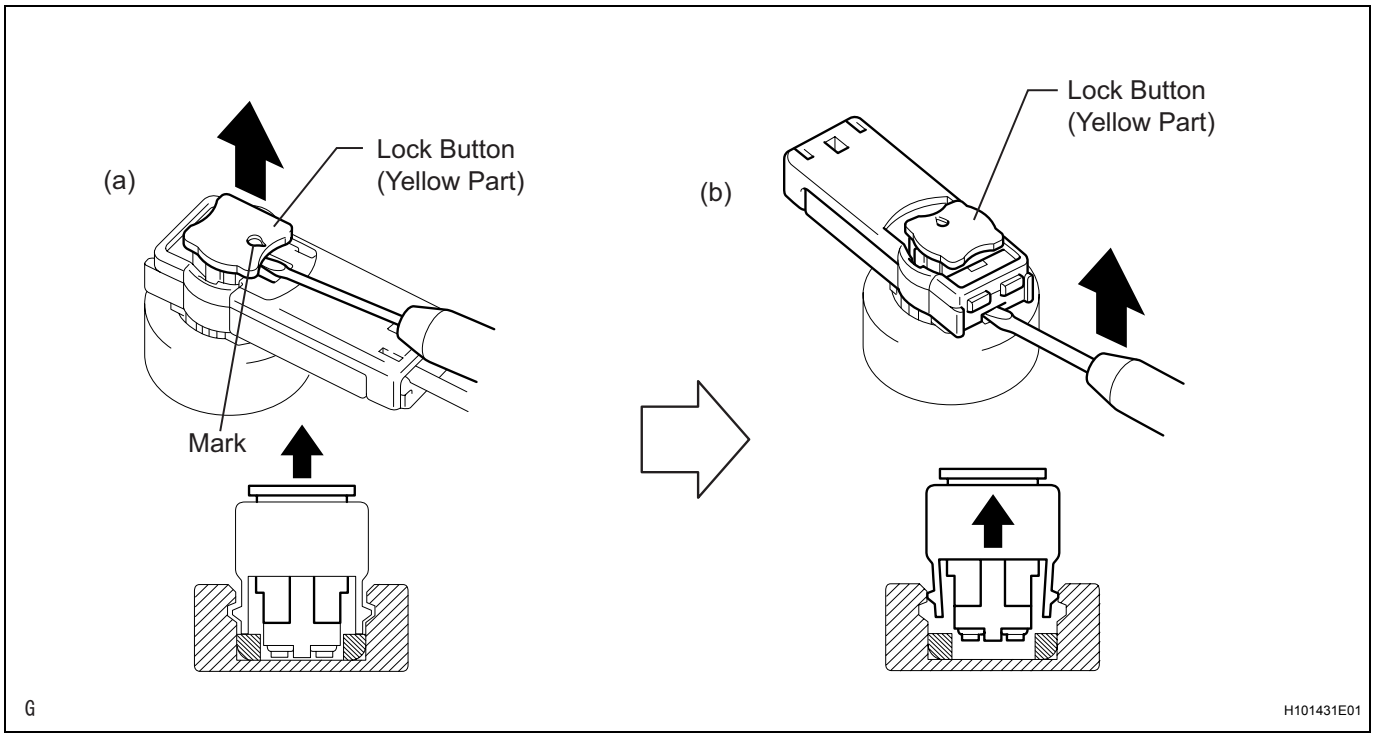
2. DISCONNECTION OF CONNECTOR FOR STEERING PAD ASSEMBLY AND CURTAIN SHIELD AIRBAG ASSEMBLY

HINT:

Tape the screwdriver tip before use.

(a) Release the lock button (yellow part) of the connector using a screwdriver.

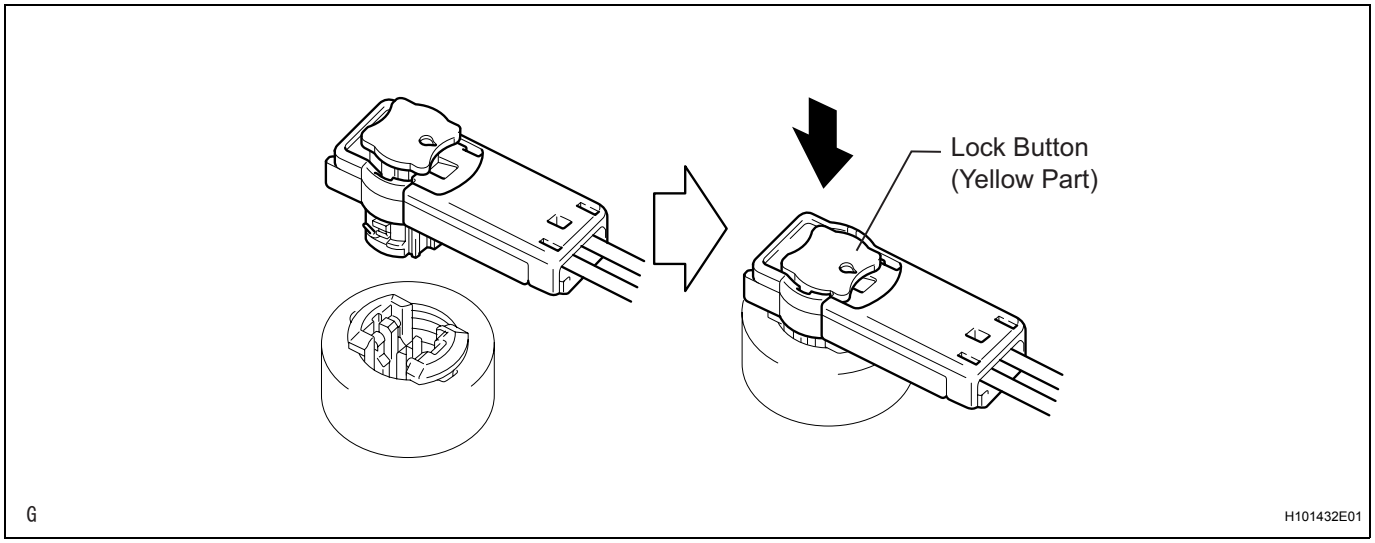
(b) Insert the screwdriver tip between the connector and base, and then raise the connector.



3. CONNECTION OF CONNECTOR FOR STEERING PAD ASSEMBLY AND CURTAIN SHIELD AIRBAG ASSEMBLY

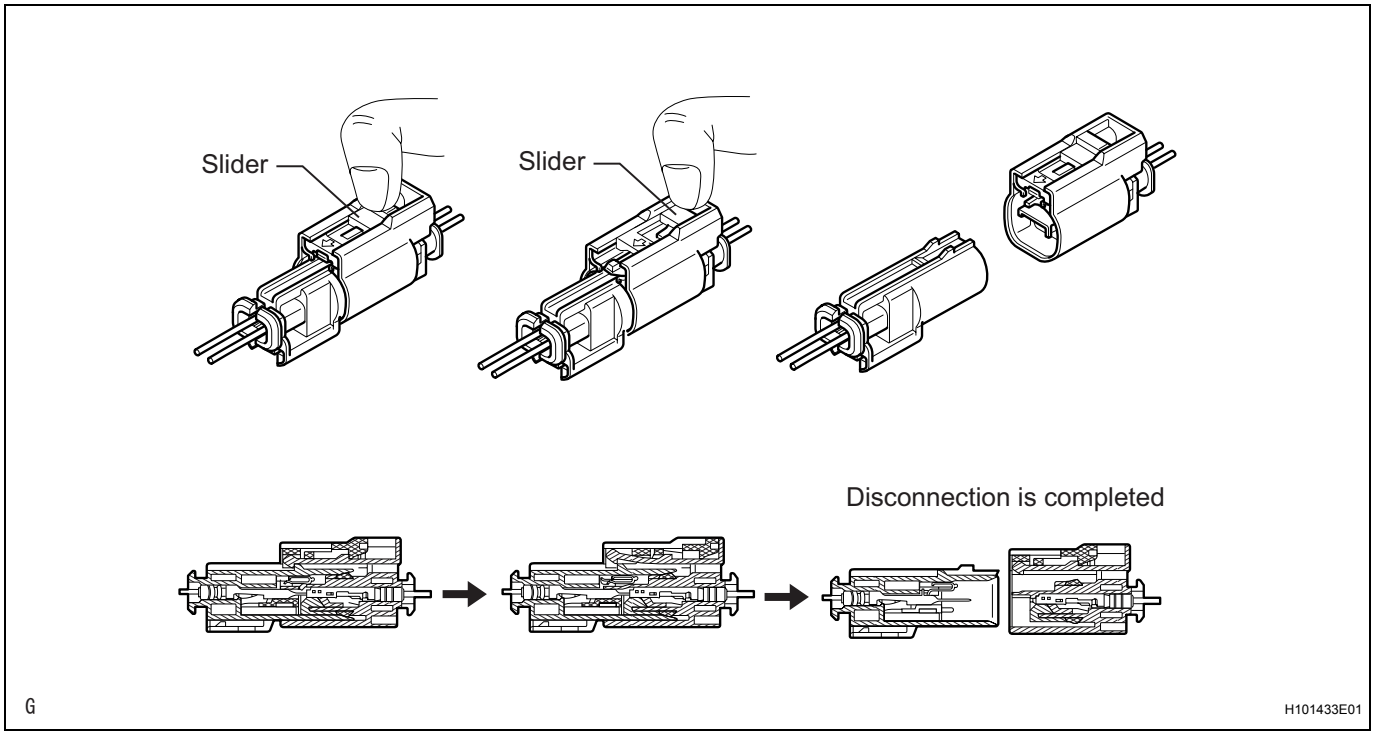
(a) Connect the connector.

(b) Push the lock button in to connect the holder (with connectors). Check that it locks and that a "click" sound is heard.



4. DISCONNECTION OF CONNECTOR FOR FRONT SEAT SIDE AIRBAG ASSEMBLY

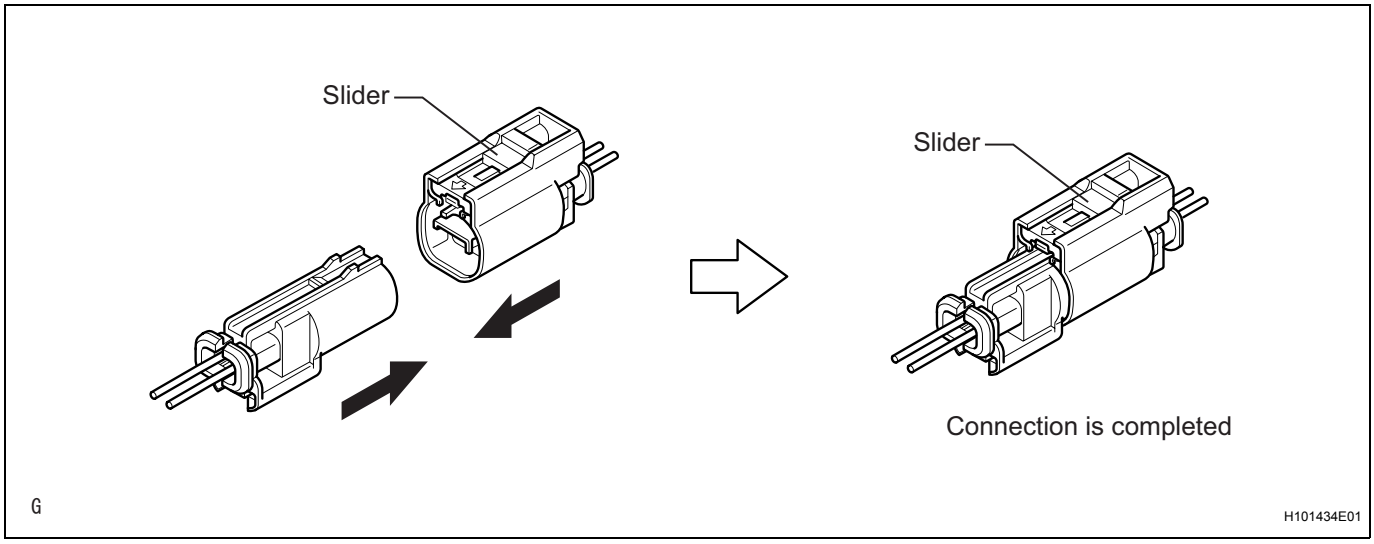
(a) Place a finger on the slider.
(b) Slide the slider to release the lock.
(c) Disconnect the connector.

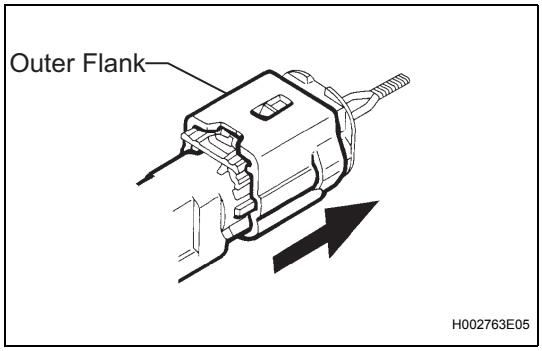


5. CONNECTION OF CONNECTOR FOR FRONT SEAT SIDE AIRBAG ASSEMBLY

(a) Connect the connector as shown in the illustration. Check that it locks and that a "click" sound is heard.
HINT:
Do not touch the slider while it is moving.

RS

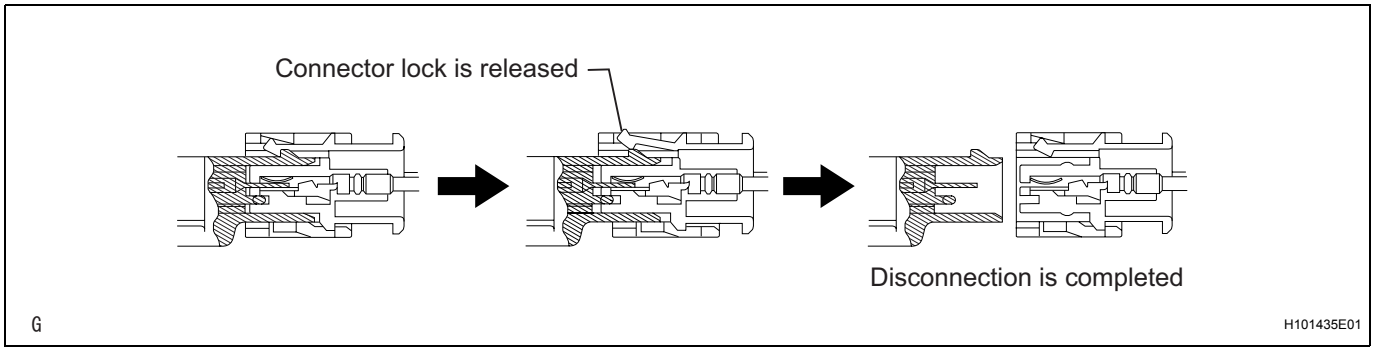




6. DISCONNECTION OF CONNECTOR FOR SIDE AIRBAG SENSOR AND REAR AIRBAG SENSOR

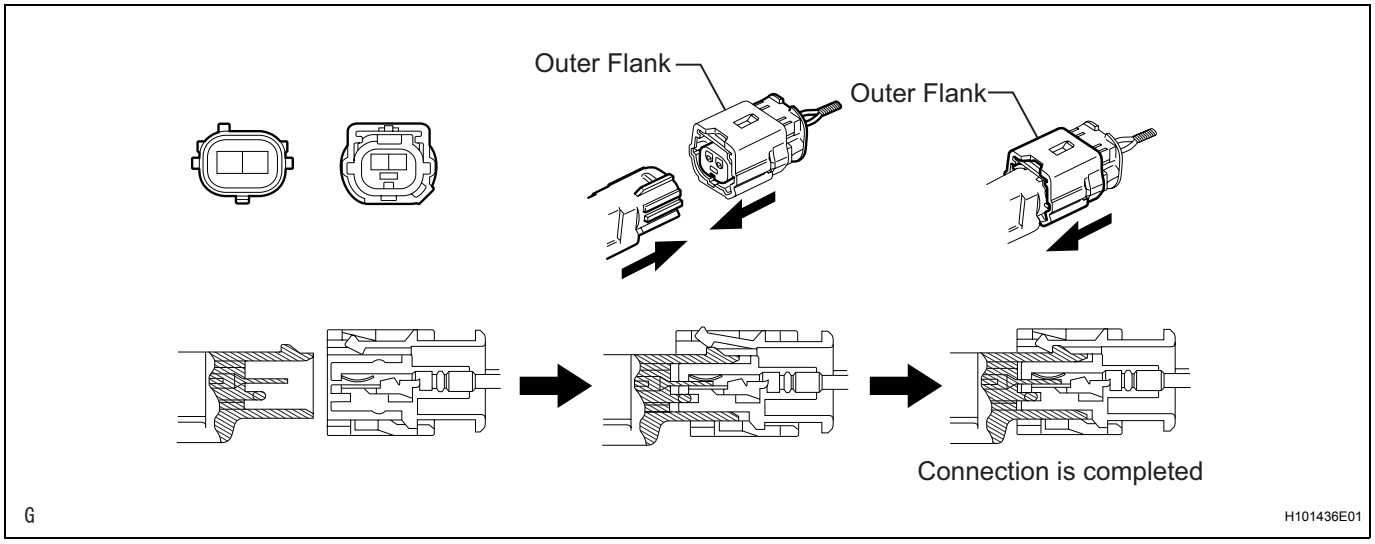
(a) Hold the sides of the outer flank and slide it as shown in the illustration to release the connector lock.

(b) Disconnect the connector.
HINT:
Be sure to hold the sides of the outer flank. Holding the top and bottom will make disconnection difficult.



7. CONNECTION OF CONNECTOR FOR SIDE AIRBAG SENSOR AND REAR AIRBAG SENSOR

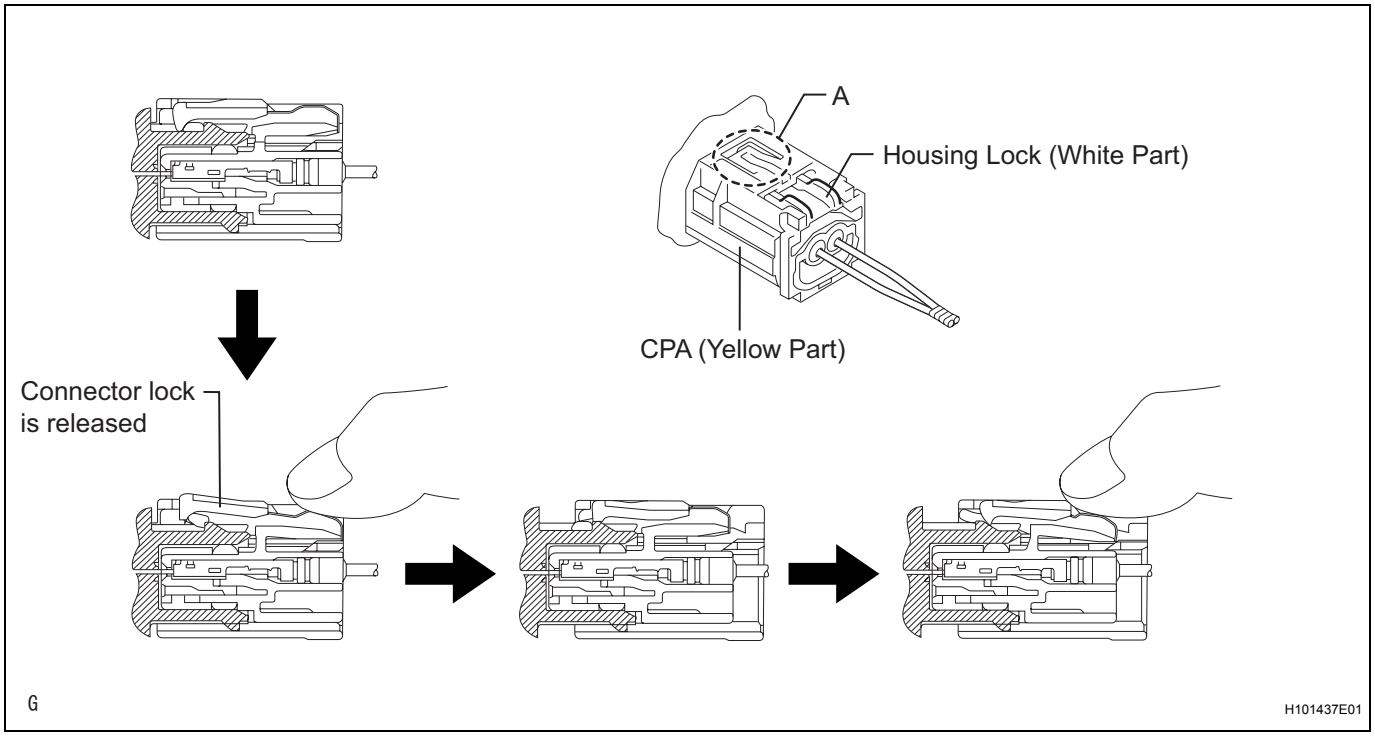
(a) Connect the connector as shown in the illustration. Check that it locks and that a "click" sound is heard.
HINT:
Do not hold the outer flank while it is moving.



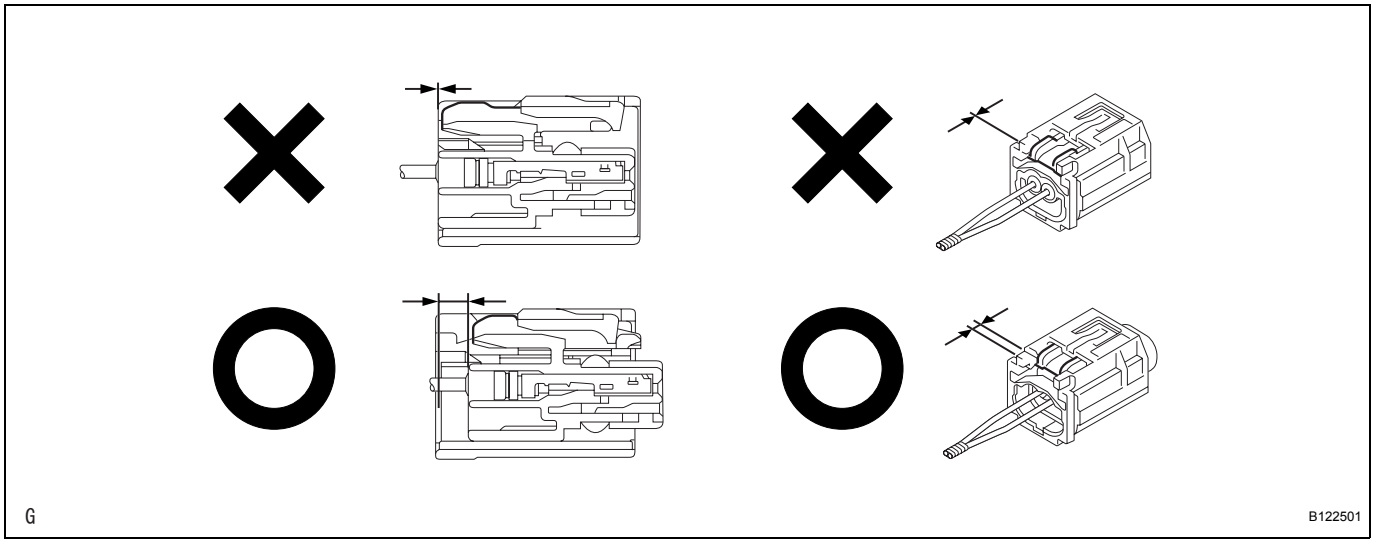
8. DISCONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

(a) Push down the housing lock (white part) and slide the CPA (yellow part). (At this time, the connector cannot be disconnected yet.)

(b) Push down the housing lock (white part) again and disconnect the connector.
HINT:
Do not push down the A part shown in the illustration when disconnecting.

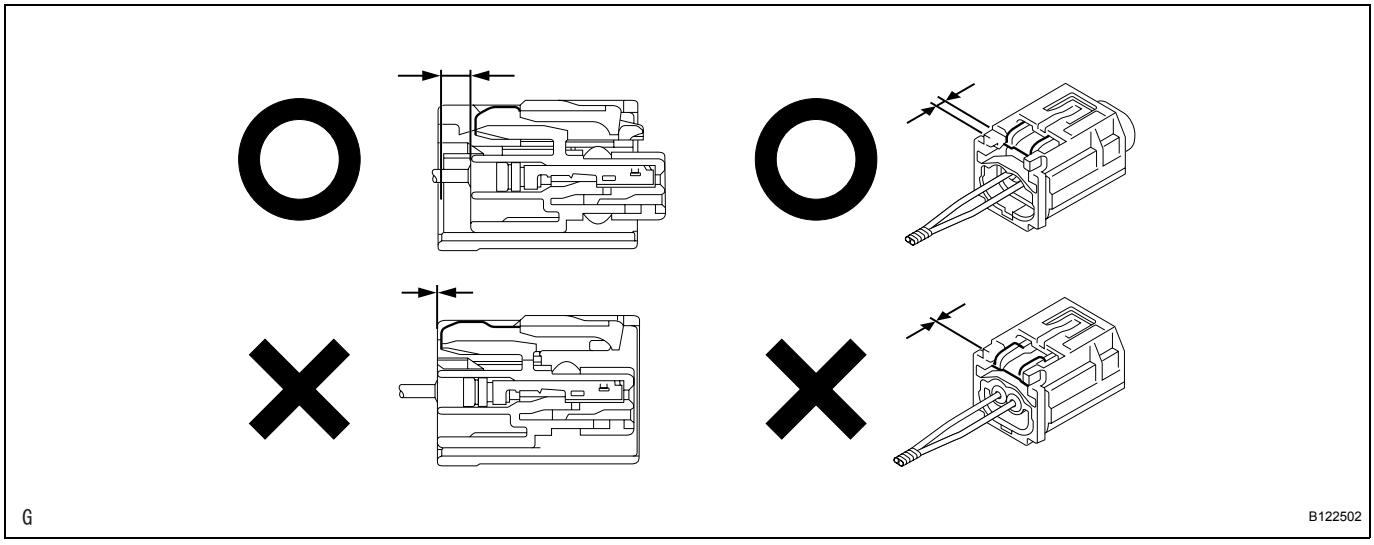


(c) After disconnecting the connector, check that the position of the housing lock (the white part) is as shown in the illustration.



9. CONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

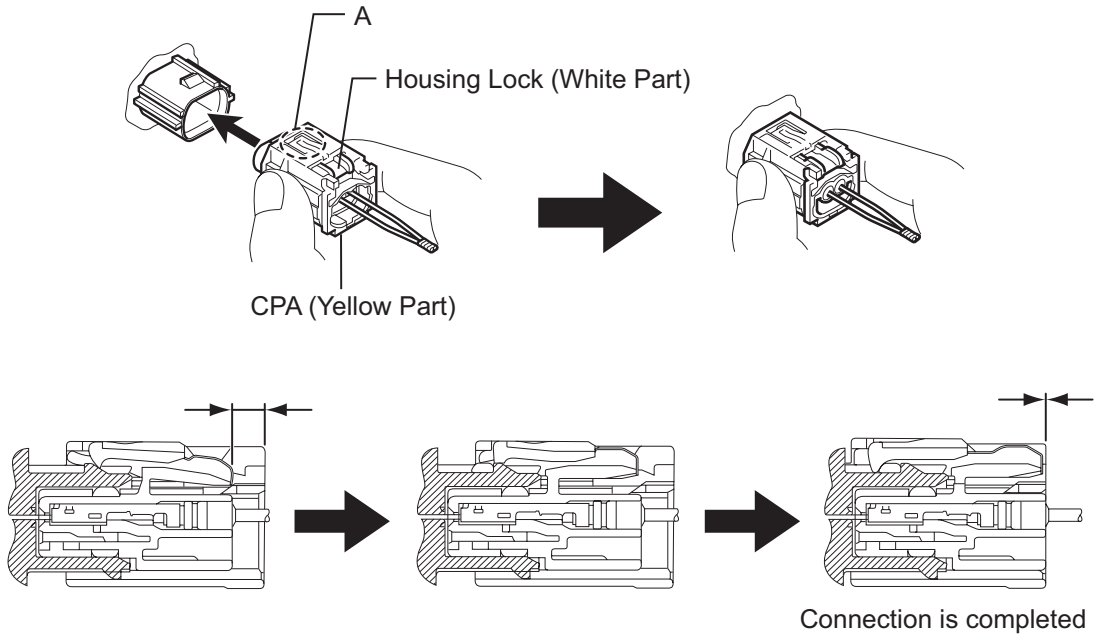
(a) Before connecting the connectors, check that the position of the housing lock (the white part) is as shown in the illustration.



(b) Be sure to engage the connectors until they are locked. (When locking, make sure that a click sound can be heard.)

HINT:

When connecting them, the housing lock (white part) slides. Be sure not to hold the housing lock (white part) and A part, as it may result in an insecure fit.



G

B122503E01

DTC	B0108/52	Short to B+ in Front Passenger Side Squib Circuit

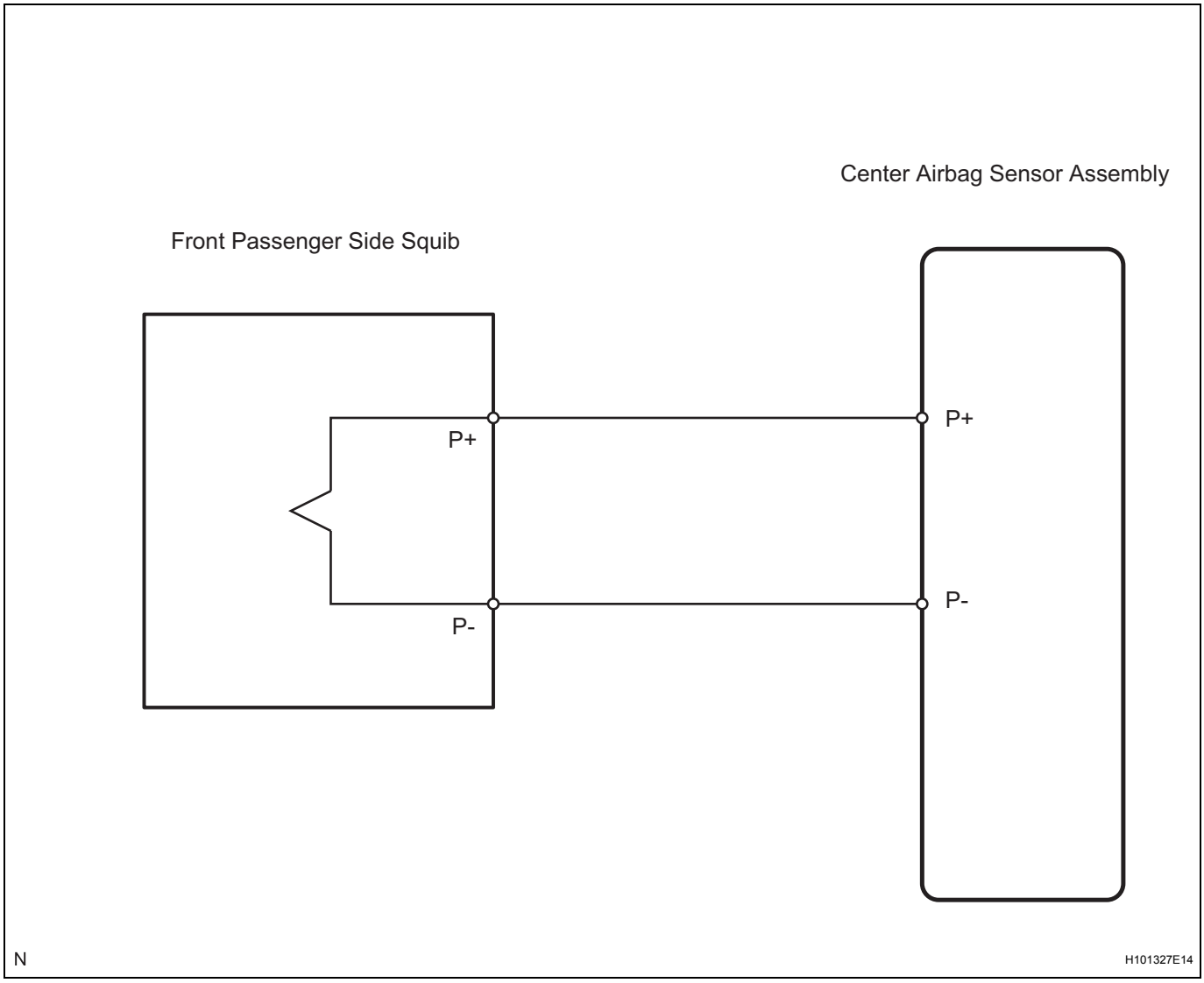
DESCRIPTION

The front passenger side squib circuit consists of the center airbag sensor and the front passenger airbag. The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B0108/52 is recorded when a B+ short is detected in the front passenger side squib circuit.

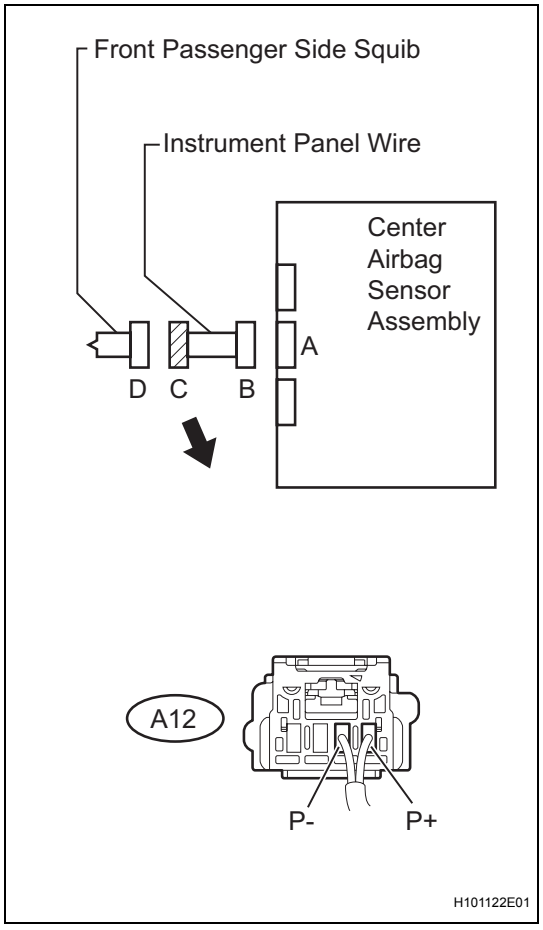
DTC No.	DTC Detection Condition	Trouble Area
B0108/52	• Short in front passenger side squib circuit (to B+) • Front passenger side squib malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib) • Center airbag sensor assembly • Instrument panel wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL WIRE (FRONT PASSENGER SIDE SQUIB CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front passenger airbag.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

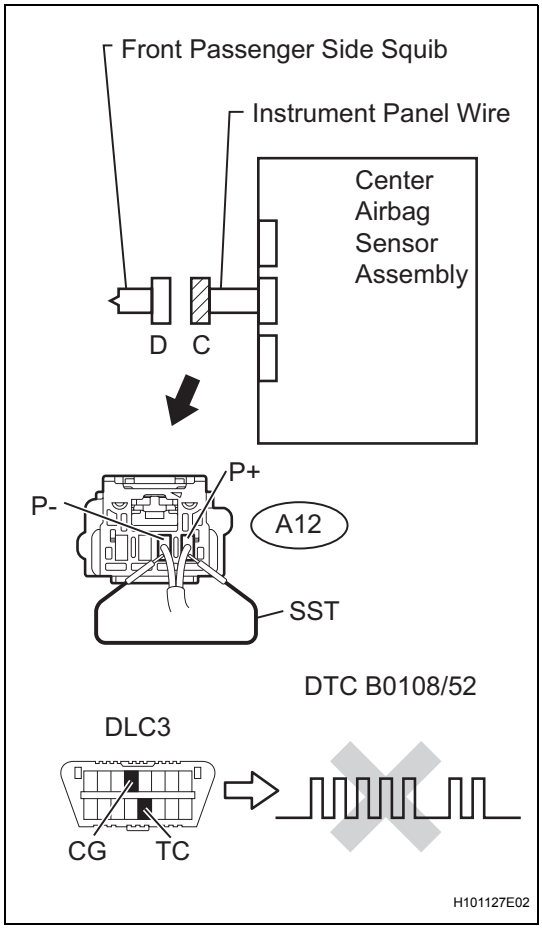
Tester Connection (Connector "C")	Condition	Specified Condition
A12-1 (P+) - Body ground	Ignition switch ON	Below 1 V
A12-2 (P-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

2	CHECK CENTER AIRBAG SENOR ASSEMBLY



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using SST, connect terminals P+ and P- of connector "C".

SST 09843-18040

NOTICE:
Do not forcibly insert SST into the terminals of the connector when connecting.

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

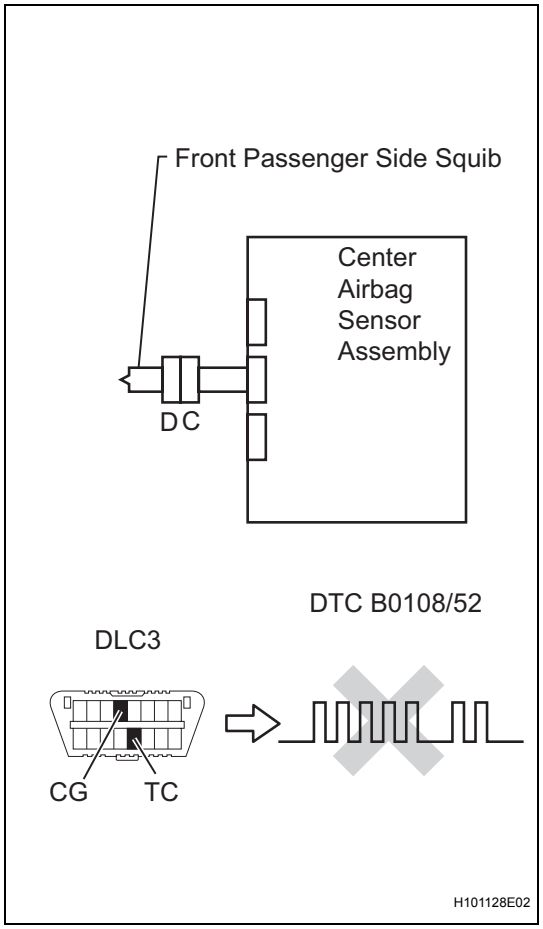
OK:
DTC B0108/52 is not output.

HINT:
Codes other than code B0108/52 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front passenger airbag (front passenger side squib) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B0108/52 is not output.

HINT:

Codes other than code B0108/52 may be output at this time, but they are not relevant to this check.

NG → **REPLACE INSTRUMENT PANEL PASSENGER AIRBAG ASSEMBLY**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B0110/43	Short in Side Squib RH Circuit

DESCRIPTION

The side squib RH circuit consists of the center airbag sensor and the front seat side airbag assembly RH. The circuit instructs the SRS to deploy when deployment conditions are met.

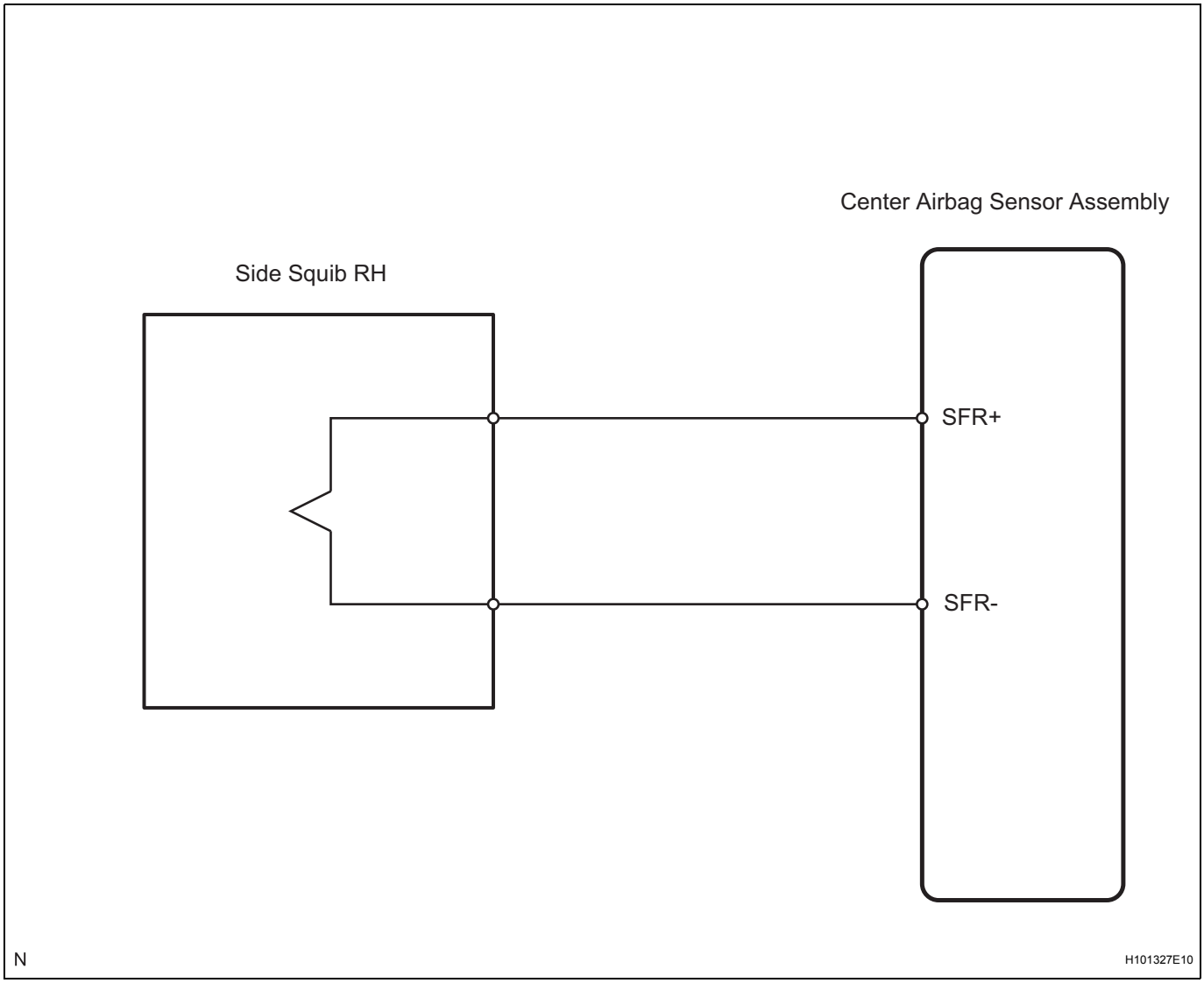
RS

DTC B0110/43 is recorded when a short is detected in the side squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0110/43	• Short in side squib RH circuit • Side squib RH malfunction • Center airbag sensor assembly malfunction	• Front seat side airbag assembly RH (side squib RH) • Center airbag sensor assembly • Floor wire

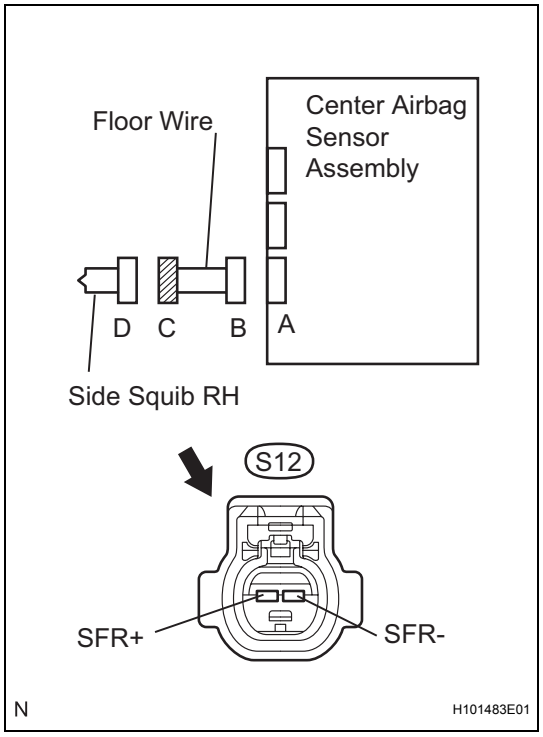
HINT:
DTC B0110/43 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat side airbag assembly RH (side squib RH).
(d) Release the activation prevention built into connector "B" (see page RS-18).
(e) Measure the resistance according to the value(s) in the table below.

Standard resistance

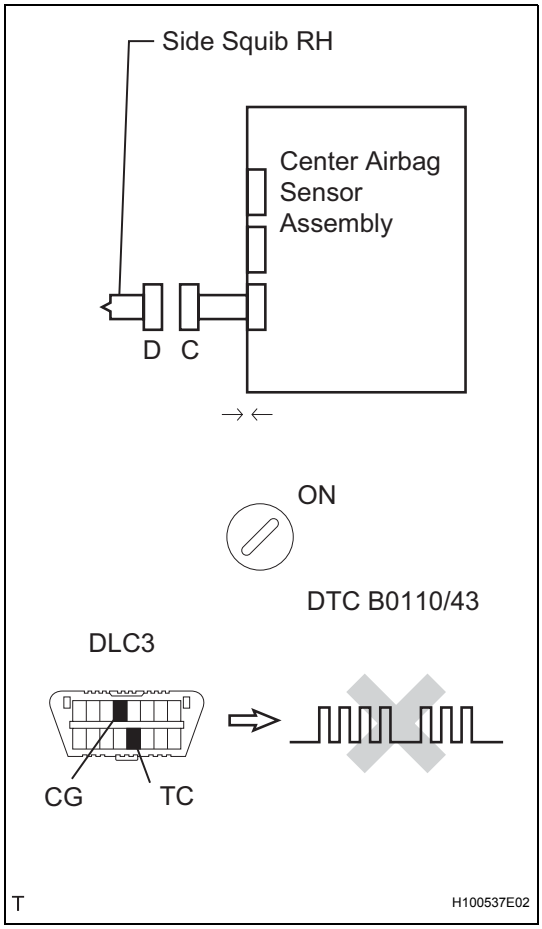
Tester Connection (Connector "C")	Specified Condition
S12-1 (SFR+) - S12-2 (SFR-)	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

DTC B0110/43 is not output.

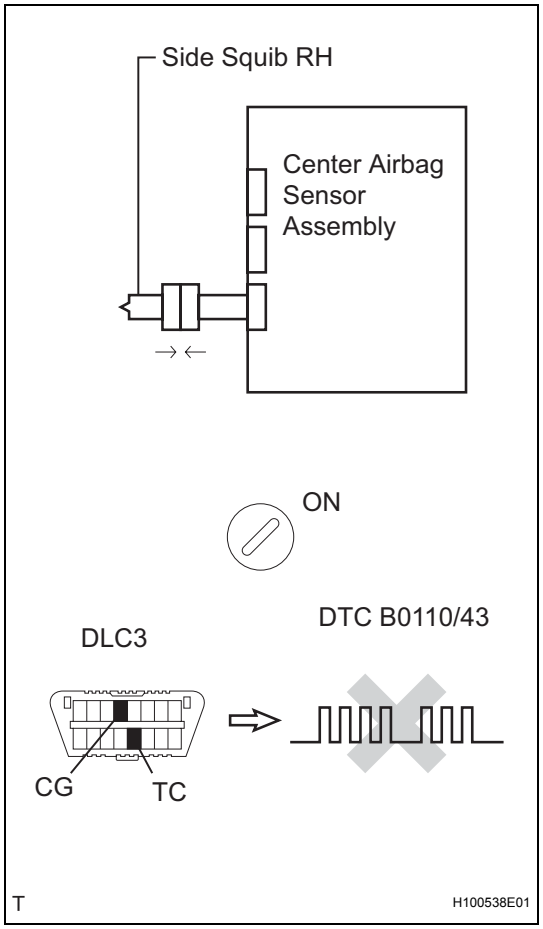
HINT:

Codes other than code B0110/43 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY RH (SIDE SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front seat side airbag assembly RH (side squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B0110/43 is not output.

HINT:

Codes other than code B0110/43 may be output at this time, but they are not relevant to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0111/44	Open in Side Squib RH Circuit

DESCRIPTION

The side squib RH circuit consists of the center airbag sensor and the front seat side airbag assembly RH. The circuit instructs the SRS to deploy when deployment conditions are met.

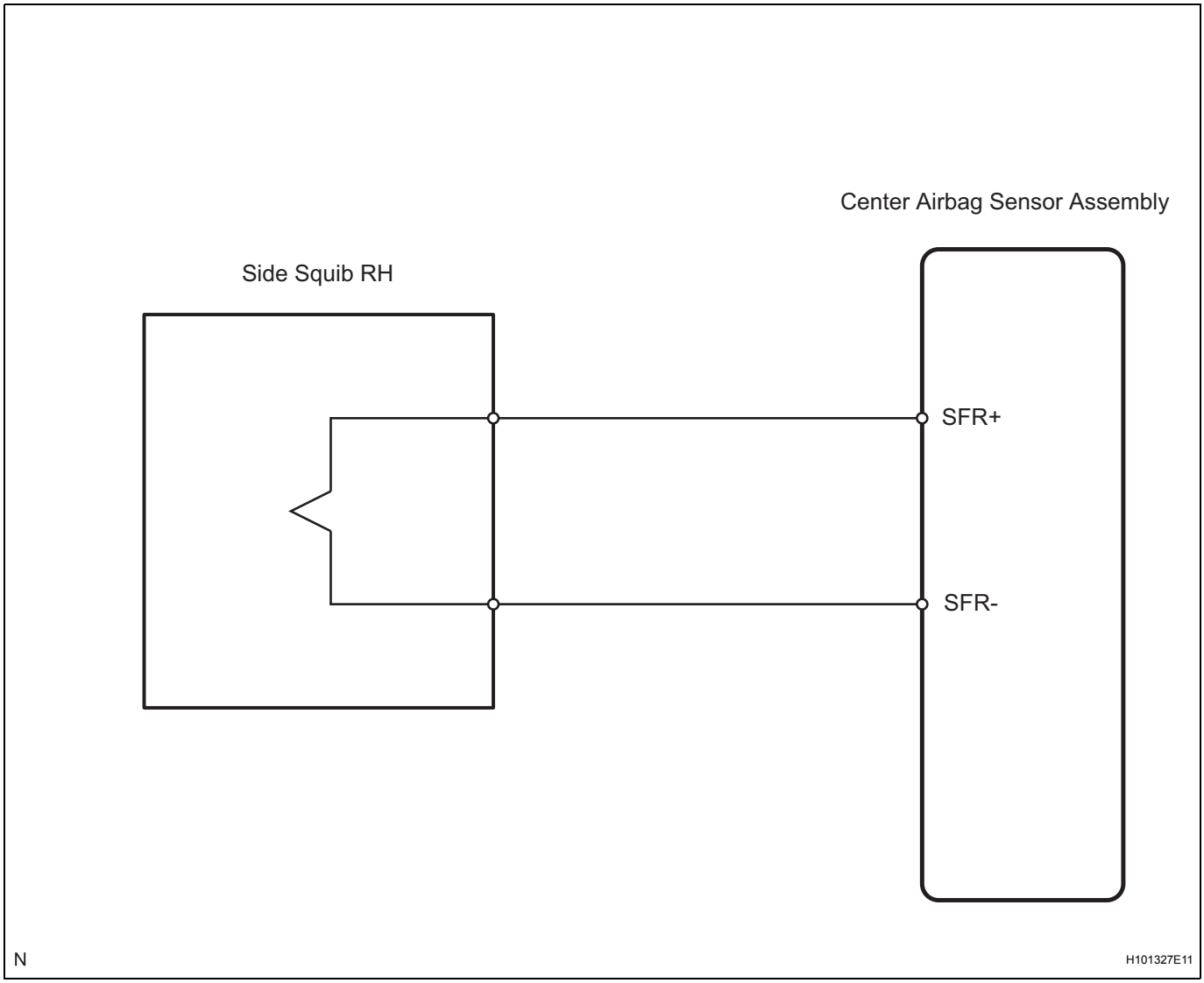
RS

DTC B0111/44 is recorded when an open is detected in the side squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0111/44	• Open in side squib RH circuit • Side squib RH malfunction • Center airbag sensor malfunction	• Front seat side airbag assembly RH (Side squib RH) • Center airbag sensor assembly • Floor wire

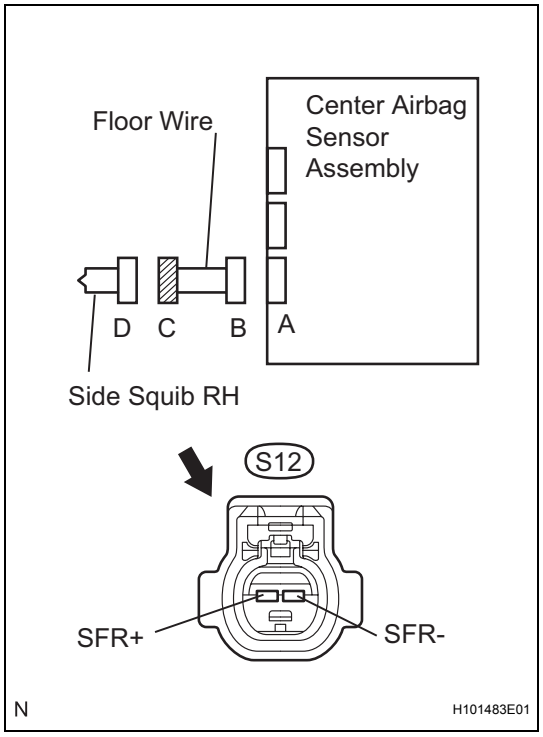
HINT:
DTC B0111/44 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat side airbag assembly RH (side squib RH).
(d) Measure the resistance according to the value(s) in the table below.

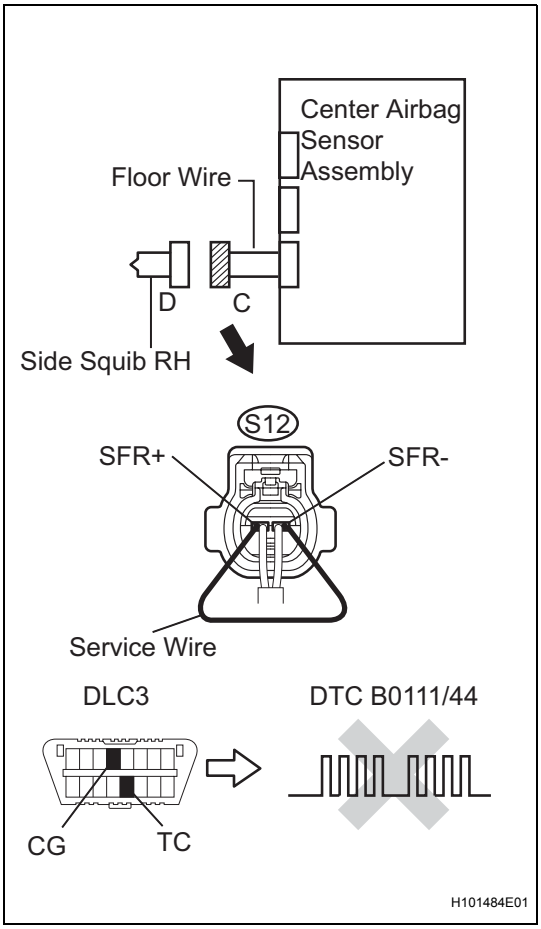
Standard resistance

Tester Connection (Connector "C")	Specified Condition
S12-1 (SFR+) - S12-2 (SFR-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

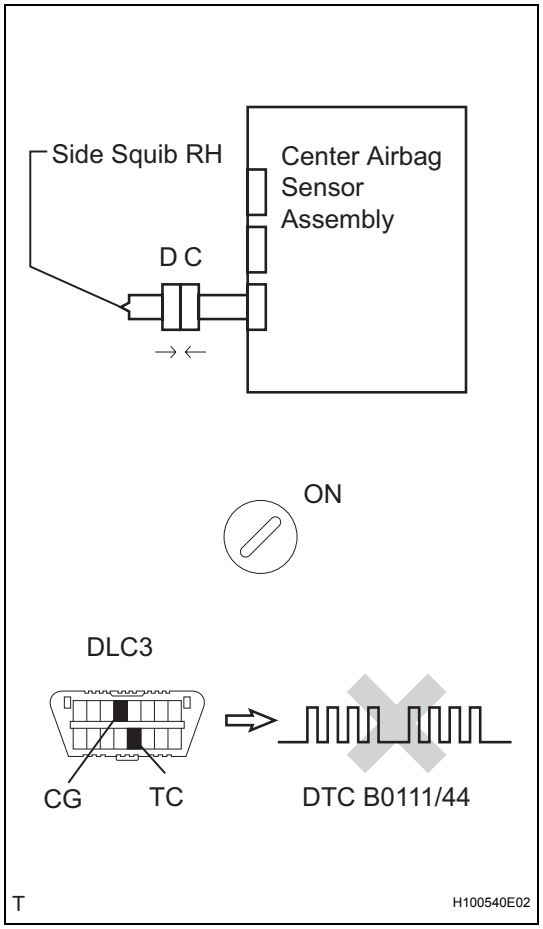


(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals SFR+ and SFR- of connector "C".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0111/44 is not output.
HINT:
Codes other than code B0111/44 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY RH (SIDE SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat side airbag assembly RH (side squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0111/44 is not output.

HINT:

Codes other than code B0111/44 may be output at this time, but they are not relevant to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0112/41	Short to GND in Side Squib RH Circuit

DESCRIPTION

The side squib RH circuit consists of the center airbag sensor and the front seat side airbag assembly RH. The circuit instructs the SRS to deploy when deployment conditions are met.

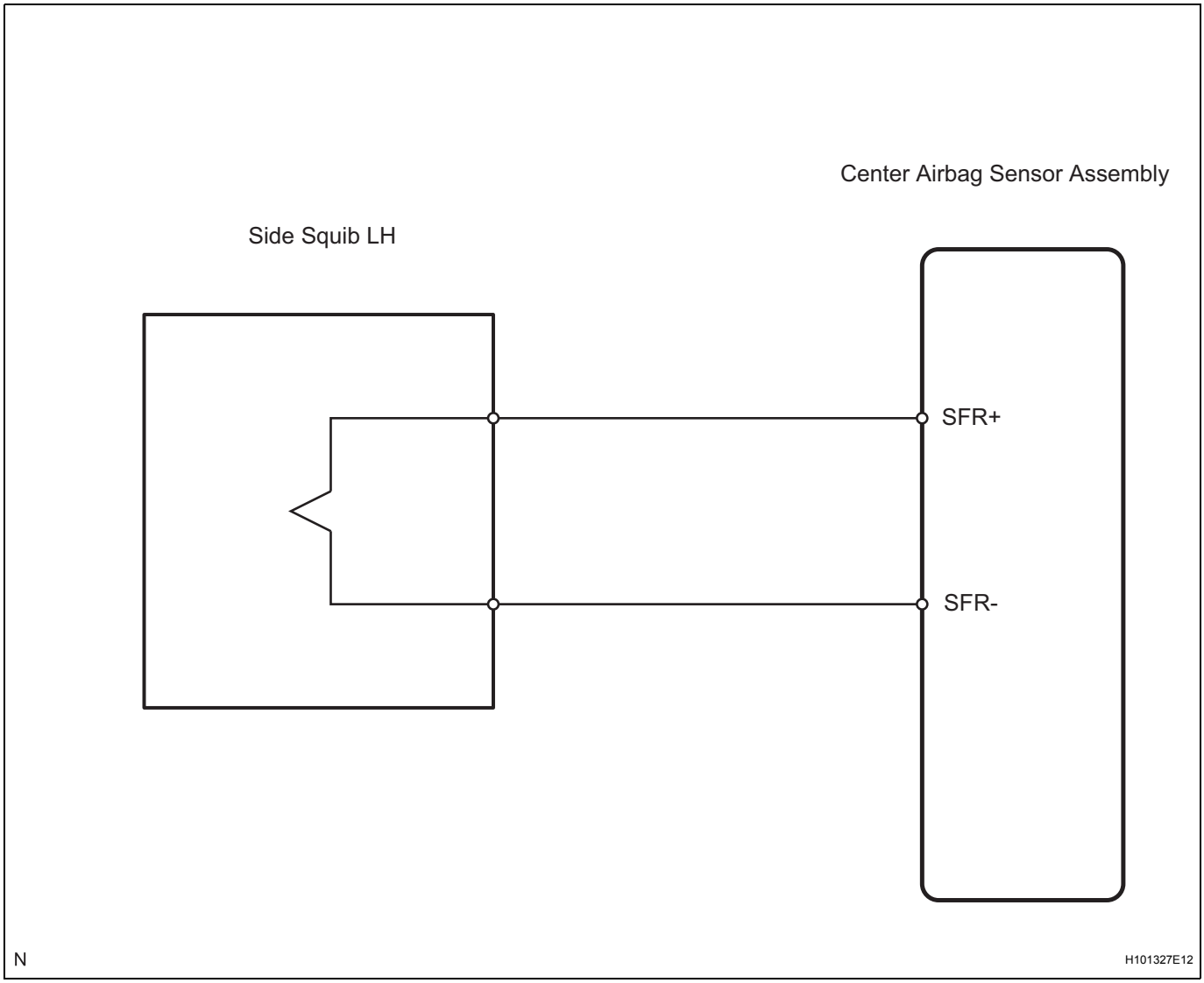
RS

DTC B0112/41 is recorded when a ground short is detected in the side squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0112/41	• Short in side squib RH circuit (to ground) • Side squib RH malfunction • Center airbag sensor malfunction	• Front seat side airbag assembly RH (side squib RH) • Center airbag sensor assembly • Floor wire

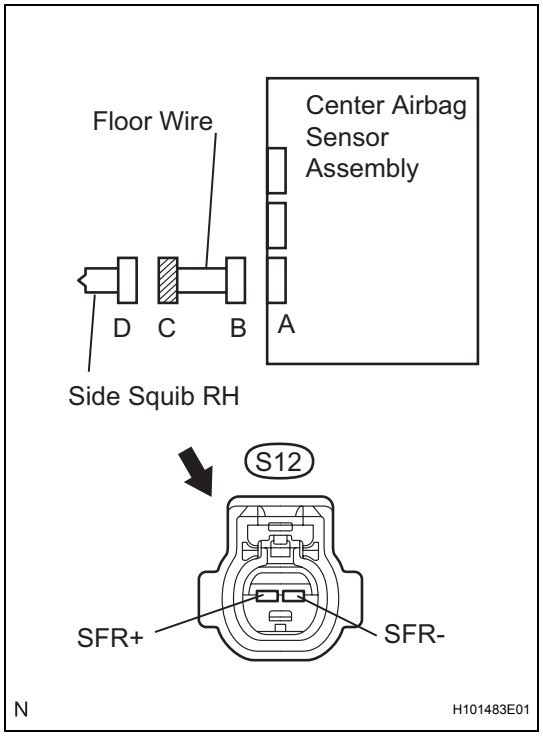
HINT:
DTC B0112/41 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the side airbag RH (side squib RH).
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

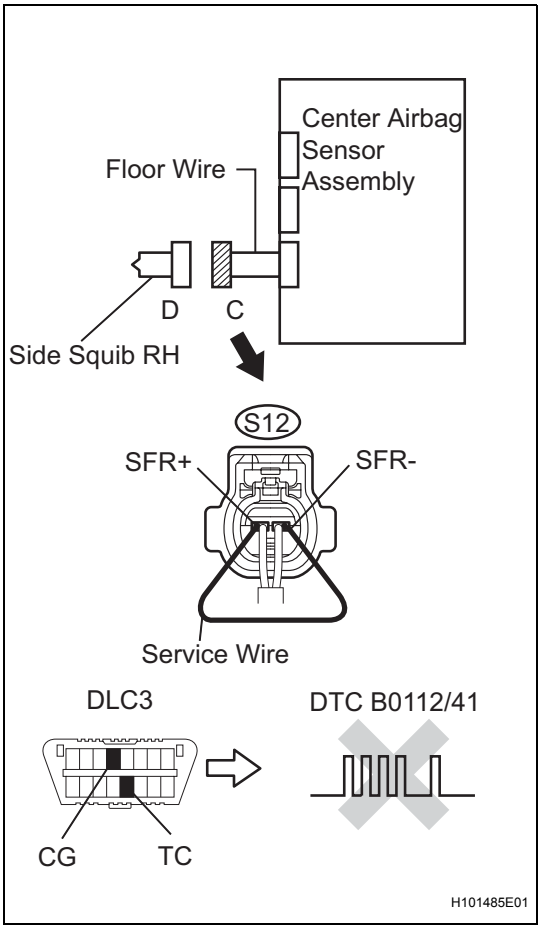
Tester Connection (Connector "C")	Specified Condition
S12-1 (SFR+) - Body ground	1 MΩ or higher
S12-2 (SFR-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

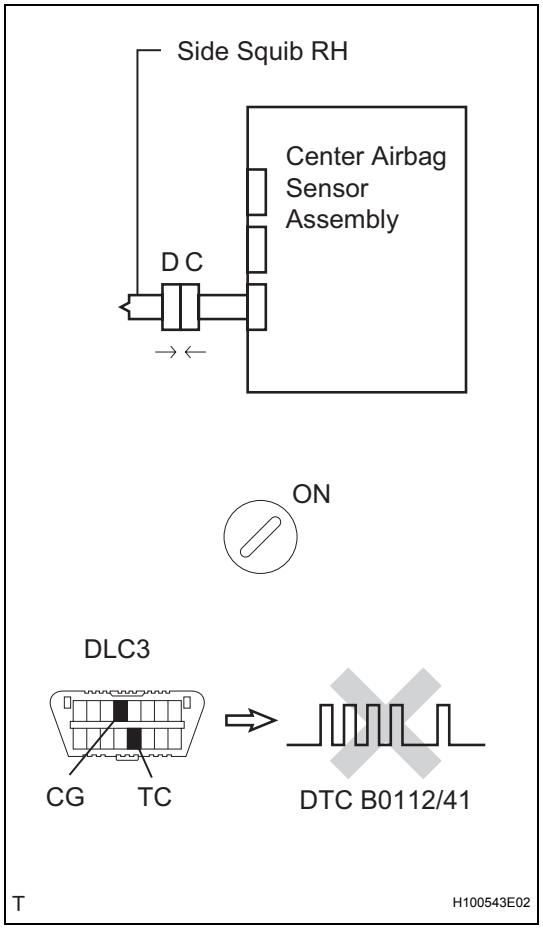


(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals SFR+ and SFR- of the connector "C".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0112/41 is not output.
HINT:
Codes other than code B0112/41 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY RH (SIDE SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat side airbag assembly RH (side squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0112/41 is not output.

HINT:

Codes other than code B0112/41 may be output at this time, but they are not relevant to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B0113/42	Short to B+ in Side Squib RH Circuit

DESCRIPTION

The side squib RH circuit consists of the center airbag sensor and the front seat side airbag assembly RH. This circuit instructs the SRS to deploy when deployment conditions are met.

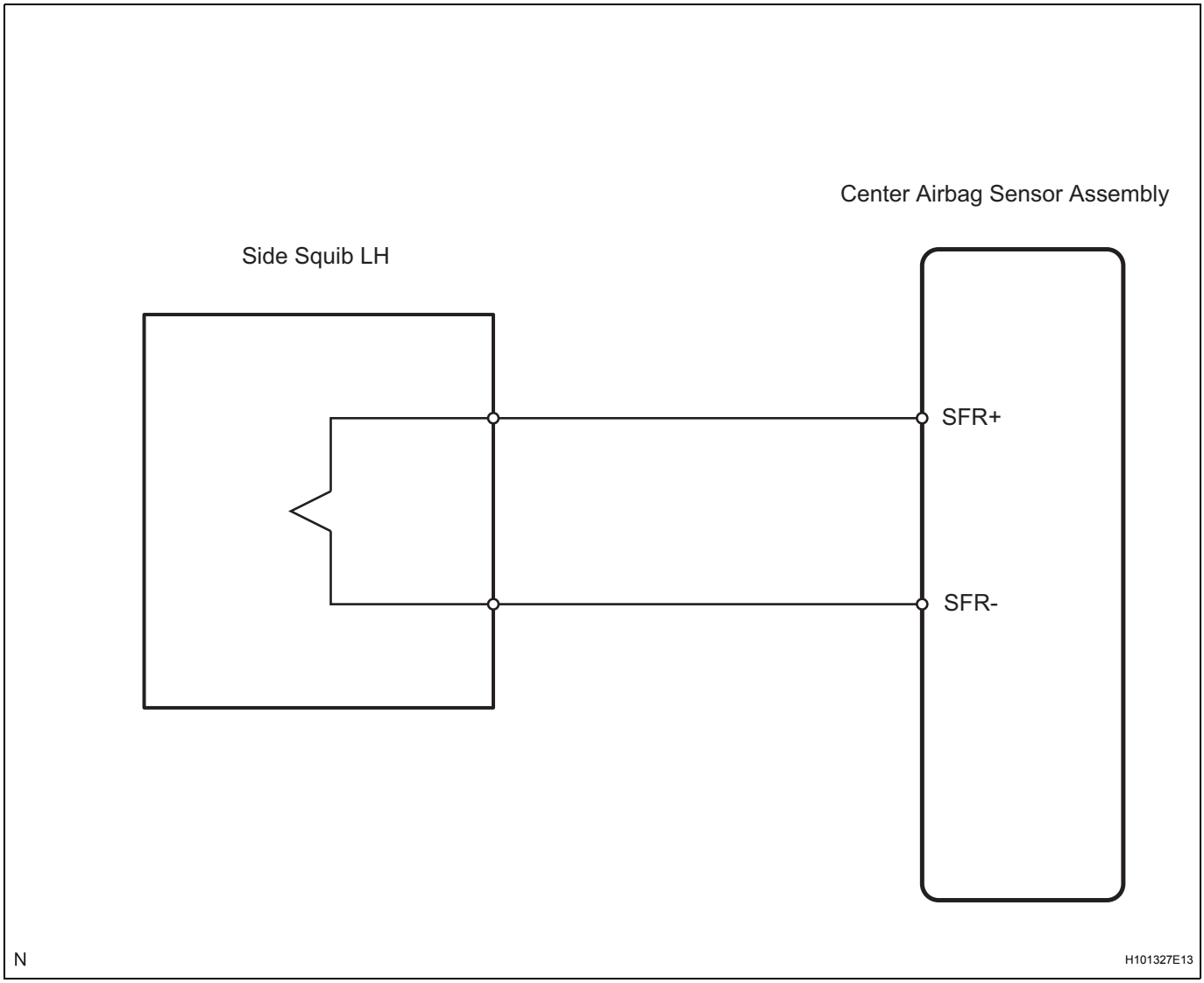
RS

DTC B0113/42 is recorded when a B+ short is detected in the side squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0113/42	• Short in side squib RH circuit (to B+) • Side squib RH malfunction • Center airbag sensor malfunction	• Front seat side airbag RH assembly (Side squib RH) • Center airbag sensor assembly • Floor wire

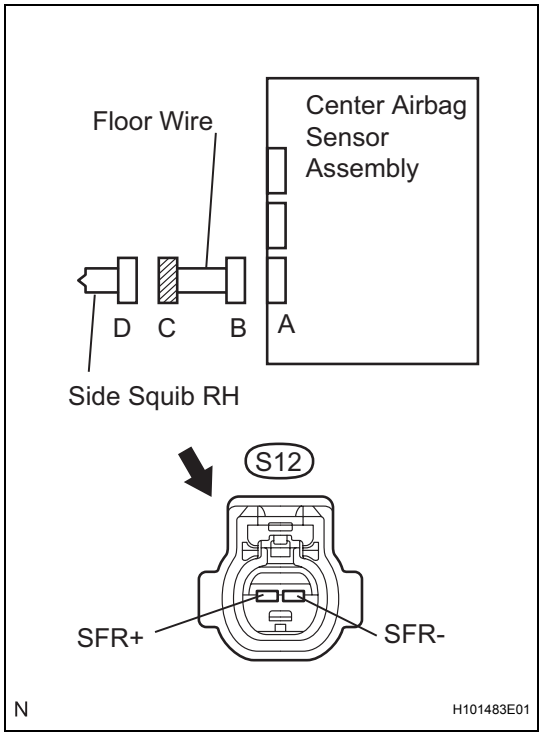
HINT:
DTC B0113/42 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat side airbag assembly RH (side squib RH).
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
S12-1 (SFR+) - Body ground	Ignition switch ON	Below 1 V
S12-2 (SFR-) - Body ground	Ignition switch ON	Below 1 V

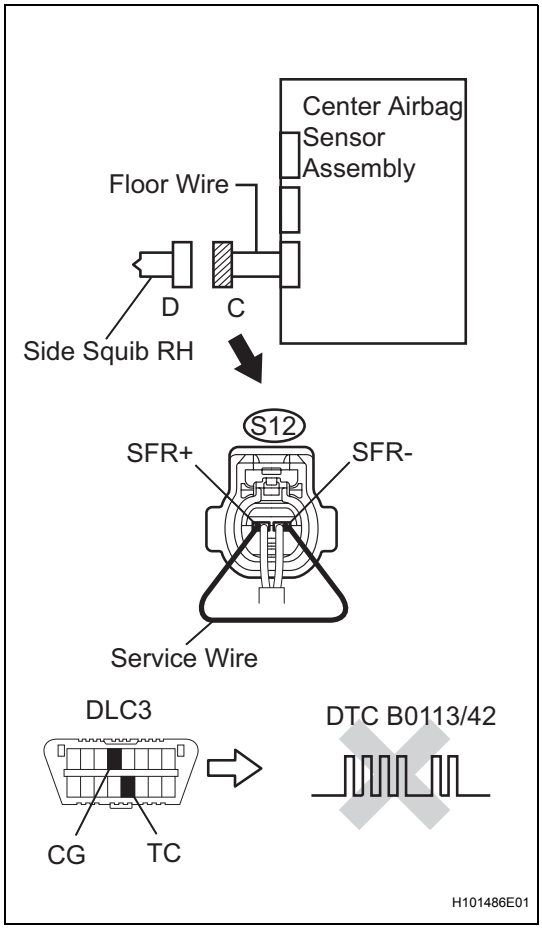
NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

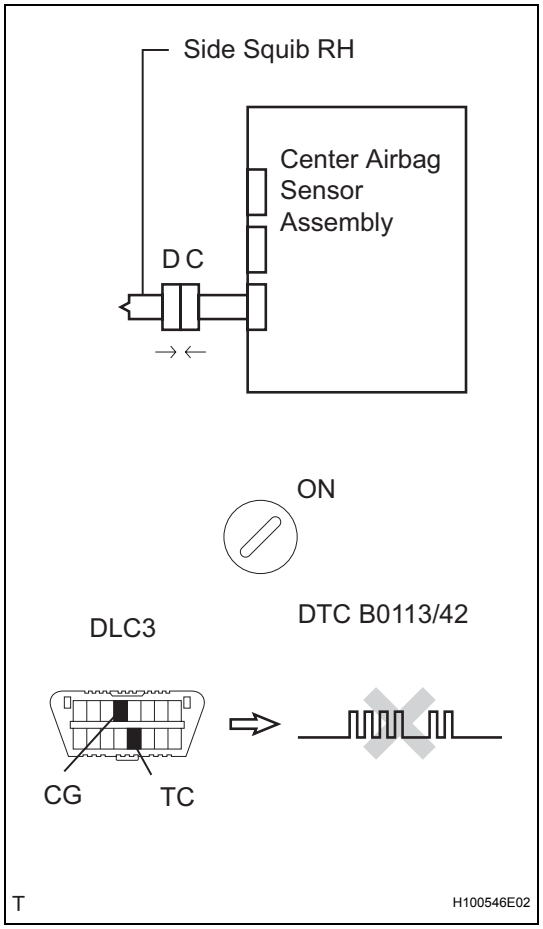


(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect terminals SFR+ and SFR- of the connector "C".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B0113/42 is not output.
HINT:
Codes other than code B0113/42 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY RH (SIDE SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat side airbag assembly RH (side squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0113/42 is not output.

HINT:

Codes other than code B0113/42 may be output at this time, but they are not relevant to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY (SIDE SQUIB RH)**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B0115/47	Short in Side Squib LH Circuit

DESCRIPTION

The side squib LH circuit consists of the center airbag sensor and the front seat side airbag assembly LH. This circuit instructs the SRS to deploy when deployment conditions are met.

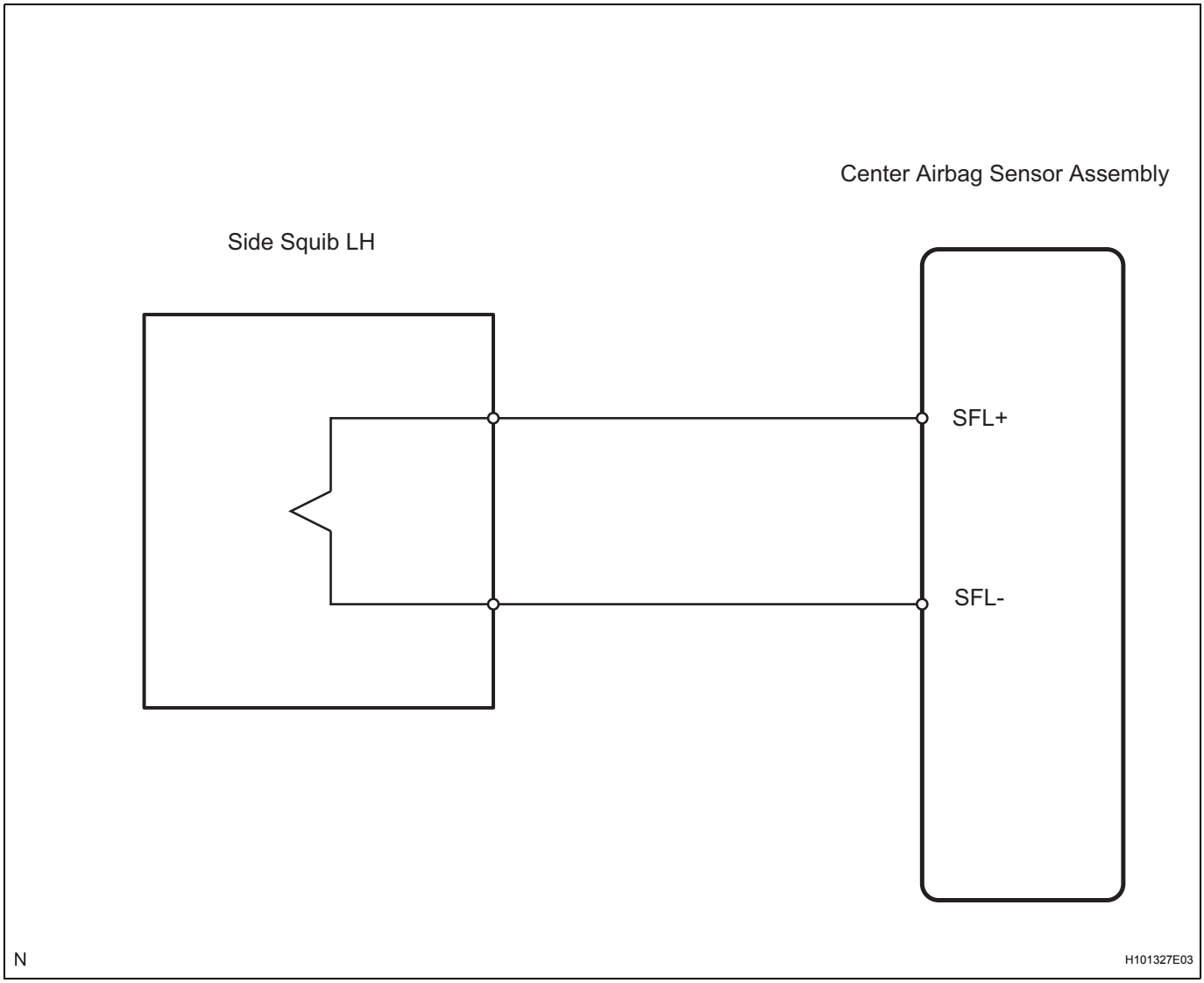
RS

DTC B0115/47 is recorded when a short is detected in the side squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0115/47	• Short in side squib LH circuit • Side squib LH malfunction • Center airbag sensor malfunction	• Front seat side airbag assembly LH (Side squib LH) • Center airbag sensor assembly • Floor wire

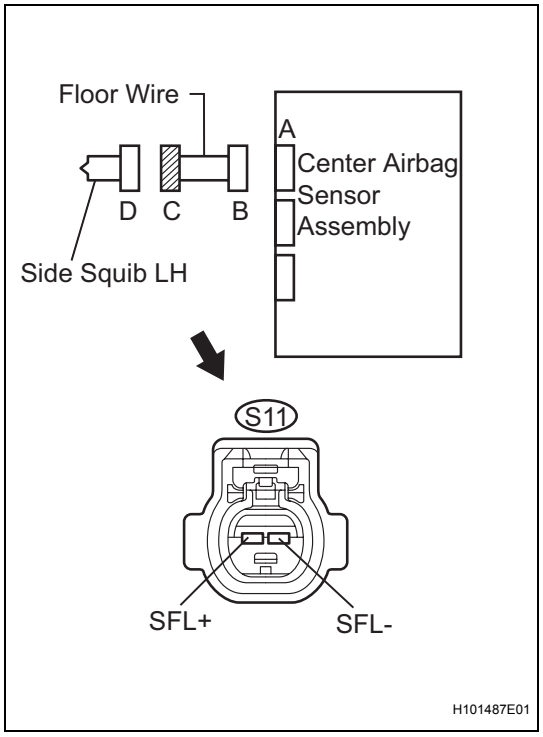
HINT:
DTC B0115/47 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat side airbag assembly LH (side squib LH).
(d) Release the activation prevention mechanism built into connector "B" (see page RS-18).
(e) Measure the resistance according to the value(s) in the table below.

Standard resistance

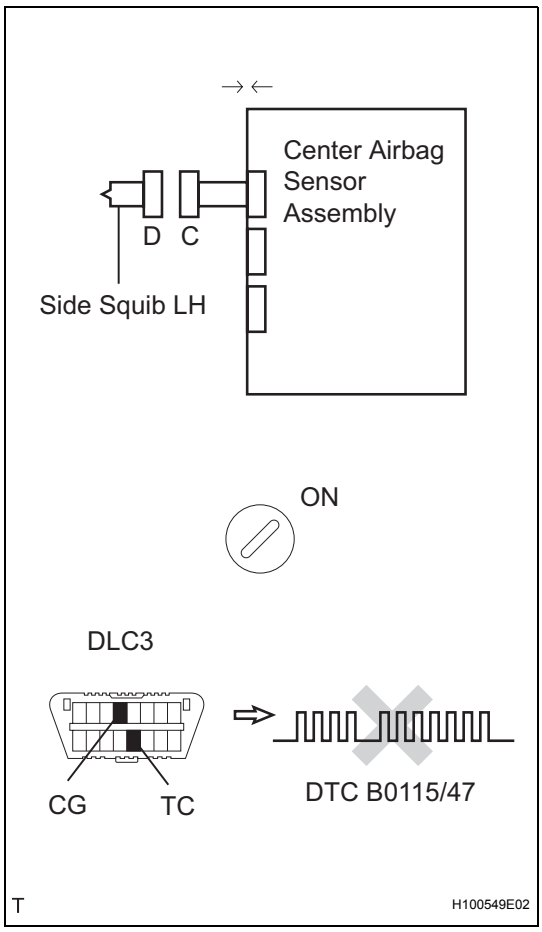
Tester Connection (Connector "C")	Specified Condition
S11-1 (SFL+) - S11-2 (SFL-)	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

DTC B0115/47 is not output.

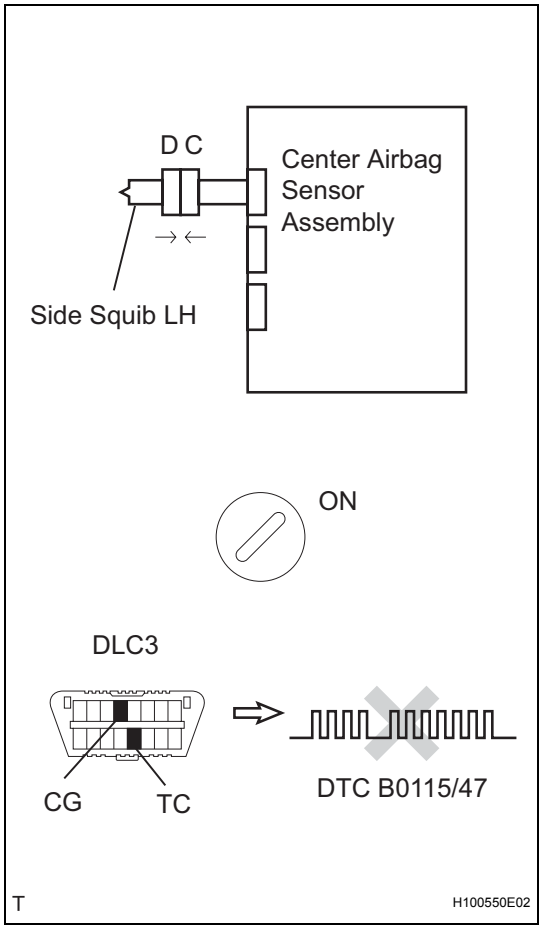
HINT:

Codes other than code B0115/47 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY LH (SIDE SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front seat side airbag assembly LH (side squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B0115/47 is not output.

HINT:

Codes other than code B0115/47 may be output at this time, but they are not relevant to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY (SIDE SQUIB LH)**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0116/48	Open in Side Squib LH Circuit

DESCRIPTION

The side squib LH circuit consists of the center airbag sensor and the front seat side airbag assembly LH. This circuit instructs the SRS to deploy when deployment conditions are met.

RS

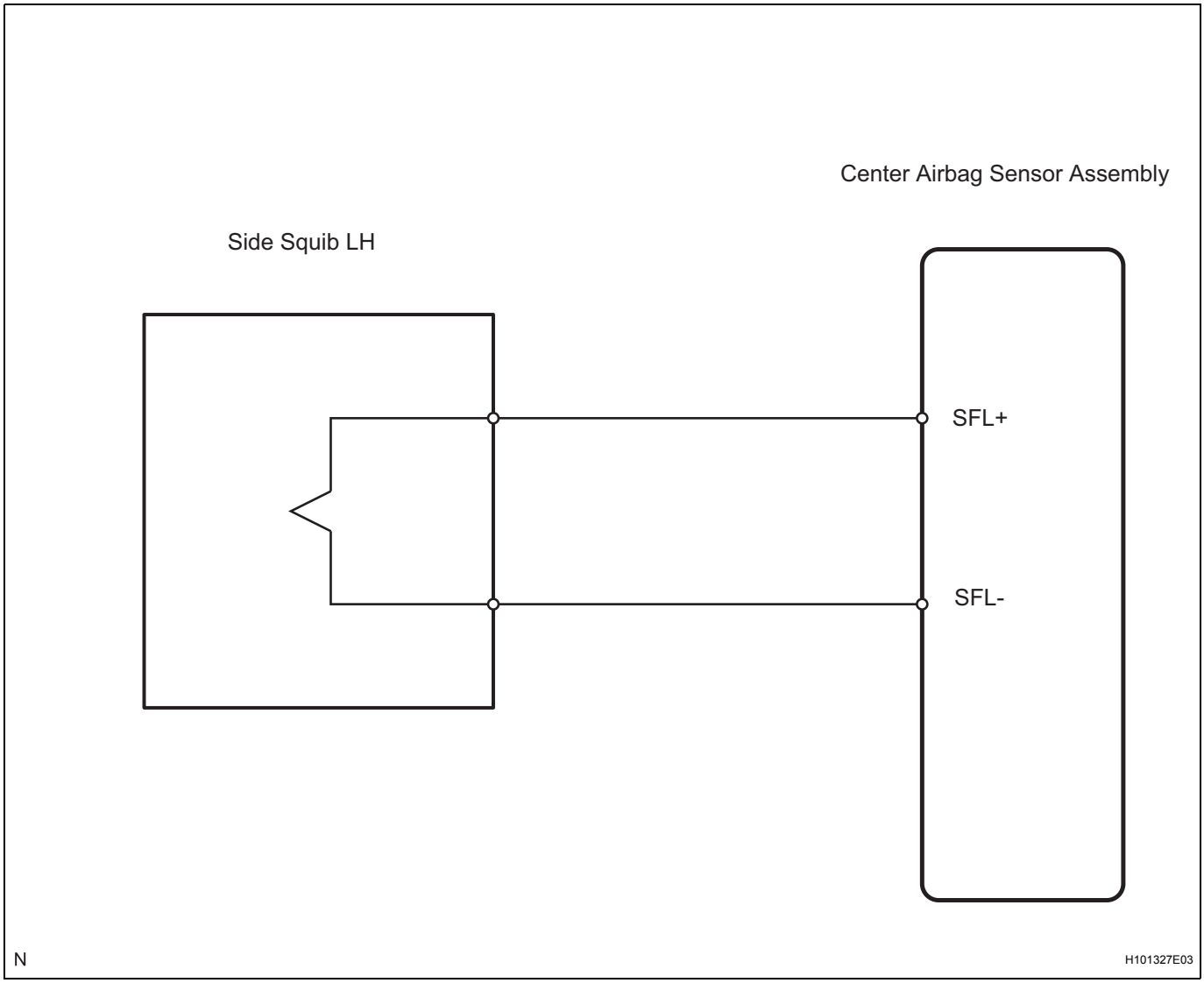
DTC B0116/48 is recorded when an open is detected in the side squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0116/48	• Open in side squib LH circuit • Side squib LH malfunction • Center airbag sensor malfunction	• Front seat side airbag LH assembly (Side squib LH) • Center airbag sensor assembly • Floor wire

HINT:

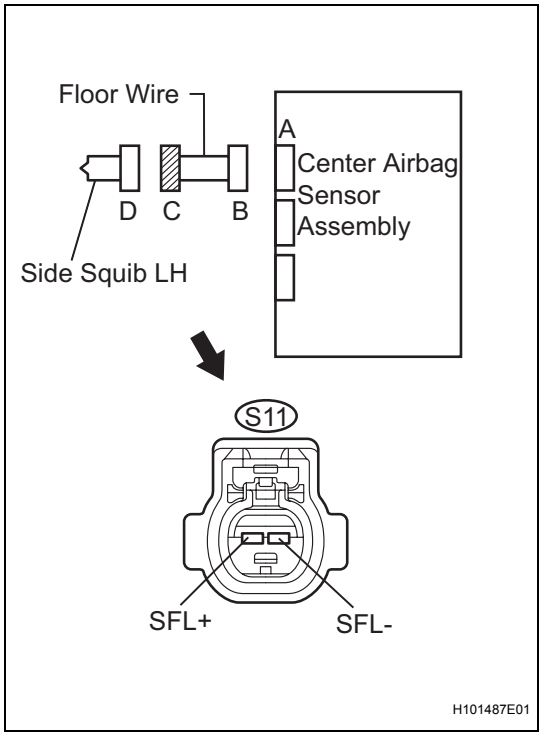
DTC B0116/48 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat side airbag assembly LH (side squib LH).
(d) Measure the resistance according to the value(s) in the table below.

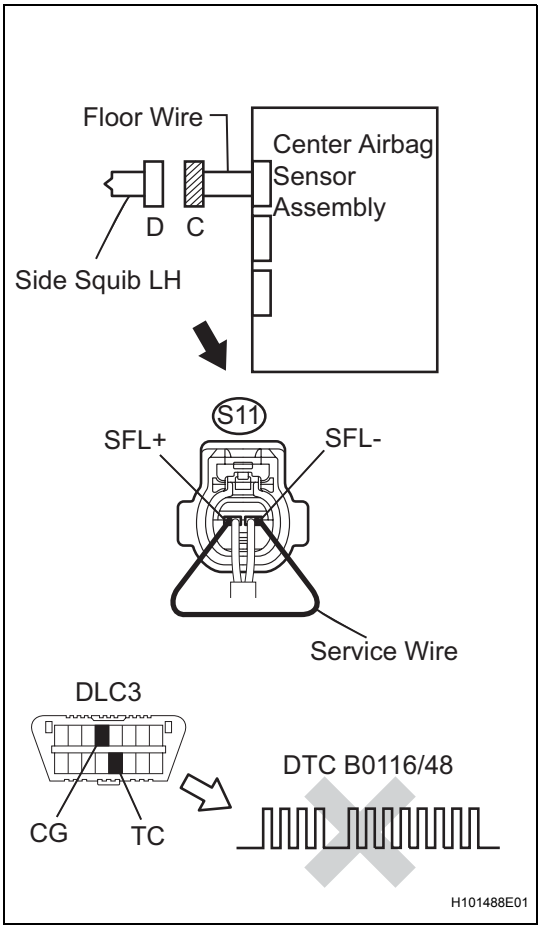
Standard resistance

Tester Connection (Connector "C")	Specified Condition
S11-1 (SFL+) - S11-2 (SFL-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

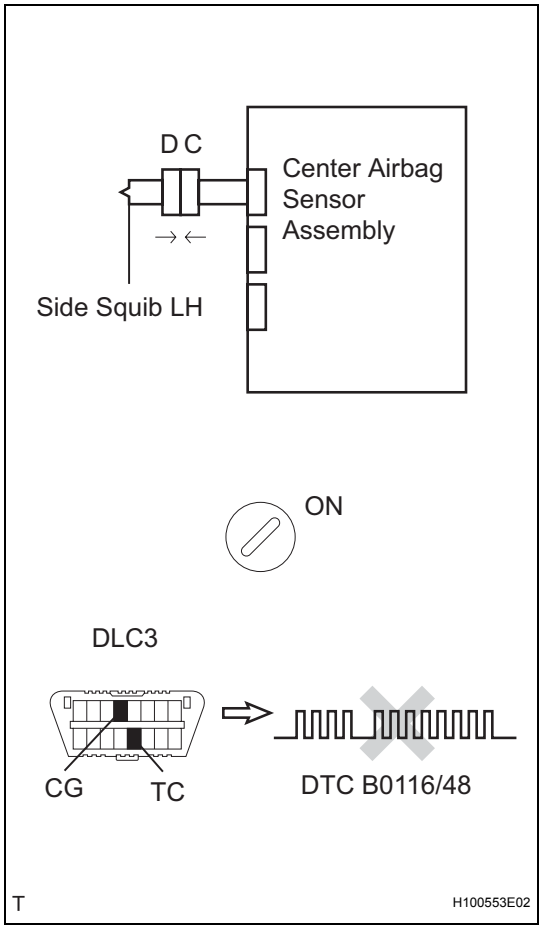


(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals SFL+ and SFL- of connector "C".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(c) Connect the negative (-) terminal cable to the battery, and wait at least 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0116/48 is not output.
HINT:
Codes other than code B0116/48 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY LH (SIDE SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the side airbag LH (side squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0116/48 is not output.

HINT:

Codes other than code B0116/48 may be output at this time, but they are not relevant to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY (SIDE SQUIB LH)**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0117/45	Short to GND in Side Squib LH Circuit

DESCRIPTION

The side squib LH circuit consists of the center airbag sensor and the front seat side airbag assembly LH. This circuit instructs the SRS to deploy when deployment conditions are met.

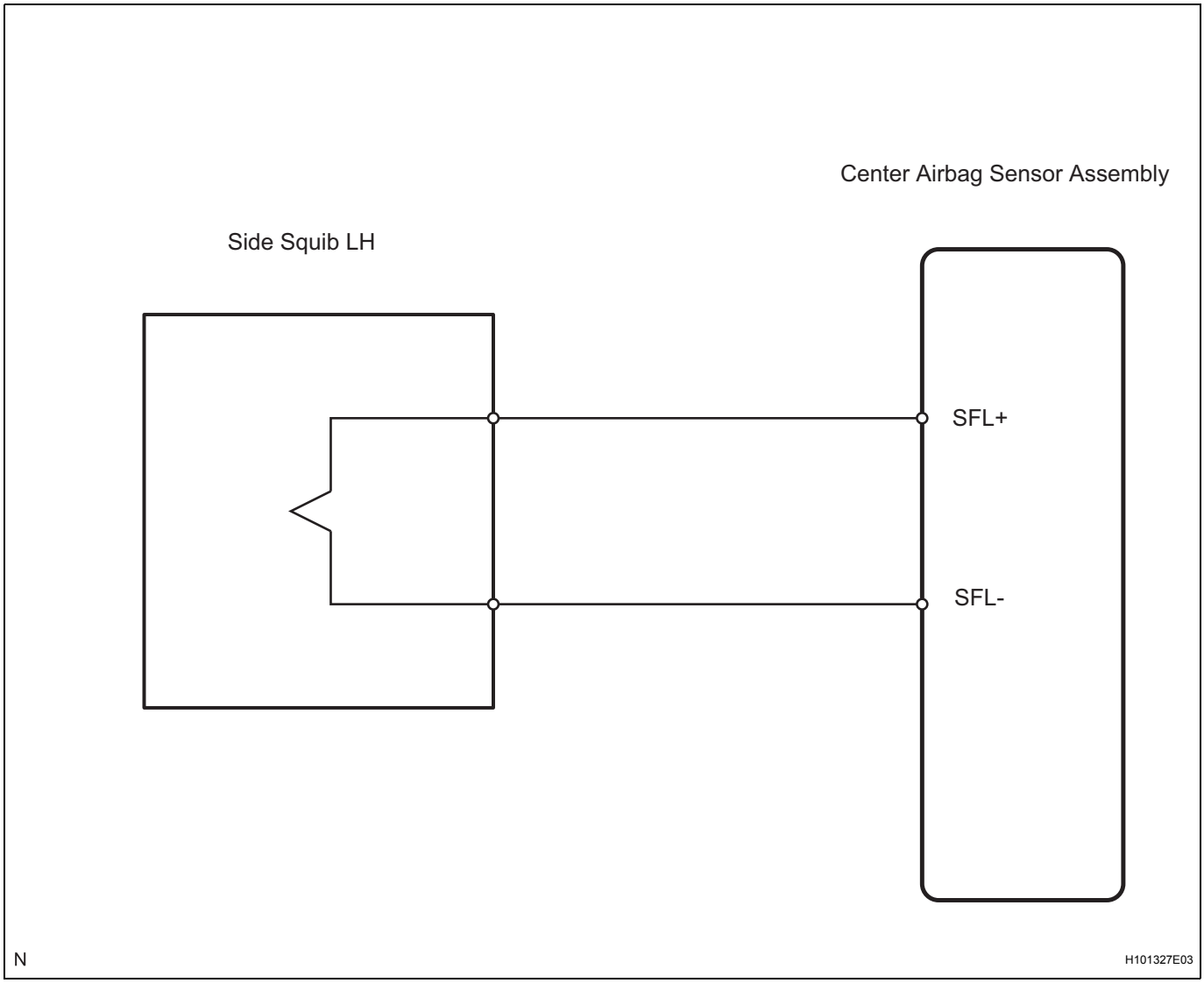
RS

DTC B0117/45 is recorded when a ground short is detected in the side squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0117/45	• Short in side squib LH circuit (to ground) • Side squib LH malfunction • Center airbag sensor assembly malfunction	• Front seat side airbag assembly LH (Side squib LH) • Center airbag sensor assembly • Floor wire

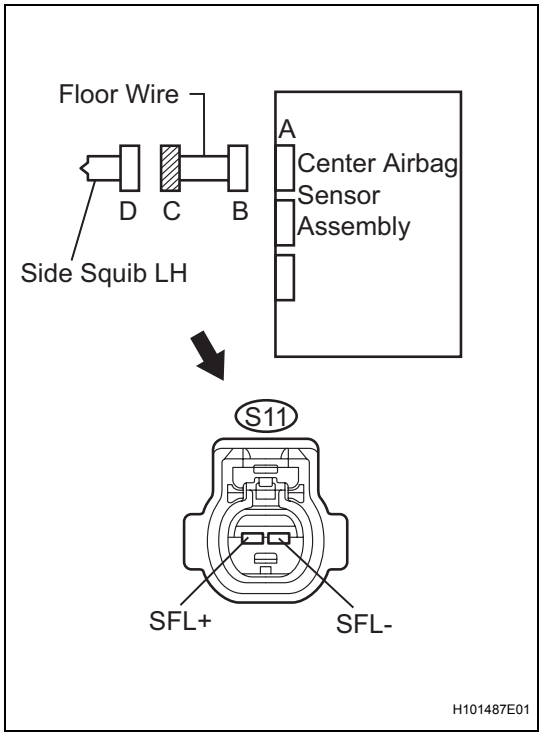
HINT:
DTC B0117/45 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat side airbag assembly LH (side squib LH).
(d) Measure the resistance according to the value(s) in the table below.

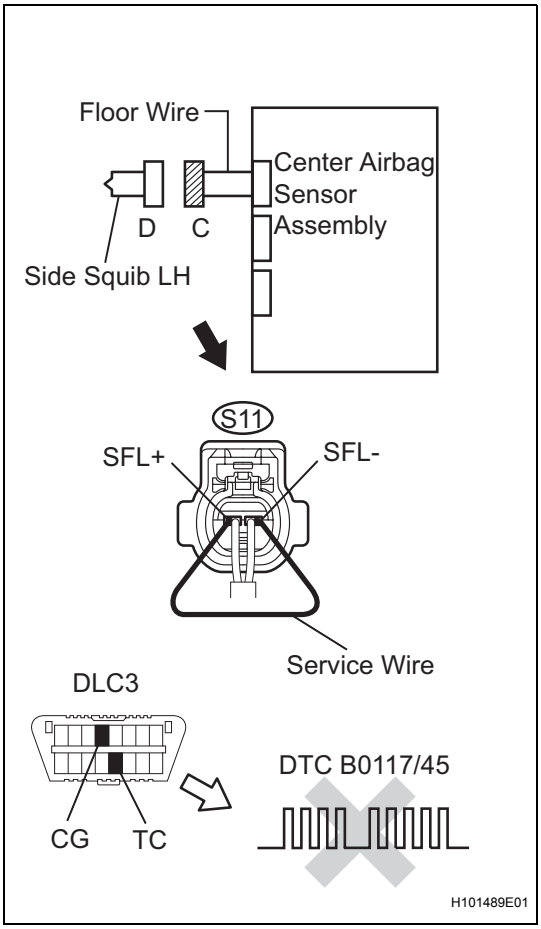
Standard resistance

Tester Connection (Connector "C")	Specified Condition
S11-1 (SFL+) - Body ground	1 MΩ or higher
S11-2 (SFL-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

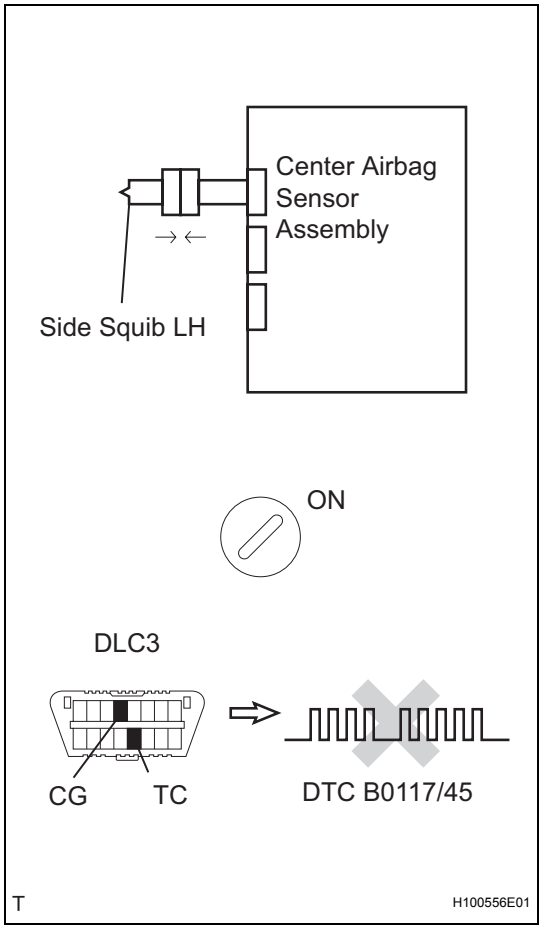


(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals SFL+ and SFL- of connector "C".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0117/45 is not output.
HINT:
Codes other than code B0117/45 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY LH (SIDE SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat side airbag assembly LH (side squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0117/45 is not output.

HINT:

Codes other than code B0117/45 may be output at this time, but they are not related to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

RS

PROBLEM SYMPTOMS TABLE

HINT:

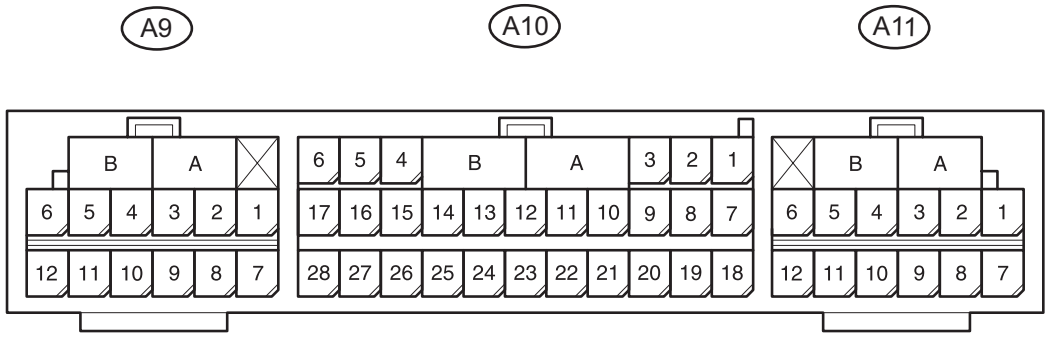
- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Proceed to the troubleshooting procedures for each circuit in the table below.

Airbag system

Symptom	Suspected area	See page
When the ignition switch is in the ON position, the SRS warning light sometimes comes on after approximately 6 seconds	SRS warning light remains ON	RS-278
SRS warning light always comes on even when DTC is not output.	SRS warning light remains ON	RS-278
With the ignition switch is in the ON position, the SRS warning light does not come on	SRS warning light does not come ON	RS-281
SRS warning light comes on normally but the DTC and normal system code are not displayed.	TC and CG Terminal circuit	RS-283
The terminals TC and CG are not connected but the DTC and normal system code are displayed.	TC and CG Terminal circuit	RS-283

TERMINALS OF ECU

1. CENTER AIRBAG SENSOR ASSEMBLY (w/o Side Airbag)



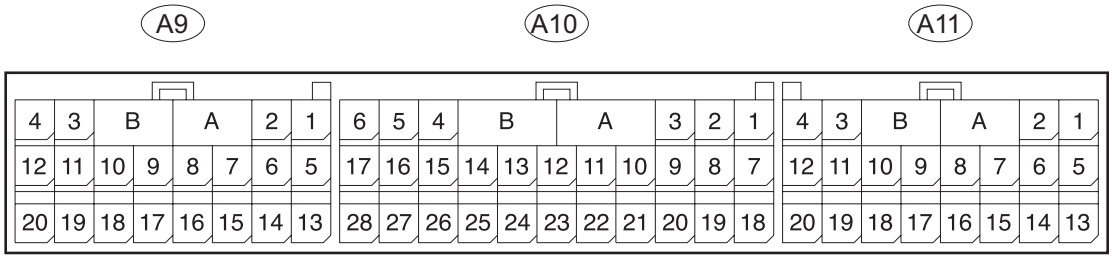
T

H101325E01

Terminal No.	Symbol	Destination
A	-	(Electrical Connector Check Mechanism)
B	-	(Electrical Connector Check Mechanism)
A10-3	LA	Combination Meter Assembly (SRS Warning Light)
A10-5	IG2	AM2 Fuse
A10-7	P2-	Front Passenger Airbag Assembly (P Squib, 2nd step)
A10-8	P2+	Front Passenger Airbag Assembly (P Squib, 2nd step)
A10-9	+SR	Front Airbag Sensor RH
A10-10	P+	Front Passenger Airbag Assembly (P Squib)
A10-11	P-	Front Passenger Airbag Assembly (P Squib)
A10-12	SIL	DLC3
A10-13	D-	Steering Pad Assembly (D Squib)
A10-14	D+	Steering Pad Assembly (D Squib)
A10-15	+SL	Front Airbag Sensor LH
A10-16	D2+	Steering Pad Assembly (D Squib, 2nd step)
A10-17	D2-	Steering Pad Assembly (D Squib, 2nd step)
A10-19	TC	DLC3
A10-20	-SR	Front Airbag Sensor RH
A10-23	GSW2	ECM
A10-26	-SL	Front Airbag Sensor LH
A10-27	E1	Ground
A10-28	E2	Ground
A9-1	PL-	Front Seat Outer Belt Assembly LH (Squib)
A9-2	PL+	Front Seat Outer Belt Assembly LH (Squib)
A9-3	LSP+	Seat Position Airbag Sensor
A9-7	LBE-	Front Seat Inner Belt Assembly LH

Terminal No.	Symbol	Destination
A9-8	LSP-	Seat Position Airbag Sensor
A9-11	LBE+	Front Seat Inner Belt Assembly LH
A11-5	PR+	Front Seat Outer Belt Assembly RH (Squib)
A11-6	PR-	Front Seat Outer Belt Assembly RH (Squib)
A11-8	RBE+	Front Seat Inner Belt Assembly RH
A11-12	RBE-	Front Seat Inner Belt Assembly RH

2. CENTER AIRBAG SENSOR ASSEMBLY (w/ Side Airbag)



T

H100500E03

Terminal No.	Symbol	Destination
A	-	(Electrical Connector Check Mechanism)
B	-	(Electrical Connector Check Mechanism)
A10-3	LA	Combination Meter Assembly (SRS Warning Light)
A10-5	IG2	AM2 Fuse
A10-7	P2-	Front Passenger Airbag Assembly (P Squib, 2nd step)
A10-8	P2+	Front Passenger Airbag Assembly (P Squib, 2nd step)
A10-9	+SR	Front Airbag Sensor RH
A10-10	P+	Front Passenger Airbag Assembly (P Squib)
A10-11	P-	Front Passenger Airbag Assembly (P Squib)
A10-12	SIL	DLC3
A10-13	D-	Steering Pad Assembly (D Squib)
A10-14	D+	Steering Pad Assembly (D Squib)
A10-15	+SL	Front Airbag Sensor LH
A10-16	D2+	Steering Pad Assembly (D Squib, 2nd step)
A10-17	D2-	Steering Pad Assembly (D Squib, 2nd step)
A10-19	TC	DLC3
A10-20	-SR	Front Airbag Sensor RH
A10-23	GSW2	ECM
A10-26	-SL	Front Airbag Sensor LH
A10-27	E1	Ground

DTC	B0118/46	Short to B+ in Side Squib LH Circuit

DESCRIPTION

The side squib LH circuit consists of the center airbag sensor and the front seat side airbag assembly LH. This circuit instructs the SRS to deploy when deployment conditions are met.

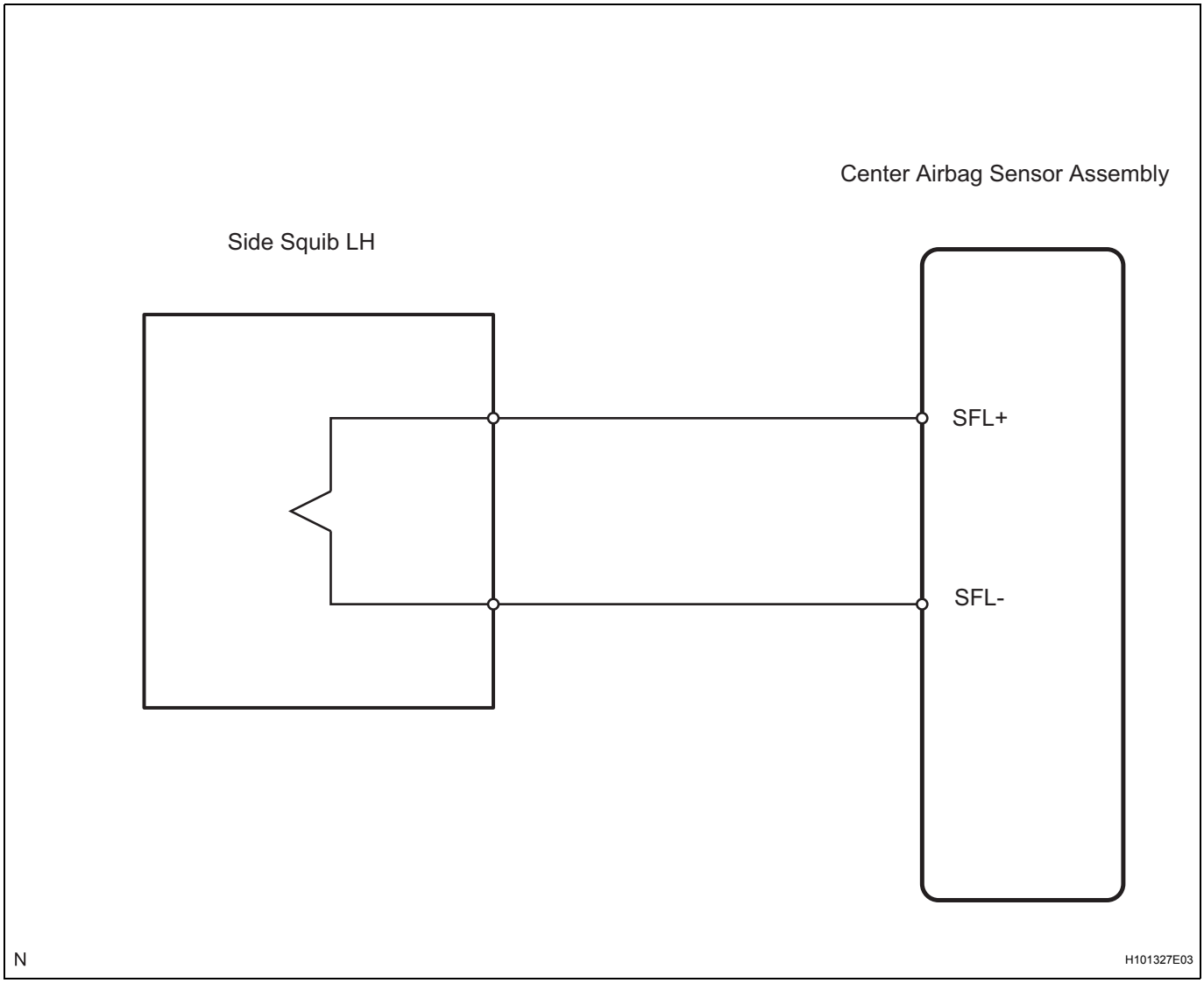
RS

DTC B0118/46 is recorded when a B+ short is detected in the side squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0118/46	• Short in side squib LH circuit (to B+) • Side squib LH malfunction • Center airbag sensor malfunction	• Front seat side airbag assembly LH (Side squib LH) • Center airbag sensor assembly • Floor wire

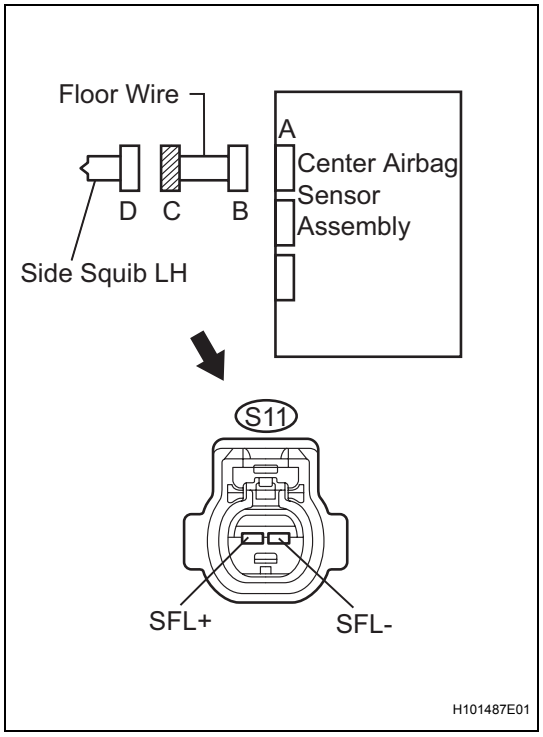
HINT:
DTC B0118/46 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat side airbag assembly LH (side squib LH).
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

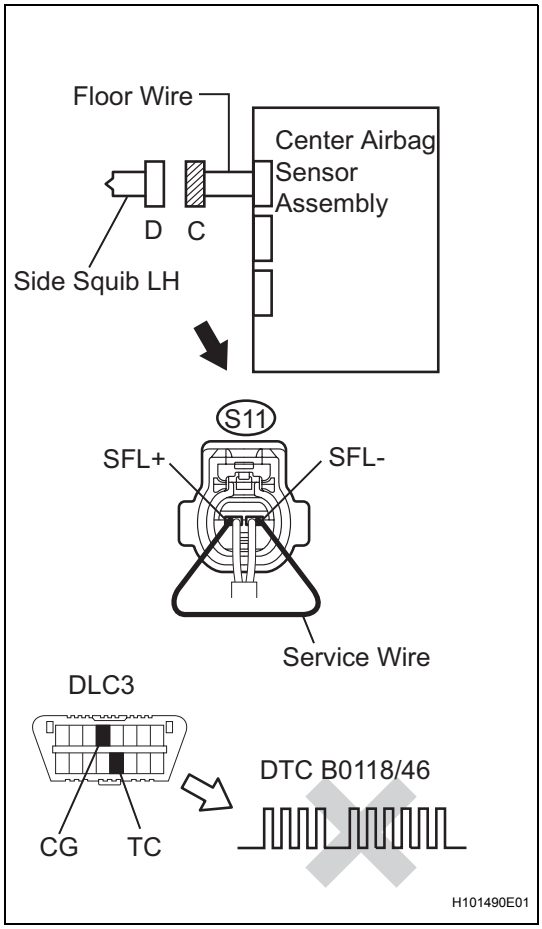
Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
S11-1 (SFL+) - Body ground	Ignition switch ON	Below 1 V
S11-2 (SFL-) - Body ground	Ignition switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK →

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

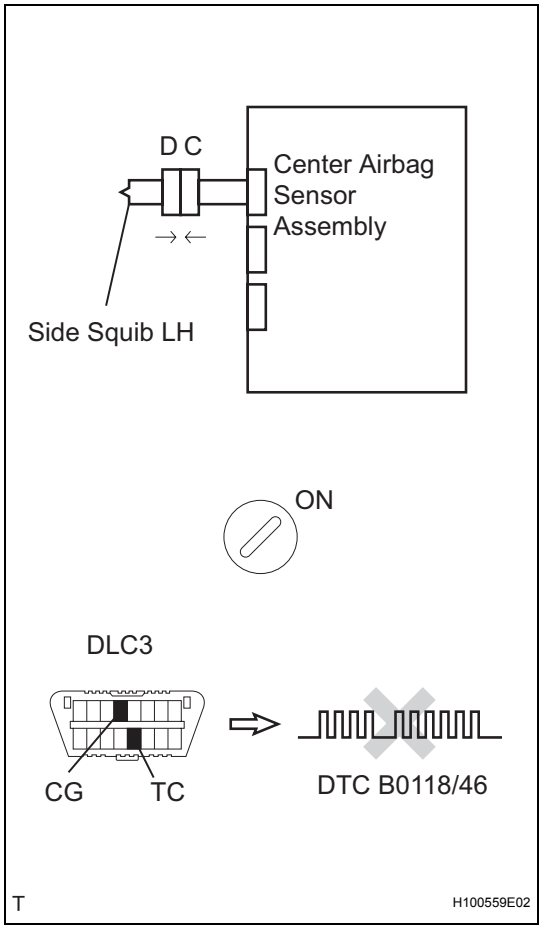


(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect terminals SFL+ and SFL- of the connector "C".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B0118/46 is not output.
HINT:
Codes other than code B0118/46 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY LH (SIDE SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the from the connector "C".
(d) Connect the front side seat airbag assembly LH (side squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B0118/46 is not output.
HINT:
Codes other than code B0118/46 may be output at this time, but they are not relevant to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEATBACK ASSEMBLY (SIDE SQUIB LH)**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B0121/26	Seat Belt Buckle Switch RH Circuit Malfunction

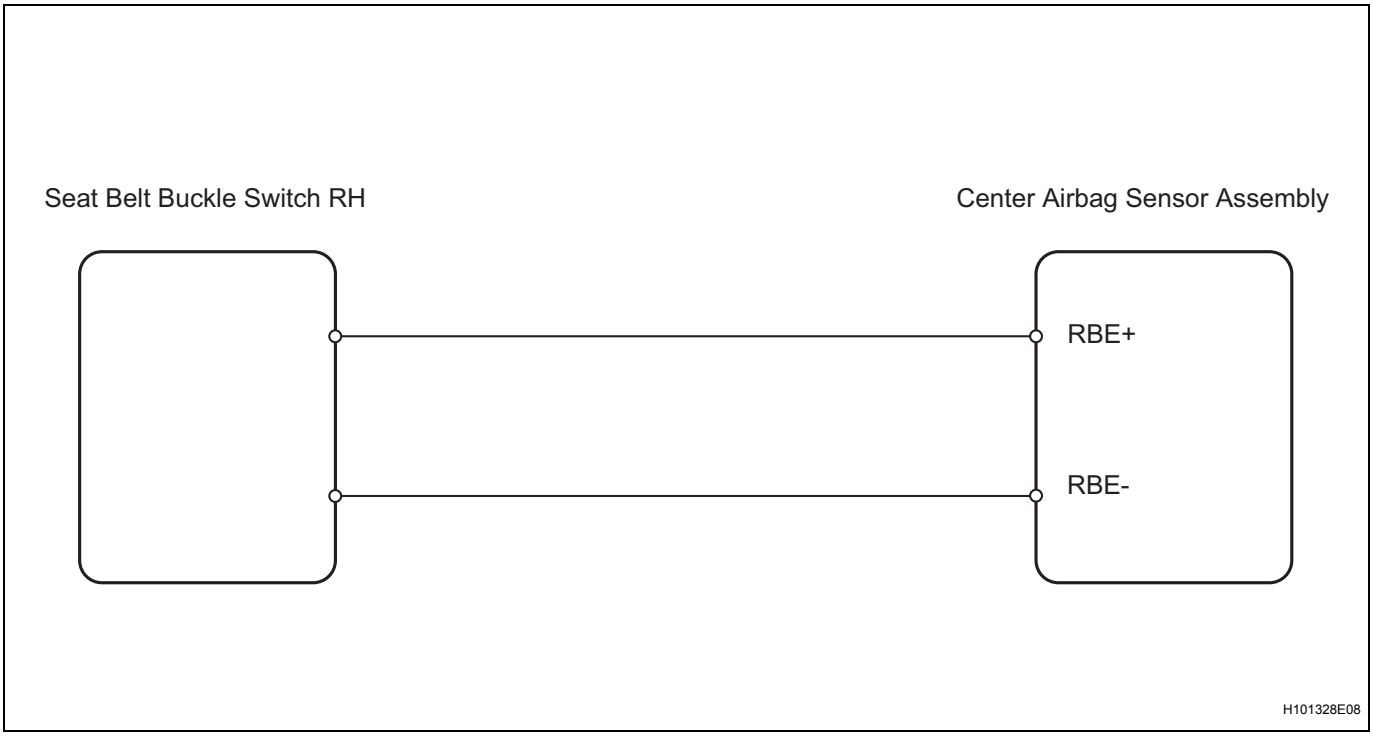
DESCRIPTION

The seat belt buckle switch RH circuit consists of the center airbag sensor assembly and the front seat inner belt assembly RH (seat belt buckle switch RH). DTC B0121/26 is recorded when a malfunction is detected in the seat belt buckle switch RH circuit.

RS

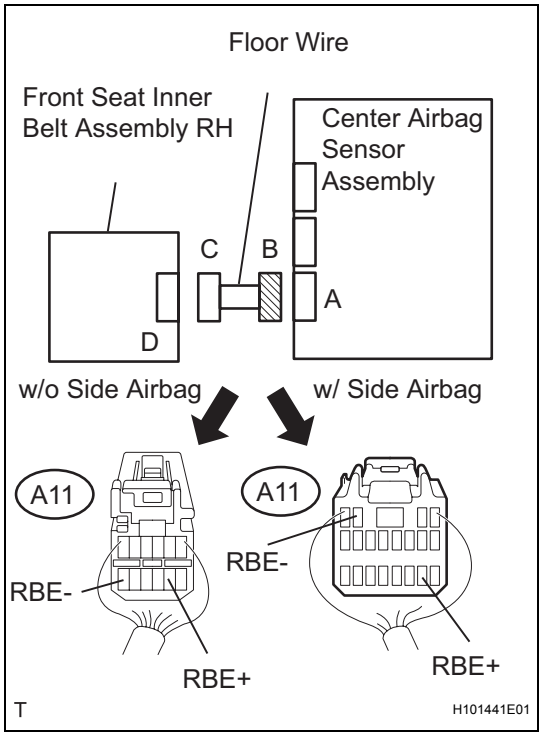
DTC No.	DTC Detecting Condition	Trouble Area
B0121/26	• Short circuit in seat belt buckle switch RH wire harness (to ground) • Short circuit in seat belt buckle switch RH wire harness (to B+) • Open circuit in RBE+ wire harness or RBE- wire harness of front seat inner belt RH • Seat belt buckle switch RH malfunction • Center airbag sensor assembly malfunction	• Front seat inner belt assembly RH (seat belt buckle switch RH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (TO B+)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor assembly and the front seat inner belt assembly RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage:

w/o Side airbag:

Tester Connection (Connector "B")	Condition	Specified Condition
A11-8 (RBE+) - Body ground	Ignition switch ON	Below 1 V
A11-12 (RBE-) - Body ground	Ignition switch ON	Below 1 V

w/ Side airbag

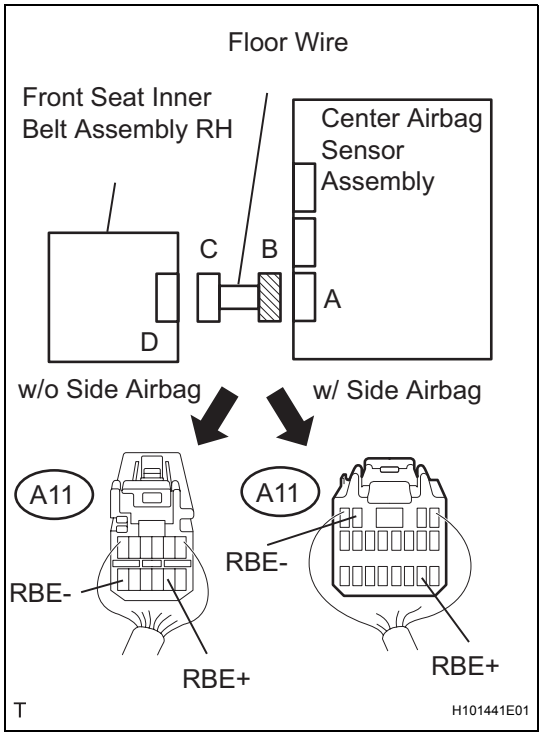
Tester Connection (Connector "B")	Condition	Specified Condition
A11-14 (RBE+) - Body ground	Ignition switch ON	Below 1 V
A11-3 (RBE-) - Body ground	Ignition switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

2 CHECK FLOOR WIRE (TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

w/o Side airbag

Tester Connection (Connector "B")	Specified Condition
A11-8 (RBE+) - Body ground	1 MΩ or higher
A11-12 (RBE-) - Body ground	1 MΩ or higher

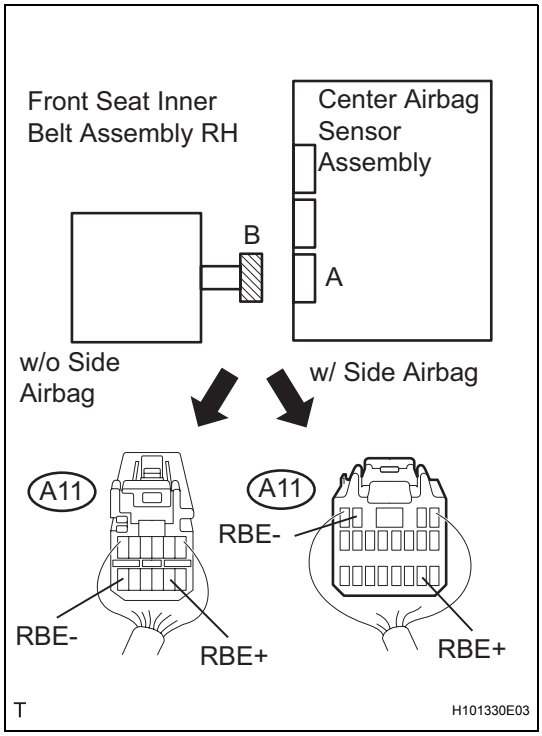
w/ Side airbag

Tester Connection (Connector "B")	Specified Condition
A11-14 (RBE+) - Body ground	1 MΩ or higher
A11-3 (RBE-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3 CHECK FRONT SEAT INNER BELT ASSEMBLY RH



(a) Connect the connector to the front seat inner belt assembly RH.
(b) Unfasten the seat belt from the front seat inner belt RH.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

w/o Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A11-8 (RBE+) - A11-12 (RBE-)	Seat belt unfastened	100 to 500 Ω

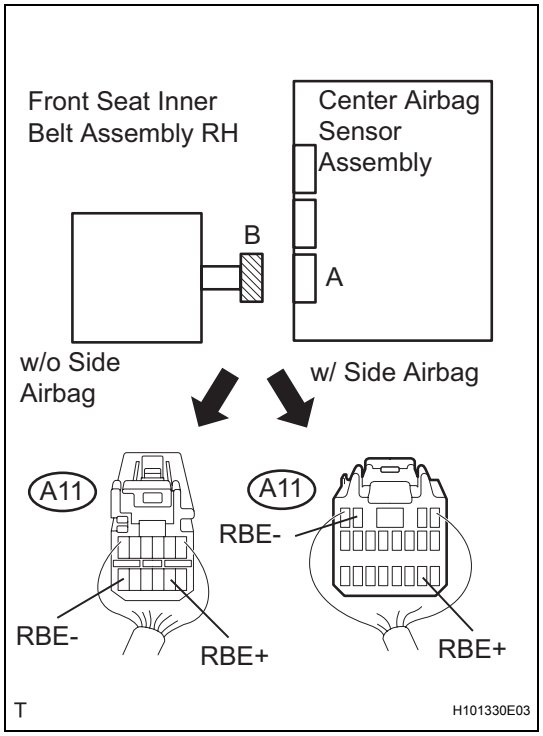
w/ Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A11-14 (RBE+) - A11-3 (RBE-)	Seat belt unfastened	100 to 500 Ω

NG → **REPLACE FRONT SEAT INNER BELT ASSEMBLY RH**

OK

4 CHECK FRONT SEAT INNER BELT ASSEMBLY RH



(a) Fasten the seat belt to the front seat inner belt RH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

w/o Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A11-8 (RBE+) - A11-12 (RBE-)	Seat belt fastened	1.0 to 1.6 kΩ

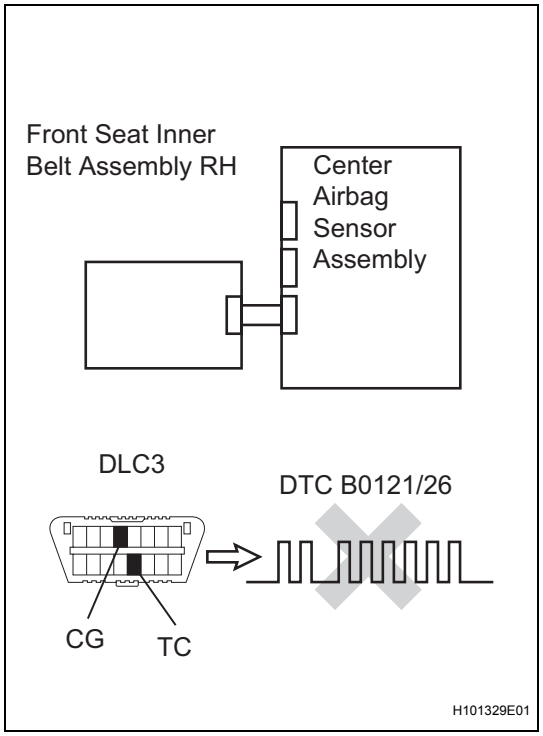
w/ Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A11-14 (RBE+) - A11-3 (RBE-)	Seat belt fastened	1.0 to 1.6 kΩ

NG → **REPLACE FRONT SEAT INNER BELT ASSEMBLY RH**

OK

5 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the stored DTCs in the memory (see page RS-30).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-30).

OK:

DTC B0121/26 is not output.

HINT:

Codes other than code B0121/26 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

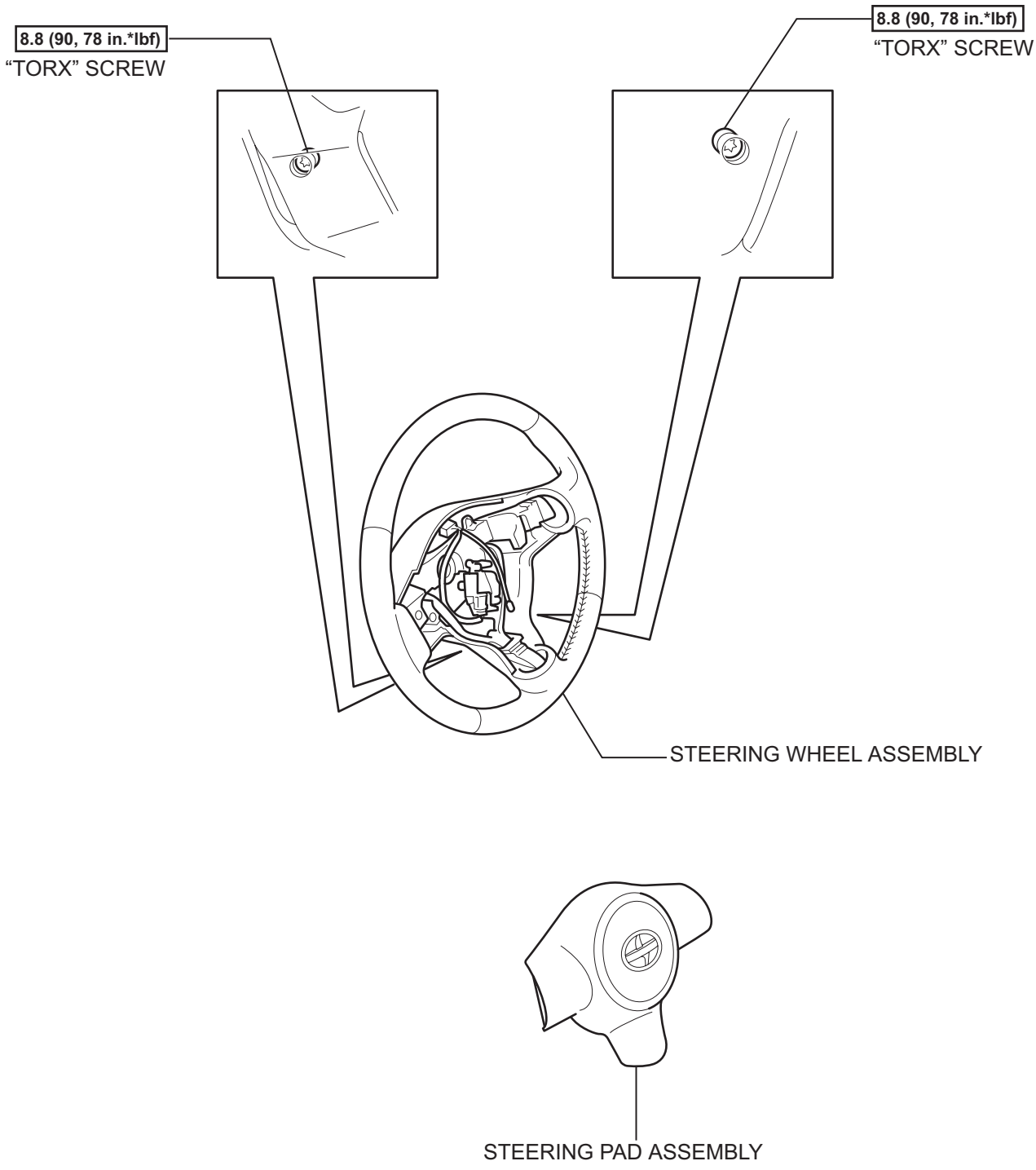
OK

USE SIMULATION METHOD TO CHECK

STEERING PAD

COMPONENTS

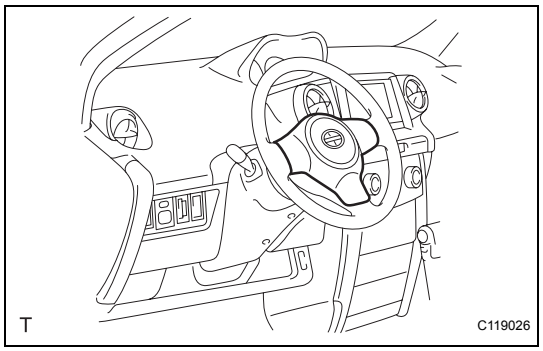
RS



N*m (kgf*cm, ft.*lbf) : Specified torque

T

C119023E06

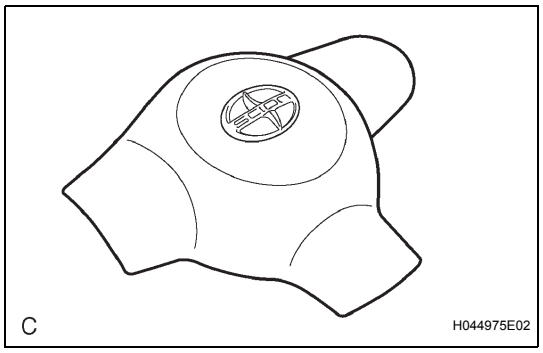


ON-VEHICLE INSPECTION

1. CHECK STEERING PAD ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)

(a) Perform a diagnostic system check (see page RS-33).

(b) With the steering pad (with airbag) installed on the vehicle, perform a visual check:
Check for cuts, cracks or discoloration on the steering pad outer surface and in the grooved portion.
If any of the defects mentioned above are present, replace the steering pad assembly with a new one.
CAUTION:
For removal and installation of the steering pad assembly, be sure to follow the correct procedures.

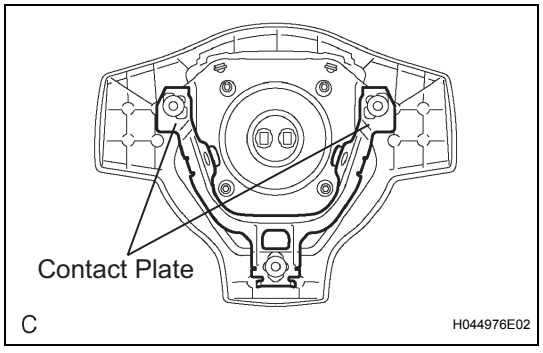


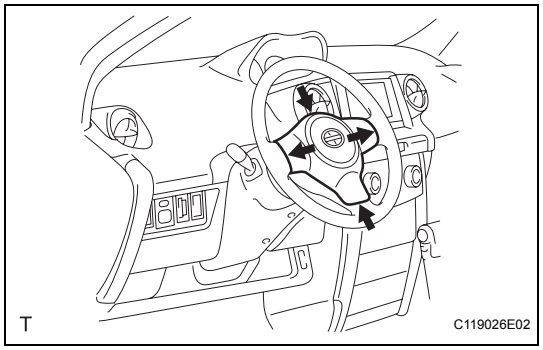
2. CHECK STEERING PAD ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)

(a) Perform a diagnostic system check (see page RS-33).

(b) With the steering pad (with airbag) removed from the vehicle, perform a visual check:
- Check for cuts, cracks or discoloration on the steering pad outer surface and in the grooved portion.
- Check for cuts and cracks in the wire harness, and chipping on the connectors.
- Check for deformation on the steering wheel.
- Check for deformation of the steering pad contact plates.

If any of the defects mentioned above are present, replace the steering pad assembly with a new one.
CAUTION:
For removal and installation of the steering pad assembly, be sure to follow the correct procedures.
HINT:
- If the steering pad contact plates are deformed, never repair them. Always replace the steering pad assembly with a new one.
- There should be no interference between the steering pad and steering wheel, and the clearance should be uniform all the way around when the new steering pad is installed on the steering wheel.





DTC	B0126/27	Seat Belt Buckle Switch LH Circuit Malfunction

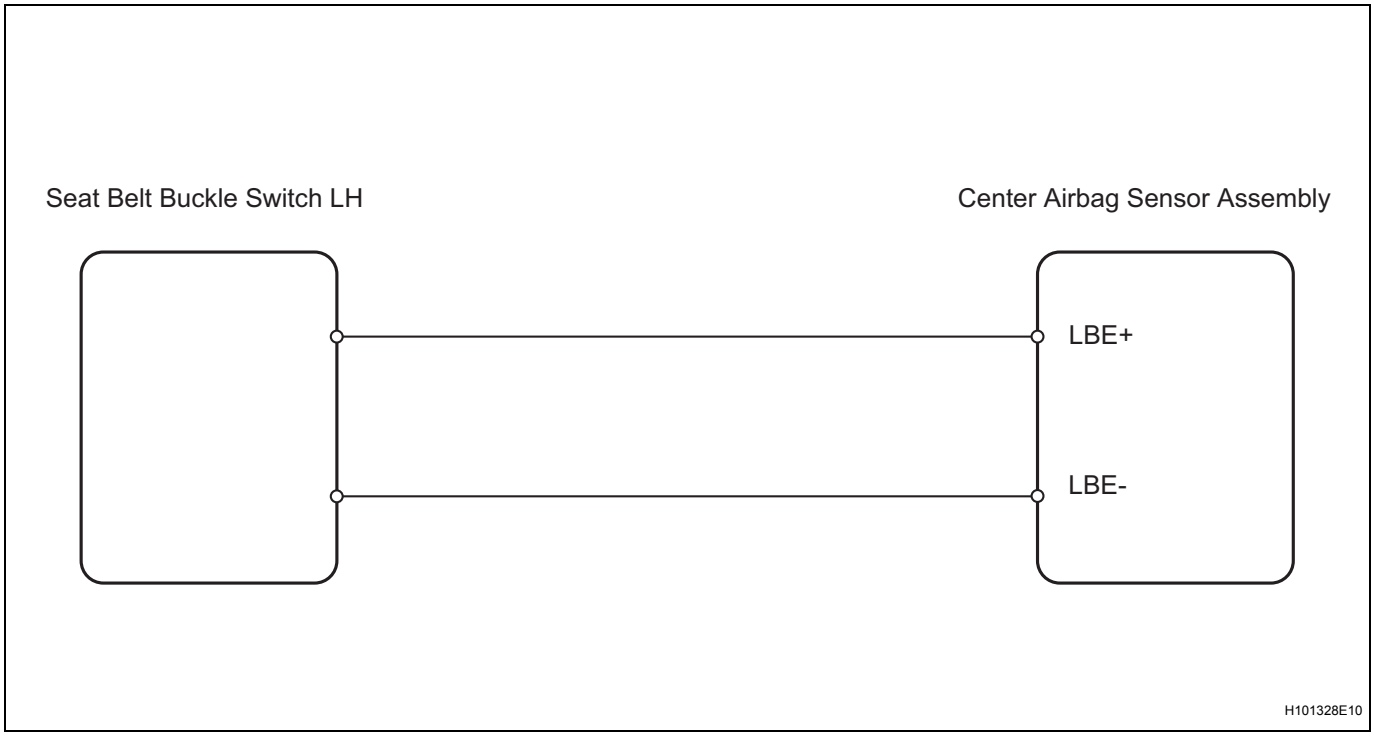
DESCRIPTION

The seat belt buckle switch LH circuit consists of the center airbag sensor and the front seat inner belt LH (seat belt buckle switch LH).

DTC B0126/27 is recorded when a malfunction is detected in the seat belt buckle switch LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0126/27	• Short circuit in front seat inner belt LH wire harness (to ground) • Short circuit in front seat inner belt LH wire harness (to B+) • Open circuit in LBE+ wire harness or LBE- wire harness of front seat inner belt RH • Front seat inner belt LH malfunction • Center airbag sensor malfunction	• Front seat inner belt LH assembly (seat belt buckle switch LH) • Center airbag sensor assembly • Floor wire

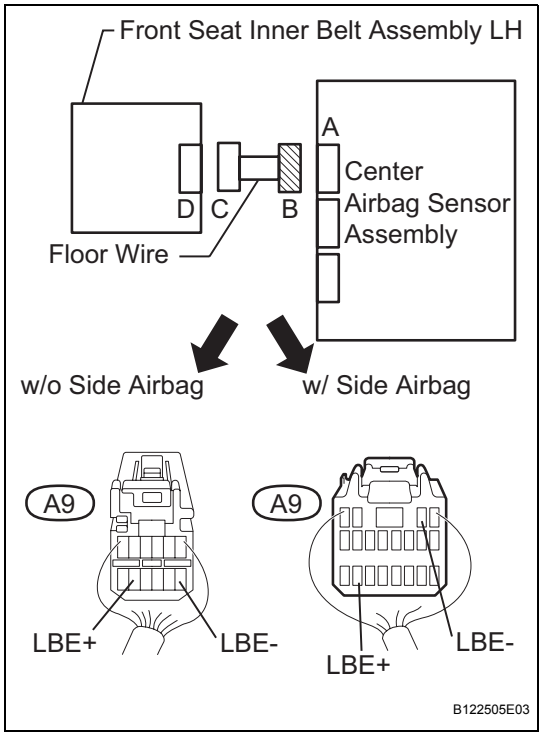
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (TO B+)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor assembly and the front seat inner belt assembly LH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage:

w/o Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A9-11 (LBE+) - Body ground	Ignition switch ON	Below 1 V
A9-7 (LBE-) - Body ground	Ignition switch ON	Below 1 V

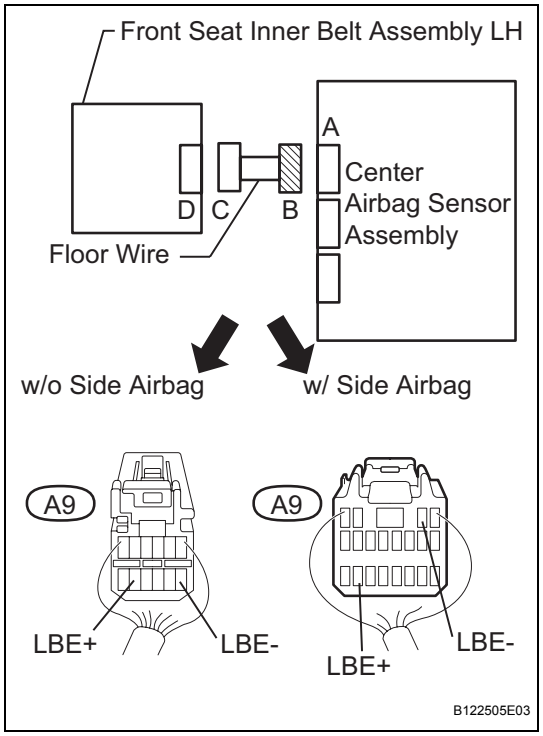
w/ Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A9-19 (LBE+) - Body ground	Ignition switch ON	Below 1 V
A9-2 (LBE-) - Body ground	Ignition switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

2 CHECK WIRE HARNESS (TO GROUND)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

w/o Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-11 (LBE+) - Body ground	1 MΩ or higher
A9-7 (LBE-) - Body ground	1 MΩ or higher

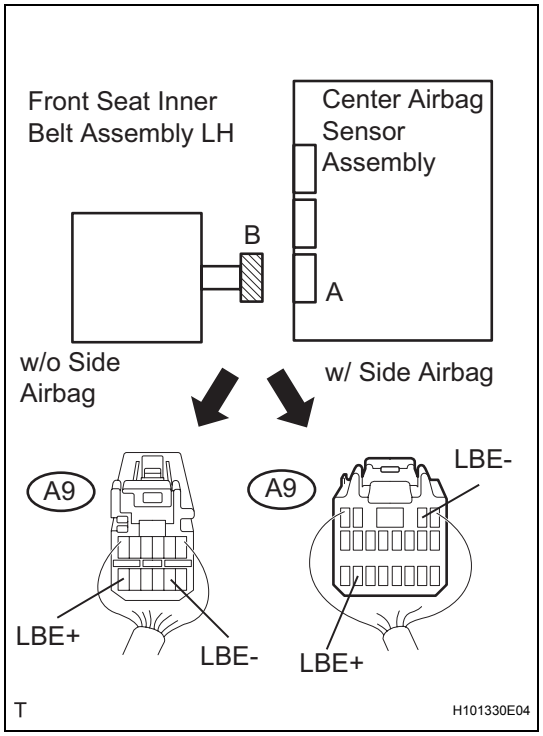
w/ Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-19 (LBE+) - Body ground	1 MΩ or higher
A9-2 (LBE-) - Body ground	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

3 CHECK FRONT SEAT INNER BELT ASSEMBLY LH



(a) Connect the connector of the front seat inner belt LH (seat belt buckle switch LH).
(b) Unfasten the seat belt from the front seat inner belt LH.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

w/o Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A9-11 (LBE+) - A9-7 (LBE-)	Seat belt unfastened	100 to 500 Ω

w/ Side airbag

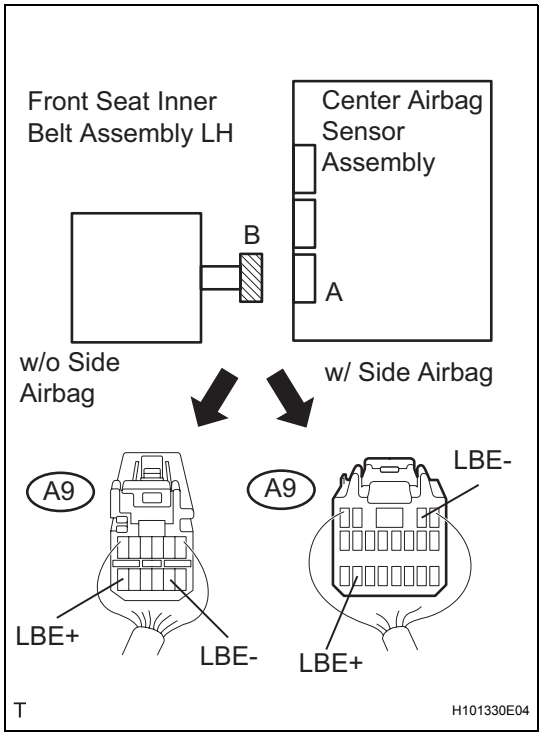
Tester Connection (Connector "B")	Condition	Specified Condition
A9-19 (LBE+) - A9-2 (LBE-)	Seat belt unfastened	100 to 500 Ω

NG → REPLACE FRONT SEAT INNER BELT ASSEMBLY LH

OK

RS

4 CHECK FRONT SEAT INNER BELT ASSEMBLY LH



(a) Fasten the seat belt to the front seat inner belt LH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

w/o Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A9-11 (LBE+) - A9-7 (LBE-)	Seat belt fastened	1.0 to 1.6 kΩ

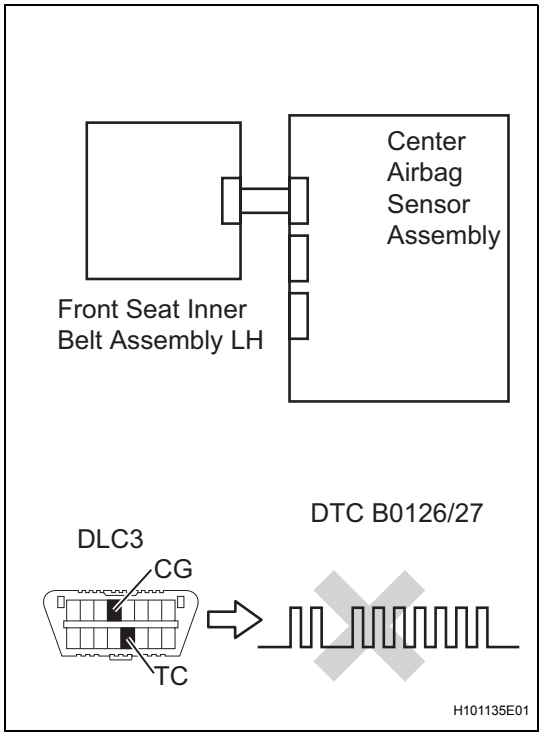
w/ Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A9-19 (LBE+) - A9-2 (LBE-)	Seat belt fastened	1.0 to 1.6 kΩ

NG → **REPAIR OR REPLACE FRONT SEAT INNER BELT ASSEMBLY LH**

OK

5 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

DTC B01267/27 is not output.

HINT:

Codes other than code B0126/27 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0130/63	Short in Front Pretensioner Squib RH Circuit

DESCRIPTION

The front pretensioner squib RH circuit consists of the center airbag sensor and the front seat outer belt assembly RH (seat belt pretensioner RH).

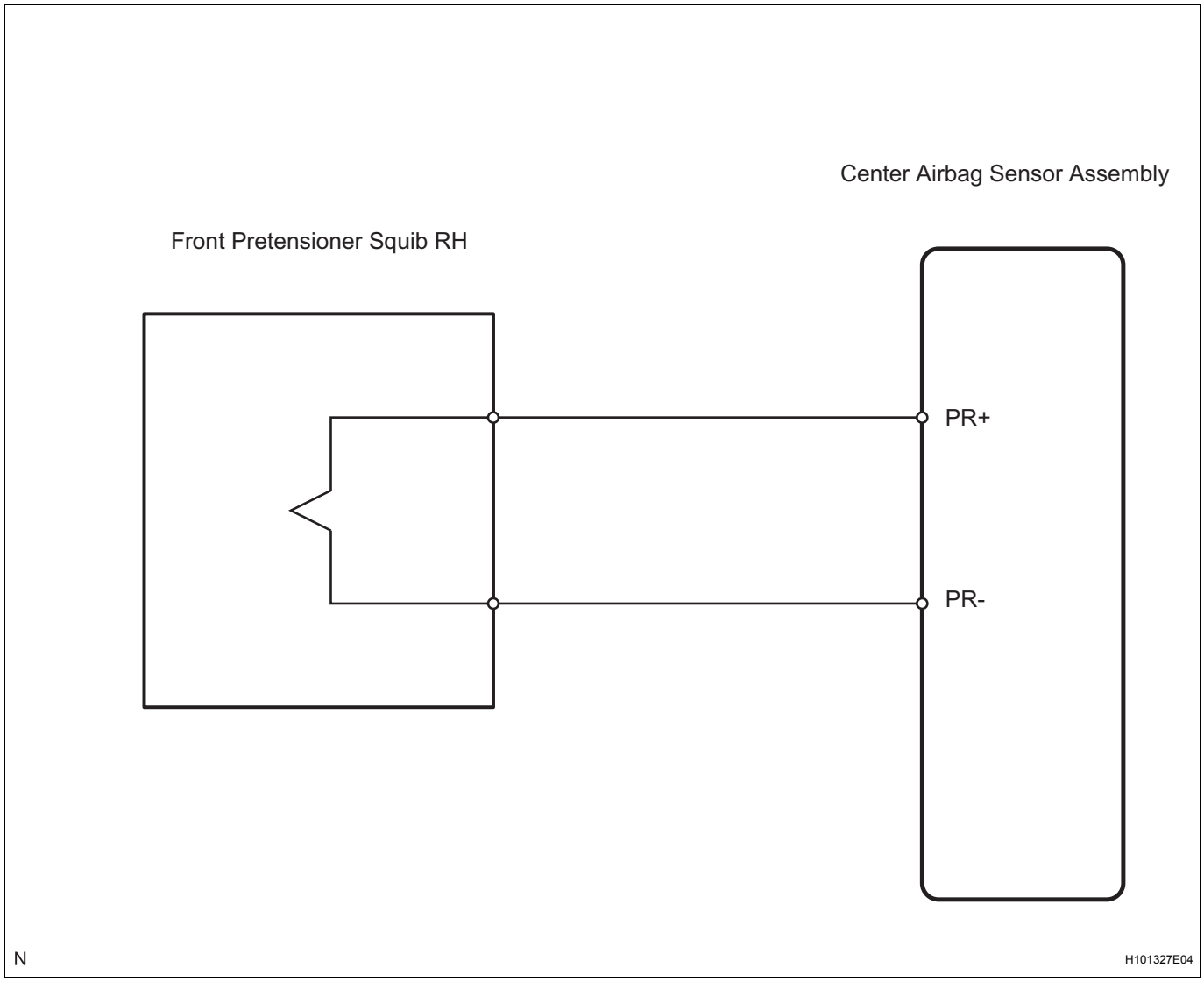
RS

This circuit instructs the SRS to deploy when deployment conditions are met.

DTC B0130/63 is recorded when a short is detected in the front pretensioner squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0130/63	• Short in front pretensioner squib RH circuit • Front pretensioner squib RH malfunction • Center airbag sensor malfunction	• Front seat outer belt assembly RH (front pretensioner squib RH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

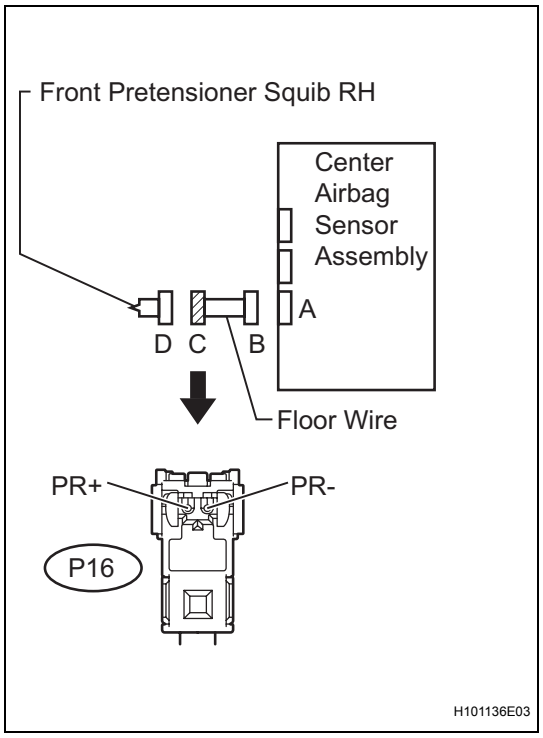
1	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the front seat outer belt RH.
(d) Check that the floor wire connector (on the front seat outer belt RH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB RH CIRCUIT)



(a) Disconnect the connector from the center airbag sensor.
(b) Release the activation prevention mechanism built into connector "B" (see page RS-18).
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

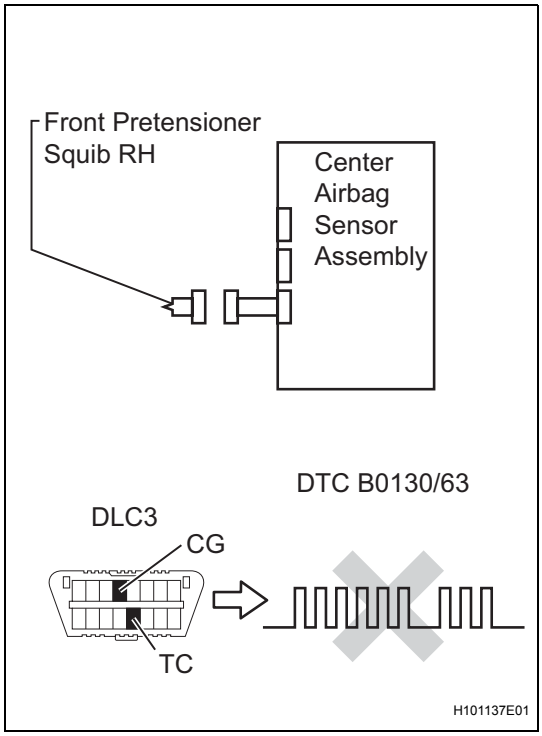
Tester Connection (Connector "C")	Specified Condition
P16-1 (PR+) - P16-2 (PR-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

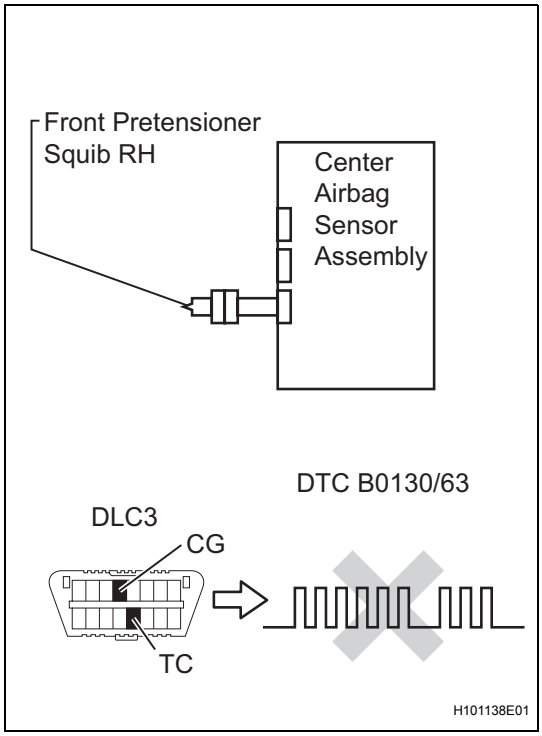
DTC B0130/63 is not output.

HINT:
Codes other than code B0130/63 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

4	CHECK FRONT SEAT OUTER BELT ASSEMBLY RH (FRONT PRETENSIONER SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front seat outer belt assembly RH (front pretensioner squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B0130/63 is not output.

HINT:
Codes other than code B0130/63 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY RH**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0131/64	Open in Front Pretensioner Squib RH Circuit

DESCRIPTION

The front pretensioner squib RH circuit consists of the center airbag sensor and the front seat outer belt assembly RH (seat belt pretensioner RH).

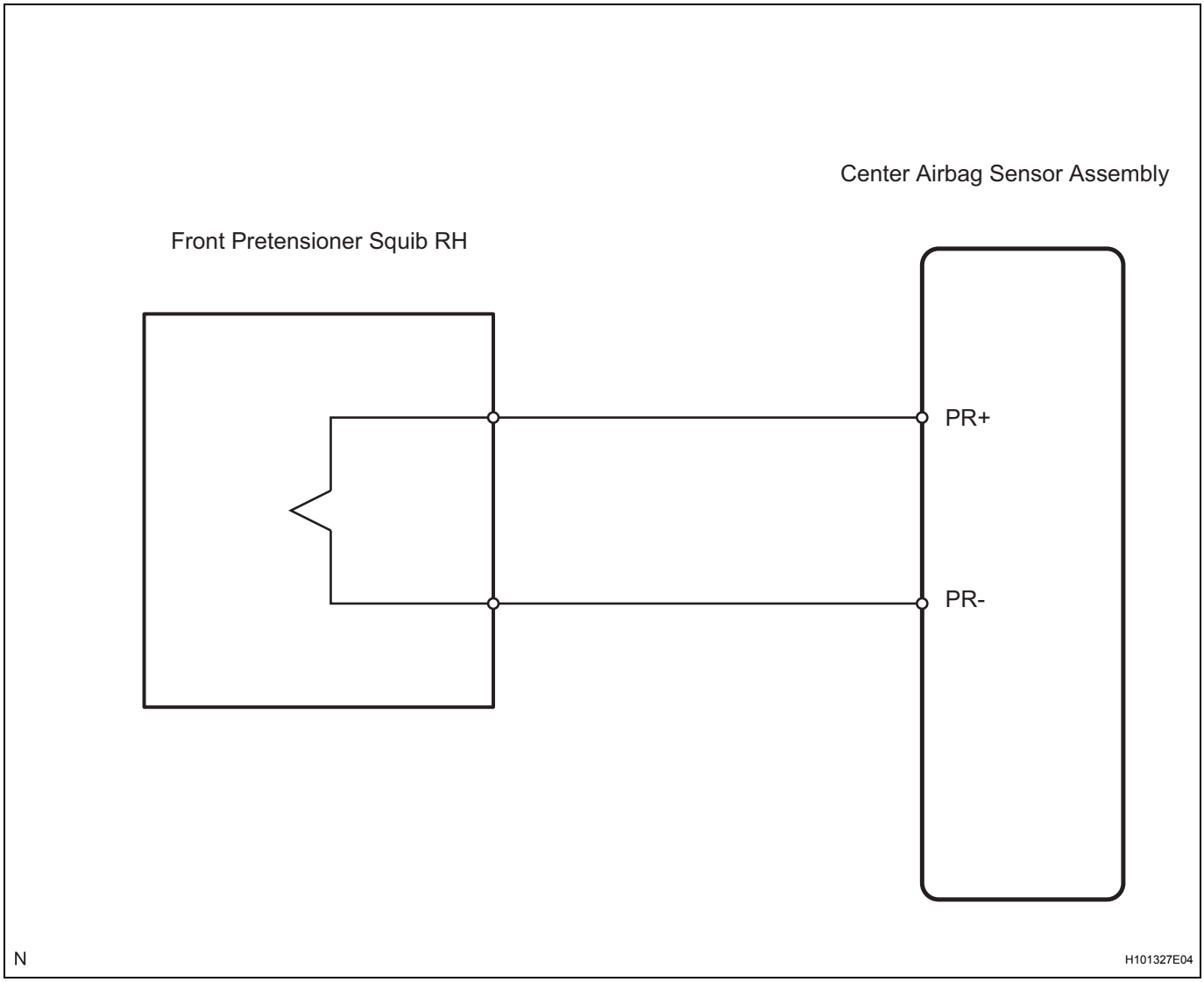
RS

This circuit instructs the SRS to deploy when deployment conditions are met.

DTC B0131/64 is recorded when an open is detected in the front pretensioner squib RH circuit.

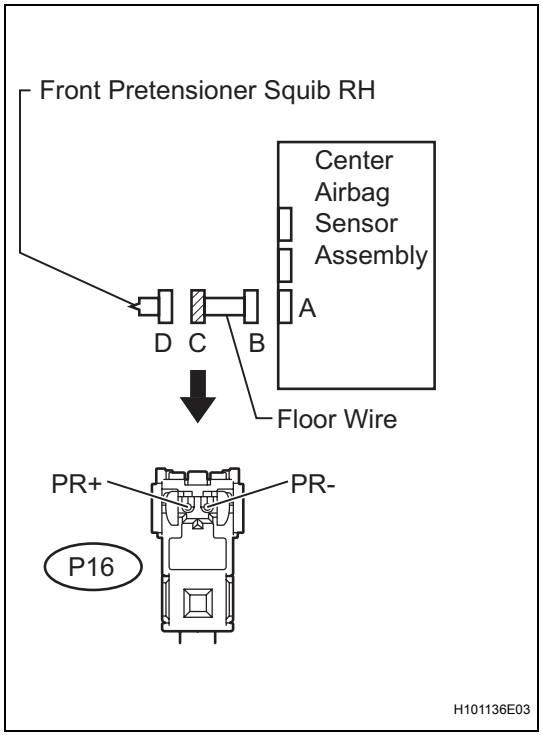
DTC No.	DTC Detection Condition	Trouble Area
B0131/64	• Open in front pretensioner squib RH circuit • front pretensioner squib RH malfunction • Center airbag sensor malfunction	• Front seat outer belt assembly RH (front pretensioner squib RH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat outer belt RH.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

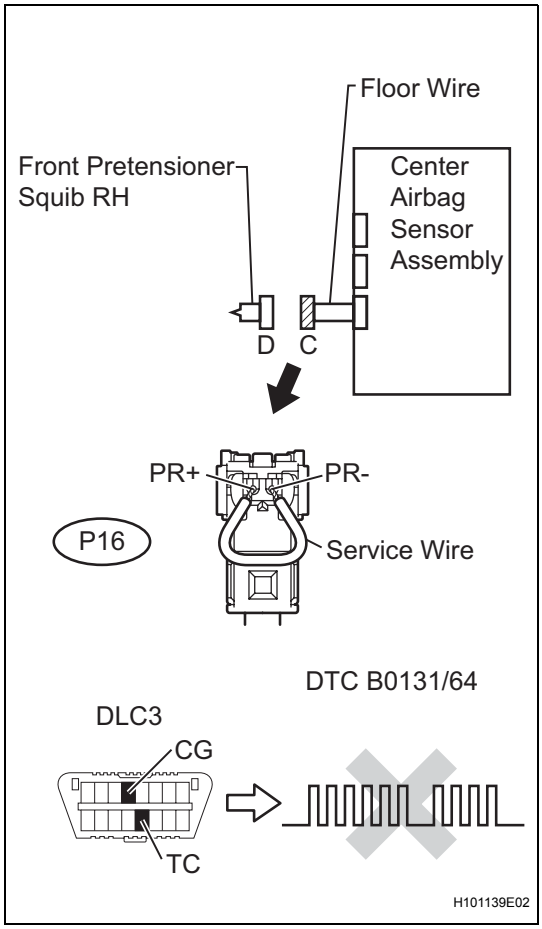
Tester Connection (Connector "C")	Specified Condition
P16-1 (PR+) - P16-2 (pr-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



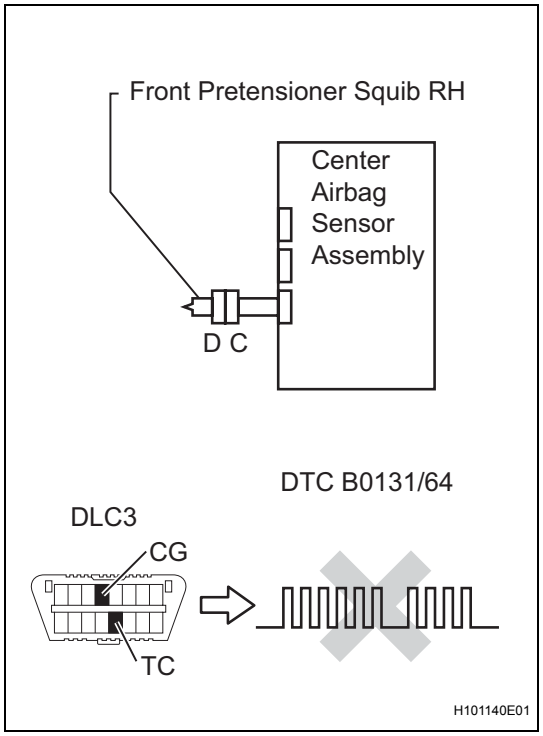
(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals PR+ and PR- of the connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0131/64 is not output.
HINT:
Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT OUTER BELT ASSEMBLY RH (FRONT PRETENSIONER SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat outer belt assembly RH (front pretensioner squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0131/64 is not output.

HINT:

Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY RH**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0132/61	Short to GND in Front Pretensioner Squib RH Circuit

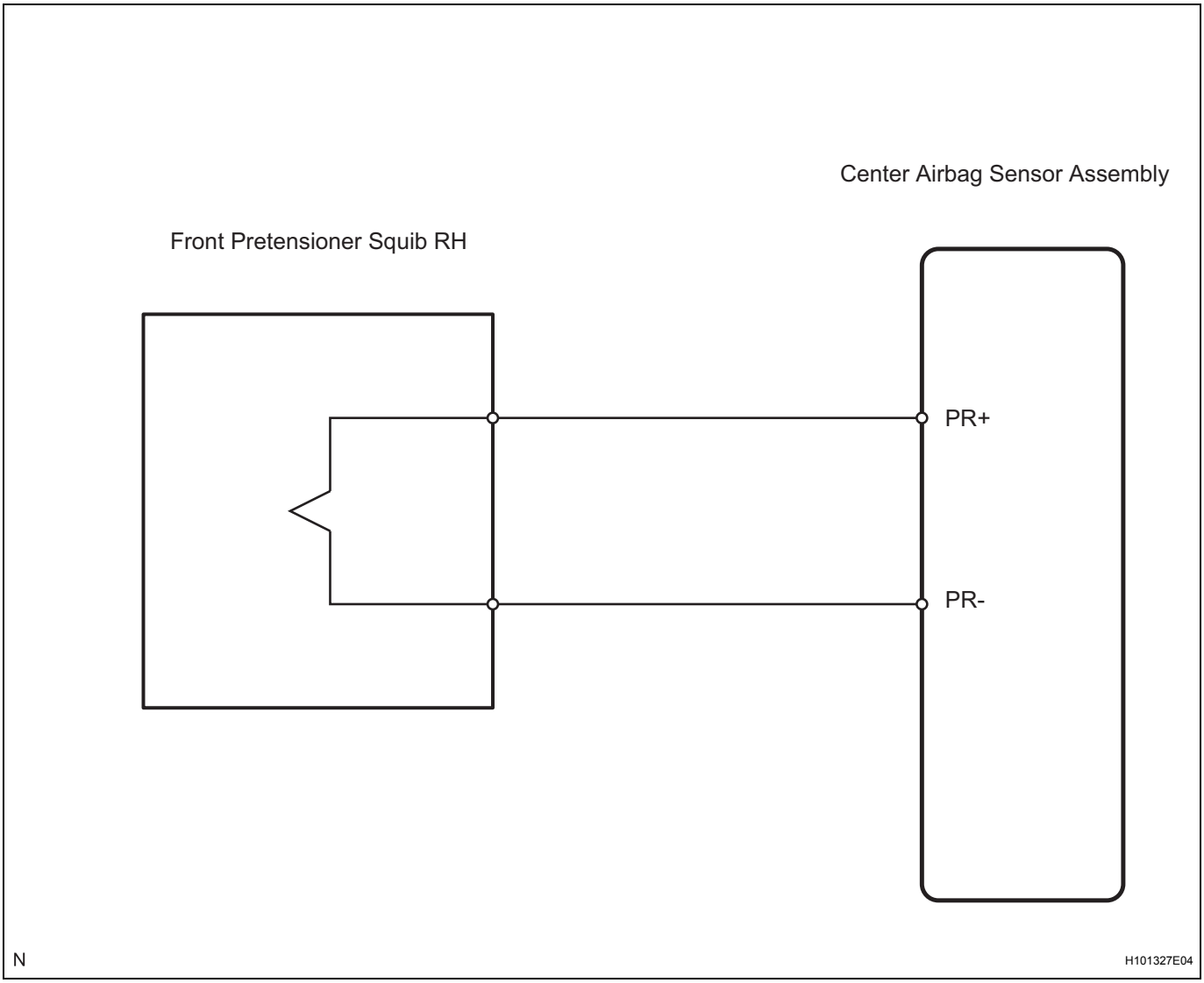
DESCRIPTION

RS

The front pretensioner squib RH circuit consists of the center airbag sensor and the front seat outer belt assembly RH (seat belt pretensioner RH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0132/61 is recorded when a ground short is detected in the front pretensioner squib RH circuit.

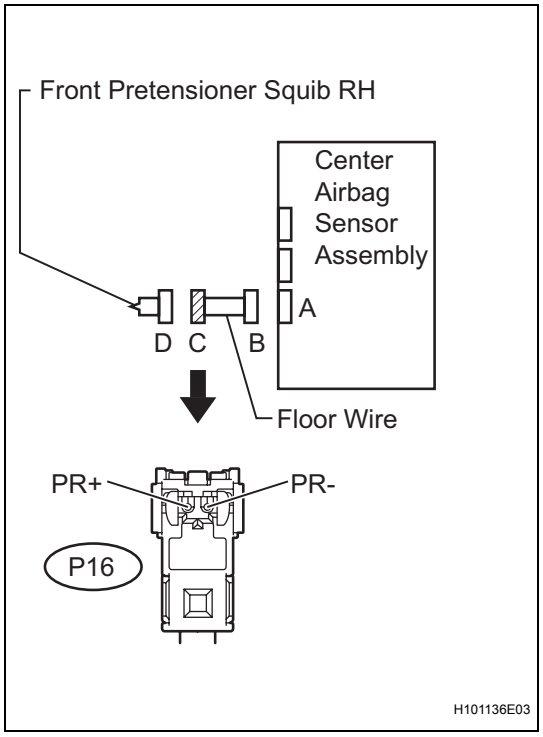
DTC No.	DTC Detecting Condition	Trouble Area
B0132/61	• Short in front pretensioner squib RH circuit (to ground) • Front pretensioner squib RH malfunction • Center airbag sensor malfunction	• Front seat outer belt assembly RH (front pretensioner squib RH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat outer belt RH.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

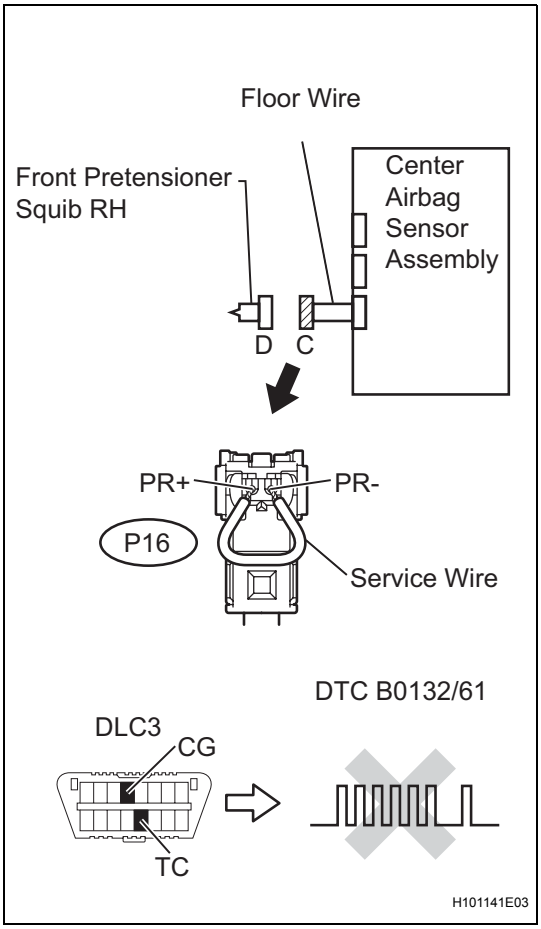
Tester Connection (Connector "C")	Specified Condition
P16-1 (PR+) - Body ground	1 MΩ or higher
P16-2 (PR-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



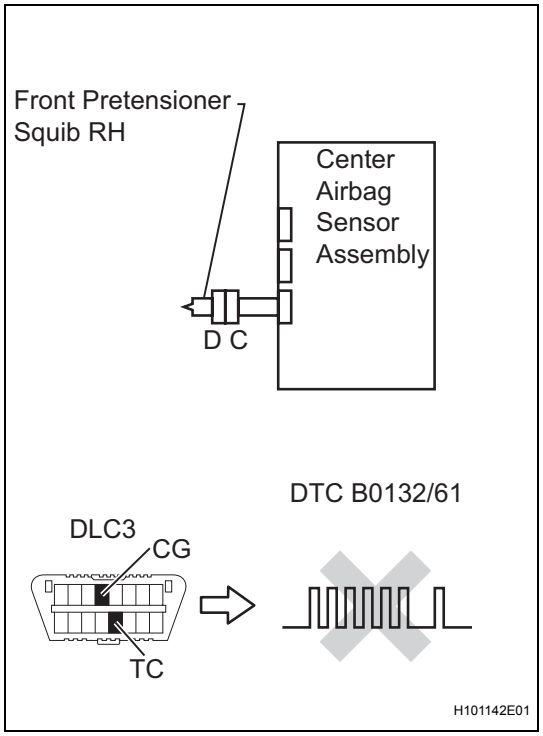
(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals PR+ and PR- of connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0132/61 is not output.
HINT:
Codes other than code B0132/61 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT OUTER BELT ASSEMBLY RH (FRONT PRETENSIONER SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat outer belt assembly RH (front pretensioner squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0132/61 is not output.

HINT:

Codes other than code B0132/61 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY RH**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B0133/62	Short to B+ in Front Pretensioner Squib RH Circuit

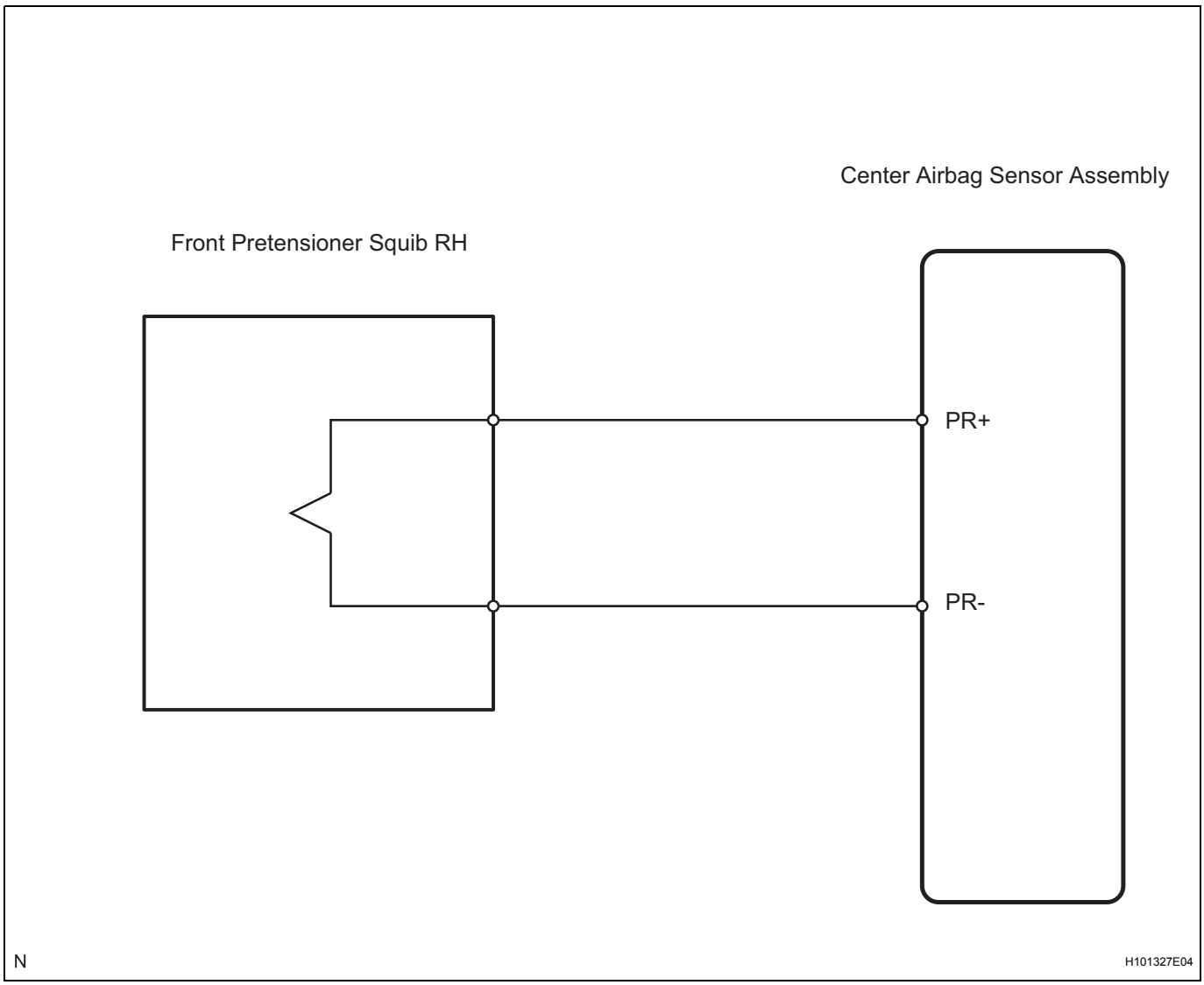
DESCRIPTION

RS

The front pretensioner squib RH circuit consists of the center airbag sensor and the front seat outer belt assembly RH (seat belt pretensioner RH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0133/62 is recorded when a B+ short is detected in the front pretensioner squib RH circuit.

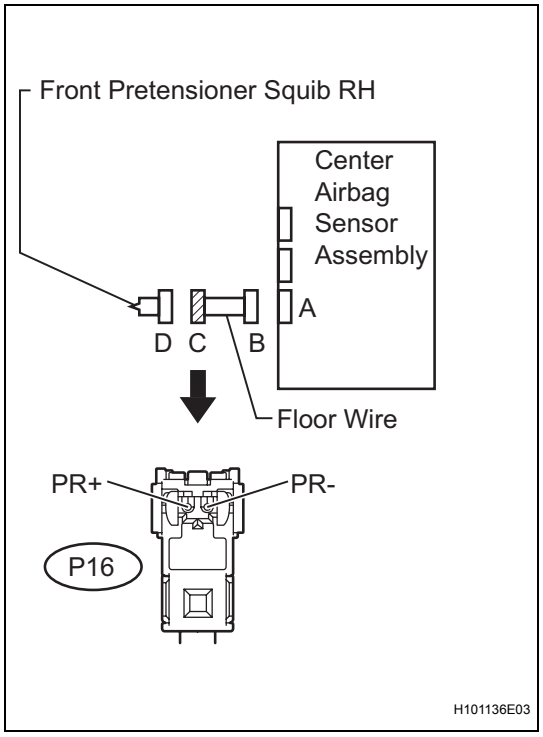
DTC No.	DTC Detection Condition	Trouble Area
B0133/62	• Short in front pretensioner squib RH circuit (to B+) • Front pretensioner squib RH malfunction • Center airbag sensor assembly malfunction	• Front seat outer belt assembly RH (front pretensioner squib RH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat outer belt RH.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

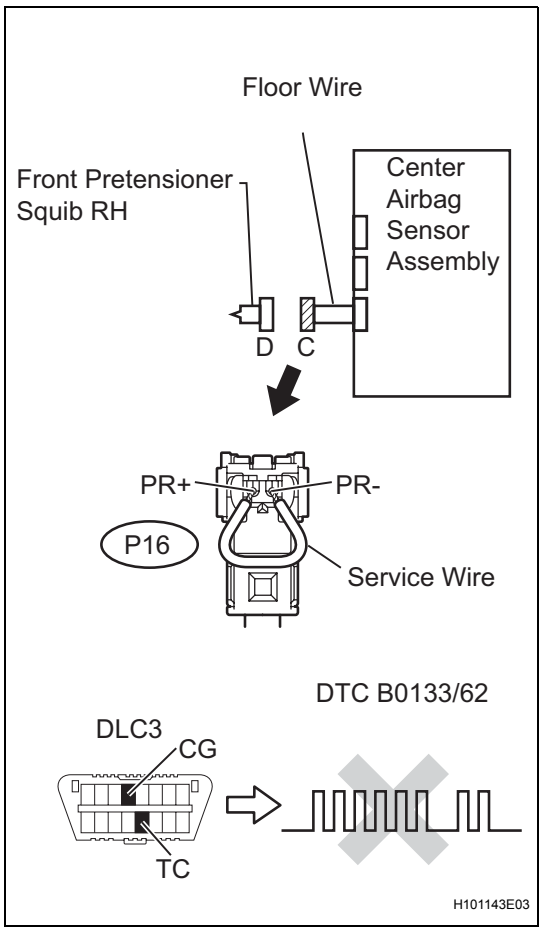
Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
PR+ - Body ground	Ignition switch ON	Below 1 V
PR- - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



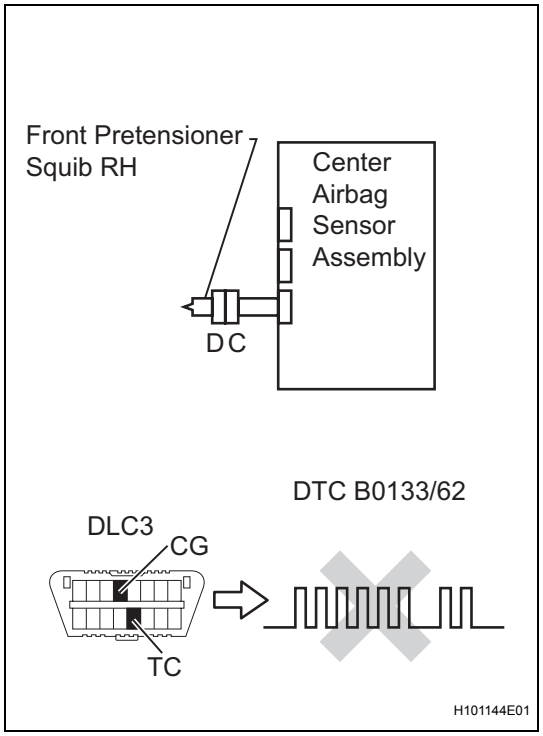
(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect terminals PR+ and PR- of connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B0133/62 is not output.
HINT:
Codes other than code B0133/62 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT OUTER BELT ASSEMBLY RH (FRONT PRETENSIONER SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat outer belt assembly RH (front pretensioner squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0133/62 is not output.

HINT:

Codes other than code B0133/62 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY RH**

OK ↓

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK ↓

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B0135/73	Short in Front Pretensioner Squib LH Circuit

DESCRIPTION

The front pretensioner squib LH circuit consists of the center airbag sensor and the front seat outer belt assembly LH (seat belt pretensioner LH).

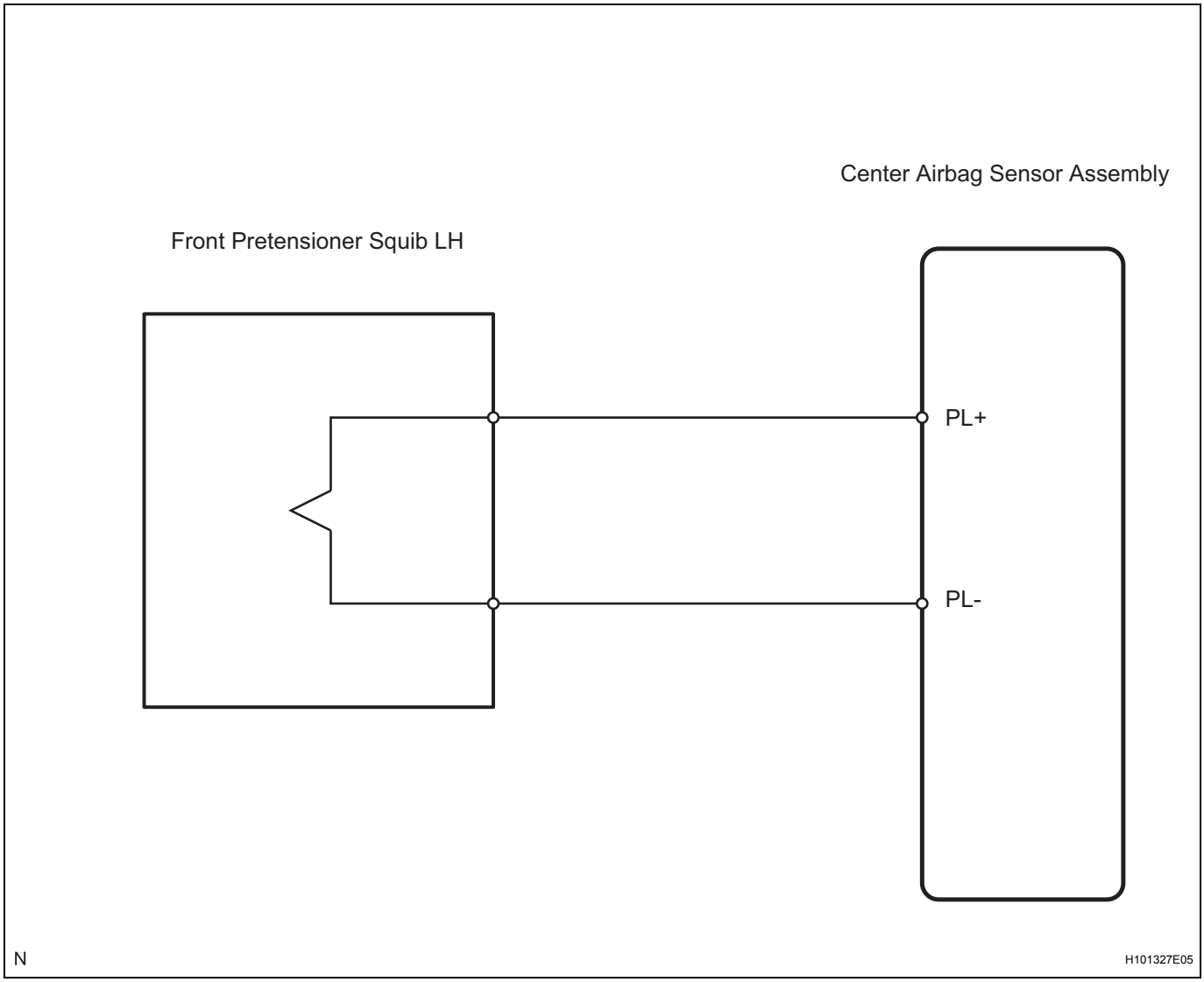
RS

This circuit instructs the SRS to deploy when deployment conditions are met.

DTC B0135/73 is recorded when a short is detected in the front pretensioner squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0135/73	• Short in front pretensioner squib LH circuit • Front pretensioner squib LH malfunction • Center airbag sensor malfunction	• Front seat outer belt assembly LH (front pretensioner squib LH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

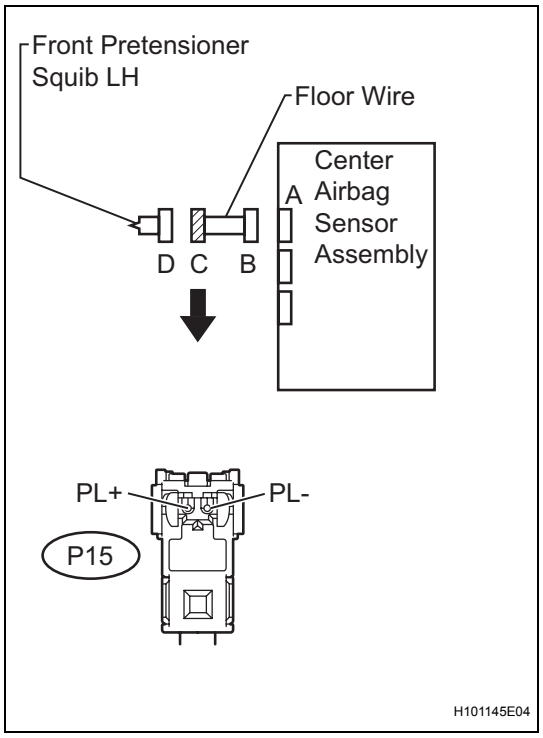
1	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the front seat outer belt LH.
(d) Check that the floor wire connector (on the front seat outer belt LH side) is not damaged.
NOTICE:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB LH CIRCUIT)



(a) Disconnect the connector from the center airbag sensor.
(b) Release the activation prevention mechanism built into connector "B" (see page RS-18).
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

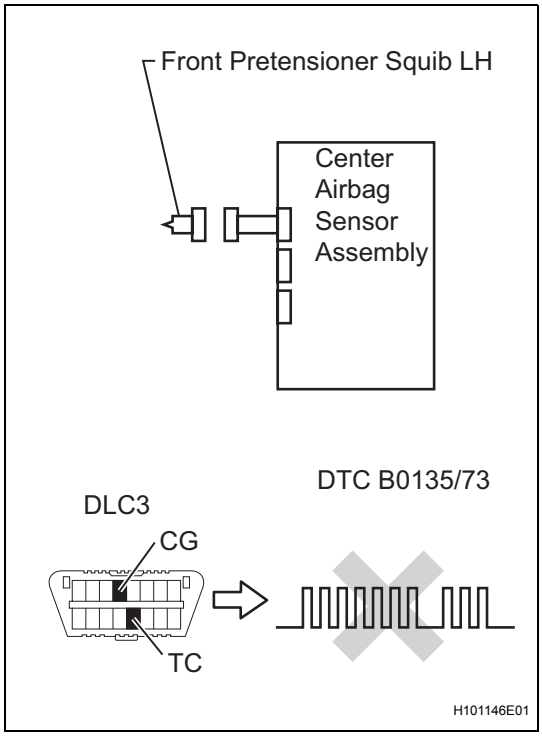
Tester Connection (Connector "C")	Specified Condition
P15-1 (PL+) - P15-2 (PL-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

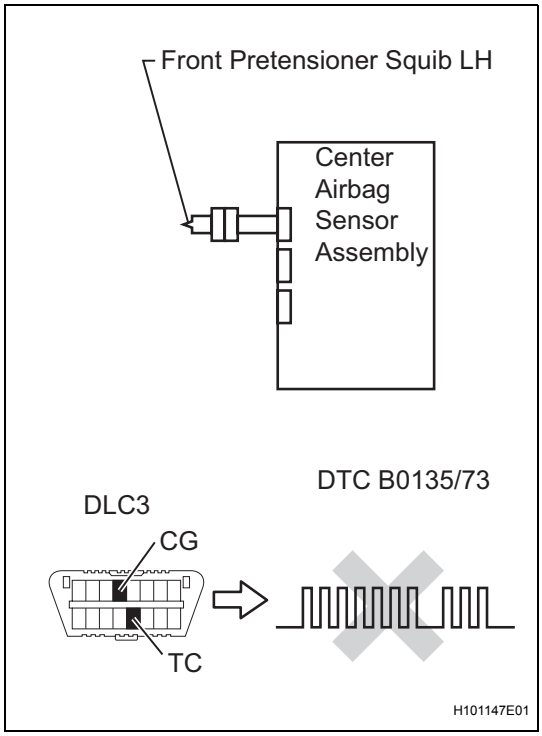
DTC B0135/73 is not output.

HINT:
Codes other than code B0135/73 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

4	CHECK FRONT SEAT OUTER BELT ASSEMBLY LH (FRONT PRETENSIONER SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front seat outer belt assembly LH (front pretensioner squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B0135/73 is not output.

HINT:
Codes other than code B0135/73 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMLY**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0136/74	Open in Front Pretensioner Squib LH Circuit

DESCRIPTION

The front pretensioner squib LH circuit consists of the center airbag sensor and the front seat outer belt assembly LH (seat belt pretensioner LH).

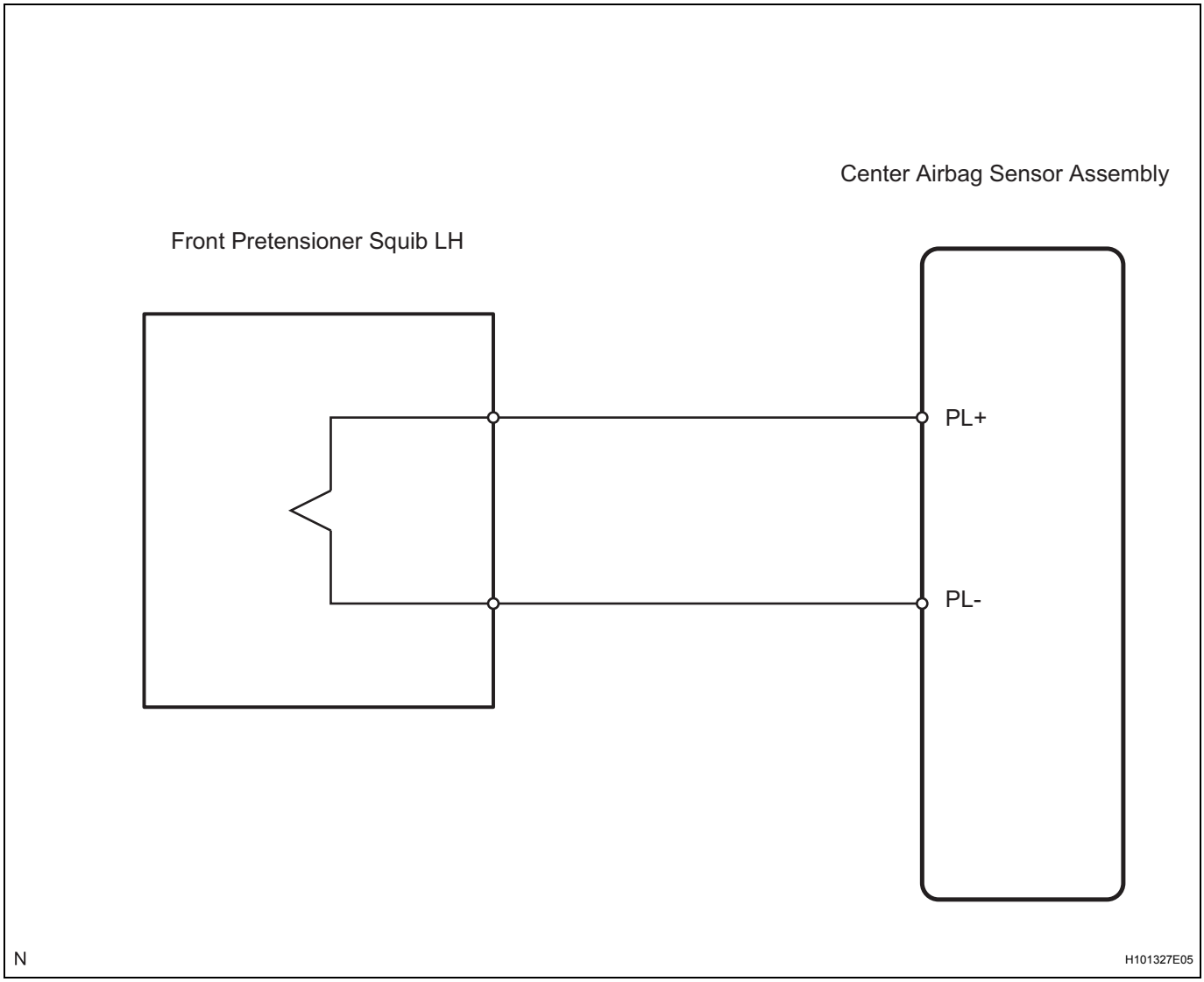
RS

This circuit instructs the SRS to deploy when deployment conditions are met.

DTC B0136/74 is recorded when an open is detected in the front pretensioner squib LH circuit.

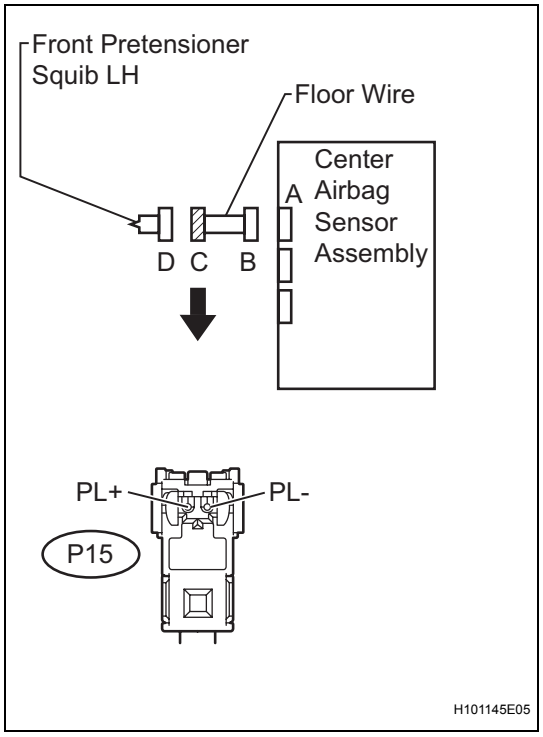
DTC No.	DTC Detection Condition	Trouble Area
B0136/74	• Open in front pretensioner squib LH circuit • Front pretensioner squib LH malfunction • Center airbag sensor malfunction	• Front seat outer belt assembly LH (front pretensioner squib LH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat outer belt LH.
(d) Measure the resistance according to the value(s) in the table below.

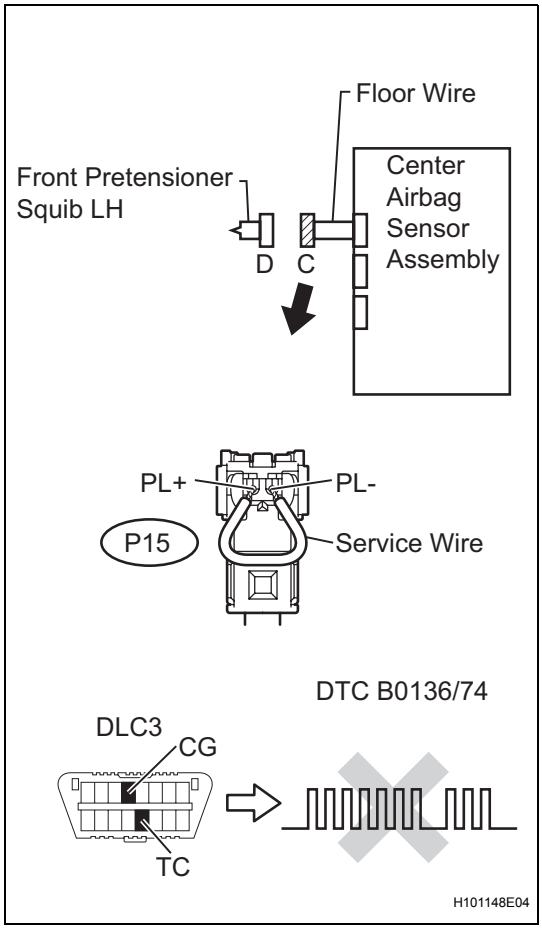
Standard resistance

Tester Connection (Connector "C")	Specified Condition
P15-1 (PL+) - P15-2 (PL-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



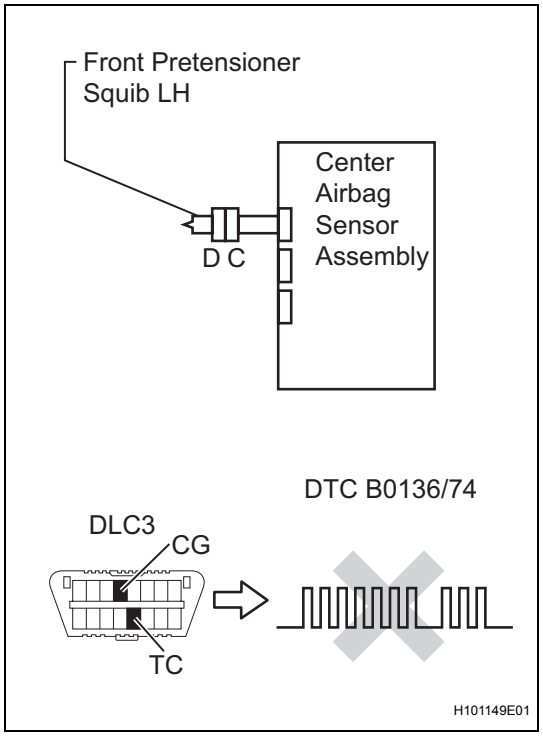
(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals PL+ and PL- of connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0136/74 is not output.
HINT:
Codes other than code B0136/74 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT OUTER BELT ASSEMBLY LH (FRONT PRETENSIONER SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the front seat outer belt assembly LH (front pretensioner squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0136/74 is not output.

HINT:

Codes other than code B0136/74 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY LH**

OK

USE SIMULATION METHOD TO CHECK

DTC	B0137/71	Short to GND in Front Pretensioner Squib LH Circuit

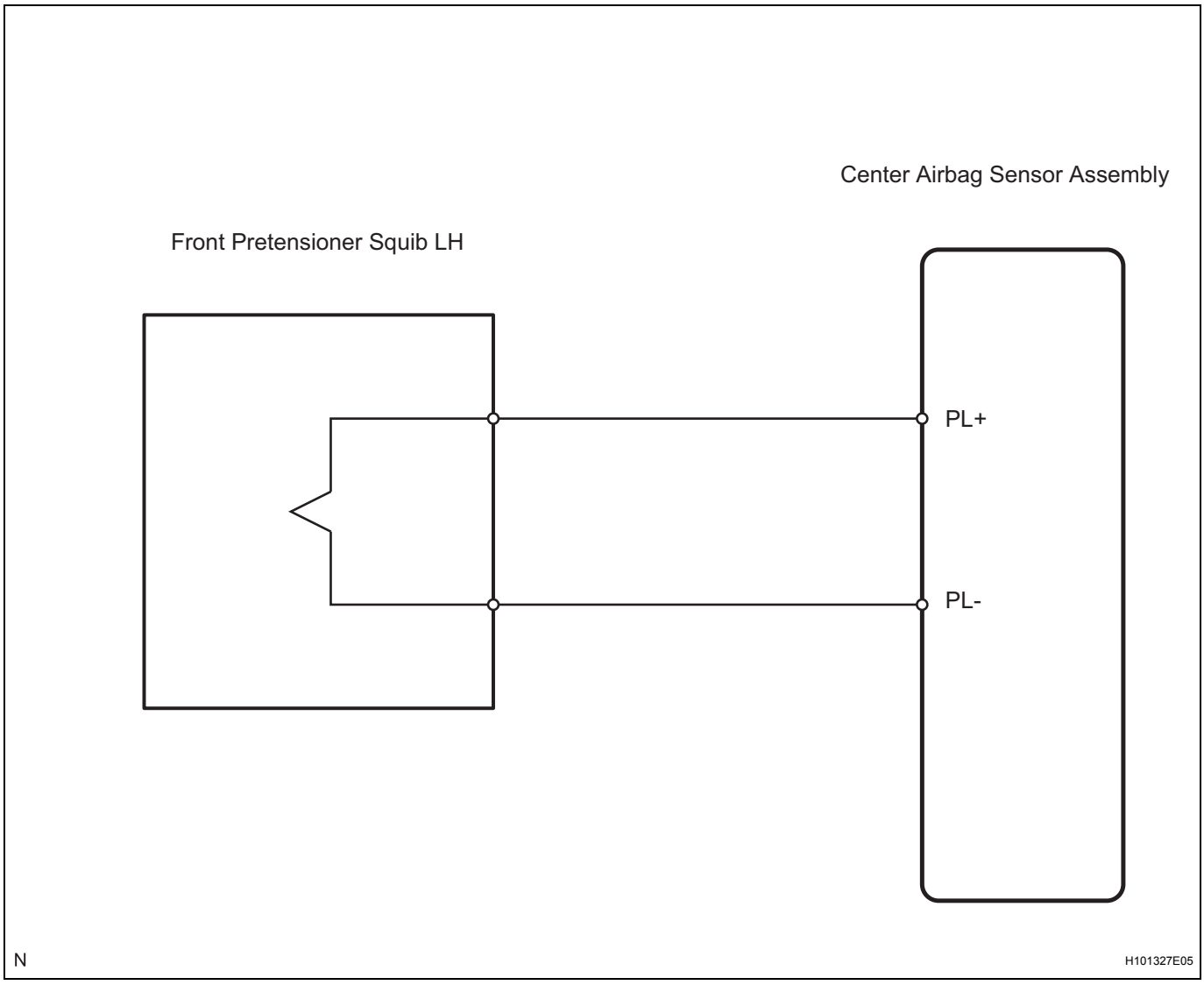
DESCRIPTION

RS

The front pretensioner squib LH circuit consists of the center airbag sensor and the front seat outer belt assembly LH (seat belt pretensioner LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0137/71 is recorded when a ground short is detected in the front pretensioner squib LH circuit.

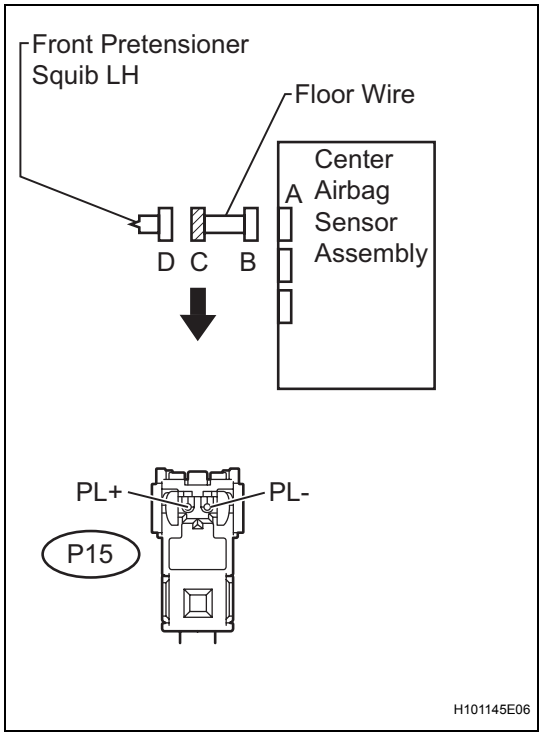
DTC No.	DTC Detection Condition	Trouble Area
B0137/71	• Short in front pretensioner squib LH circuit (to ground) • Front pretensioner squib LH malfunction • Center airbag sensor malfunction	• Front seat outer belt assembly LH (front pretensioner squib LH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat outer belt LH.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

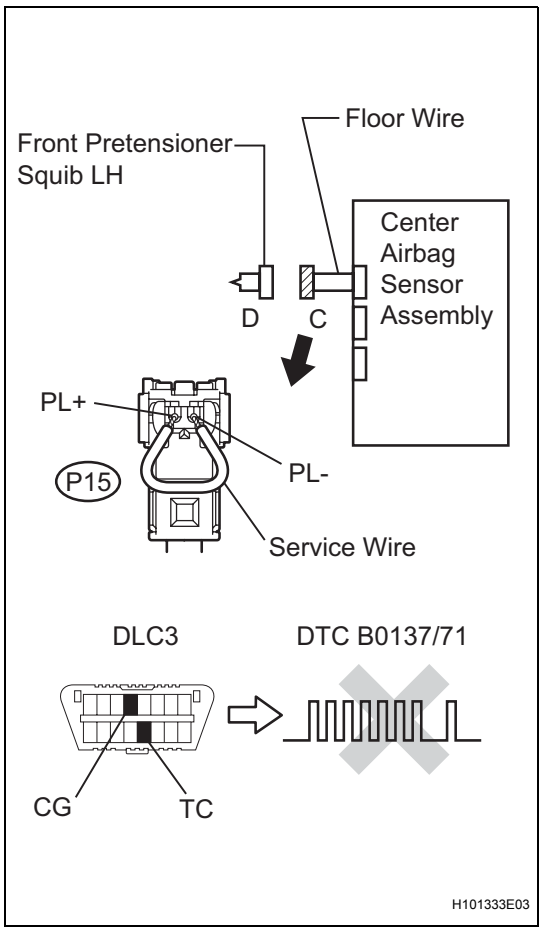
Tester Connection (Connector "C")	Specified Condition
P15-1 (PL+) - Body ground	1 MΩ or higher
P15-2 (PL-) - Body ground	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



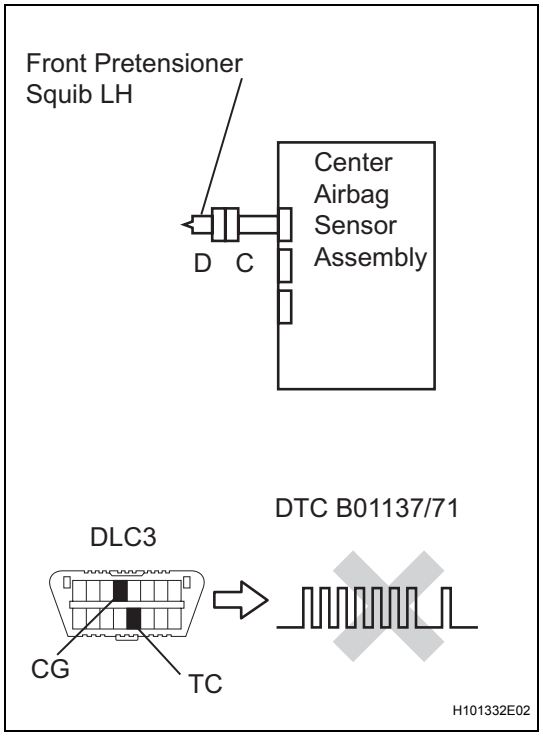
(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals PL+ and PL- of connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0137/71 is not output.
HINT:
Codes other than code B0137/71 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT SEAT OUTER BELT ASSEMBLY LH (FRONT PRETENSIONER SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat outer belt LH (front pretensioner squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0137/71 is not output.

HINT:

Codes other than code B0137/71 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY LH**

OK

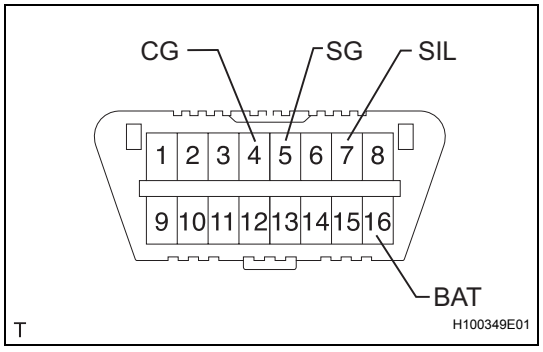
4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

Terminal No.	Symbol	Destination
A10-28	E2	Ground
A9-2	LBE-	Front Seat Inner Belt Assembly LH
A9-3	LSP-	Seat Position Airbag Sensor
A9-4	LSP+	Seat Position Airbag Sensor
A9-7	PL-	Front Seat Outer Belt Assembly LH (Squib)
A9-8	PL+	Front Seat Outer Belt Assembly LH (Squib)
A9-9	ICL+	Curtain Shield Airbag Assembly LH (Squib)
A9-10	ICL-	Curtain Shield Airbag Assembly LH (Squib)
A9-11	SFL-	Front Seat Side Airbag Assembly LH (Squib)
A9-12	SFL+	Front Seat Side Airbag Assembly LH (Squib)
A9-16	BBL+	Side Airbag Sensor Assembly LH
A9-18	BBL-	Side Airbag Sensor Assembly LH
A9-19	LBE+	Front Seat Inner Belt Assembly LH
A11-3	RBE-	Front Seat Inner Belt Assembly RH
A11-5	SFR+	Front Seat Side Airbag Assembly RH (Squib)
A11-6	SFR-	Front Seat Side Airbag Assembly RH (Squib)
A11-7	ICR-	Curtain Shield Airbag Assembly RH (Squib)
A11-8	ICR+	Curtain Shield Airbag Assembly RH (Squib)
A11-9	PR+	Front Seat Outer Belt Assembly RH (Squib)
A11-10	PR-	Front Seat Outer Belt Assembly RH (Squib)
A11-14	RBE+	Front Seat Inner Belt Assembly RH
A11-15	BBR-	Side Airbag Sensor Assembly RH
A11-17	BBR+	Side Airbag Sensor Assembly RH



DIAGNOSIS SYSTEM

1. CHECK DLC3

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V

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

HINT:

- Connect the cable of the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

2. FUNCTION OF SRS WARNING LIGHT

(a) Primary check

(1) Turn the ignition switch to the LOCK position. Wait at least 2 seconds, then turn the ignition switch to the ON position. The SRS warning light comes on for approximately 6 seconds and the diagnosis of the SRS airbag system (including the seat belt) is performed.

HINT:

If trouble is detected during the primary check, the SRS warning light remains on or blinks even after the primary check period (approximately 6 seconds) has elapsed.

(b) Constant check

(1) After the primary check, the center airbag sensor assembly activates the SRS airbag system and constantly monitors it for trouble .

HINT:

If malfunctions are detected during the constant check, the center airbag sensor functions as follows:

- The SRS warning light comes on or blinks.
- The SRS warning light comes on, and then goes off. This blinking pattern indicates the source voltage drop. The SRS warning light goes off 10 seconds after the source voltage returns to normal.

(c) Review

(1) When the airbag system is normal:

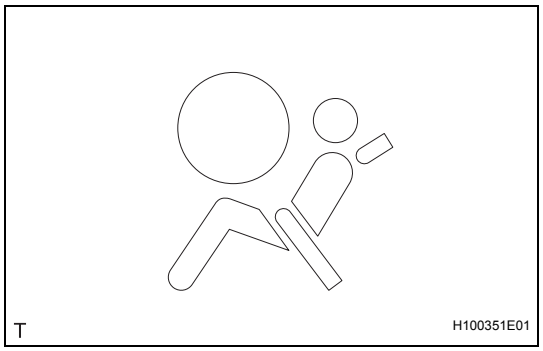
The SRS warning light comes on only during the primary check period (for approximately 6 seconds after the ignition switch is turned to the ON position).

(2) When the airbag system has trouble:

- The SRS warning light remains on or blinks even after the primary check period has elapsed.
- The SRS warning light goes off after the primary check, but comes on or blinks again during the constant check.
- The SRS warning light does not come on when turning the ignition switch from the LOCK to ON position.

HINT:

The center airbag sensor assembly keeps the SRS warning light ON if the airbag has been deployed.



3. SRS WARNING LIGHT CHECK

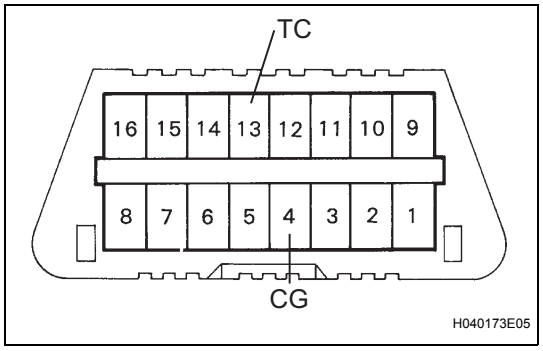
(a) Turn the ignition switch to the ON position, and check that the SRS warning light comes on for approximately 6 seconds (primary check).

(b) Check that the SRS warning light goes off approximately 6 seconds after the ignition switch is turned to the ON position (constant check).

HINT:

When any of the following symptoms occurs, refer to the "Problem Symptoms Table" (See page RS-25).

- When the SRS warning light comes on occasionally even after the primary check period has elapsed, an open or short in the SRS warning light circuit is suspected.
- When the SRS warning light comes on even when the ignition switch is in the LOCK position, trouble in the power source or combination meter assembly is suspected.
- When the ignition switch is turned from the LOCK to ON position, the SRS warning light does not come on.



DTC CHECK / CLEAR

1. CHECK DTC (USING SST CHECK WIRE)

(a) Check the DTCs (present trouble code).

(1) Turn the ignition switch to the ON position, and wait for approximately 60 seconds.

(2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(b) Output the DTCs (past trouble code).

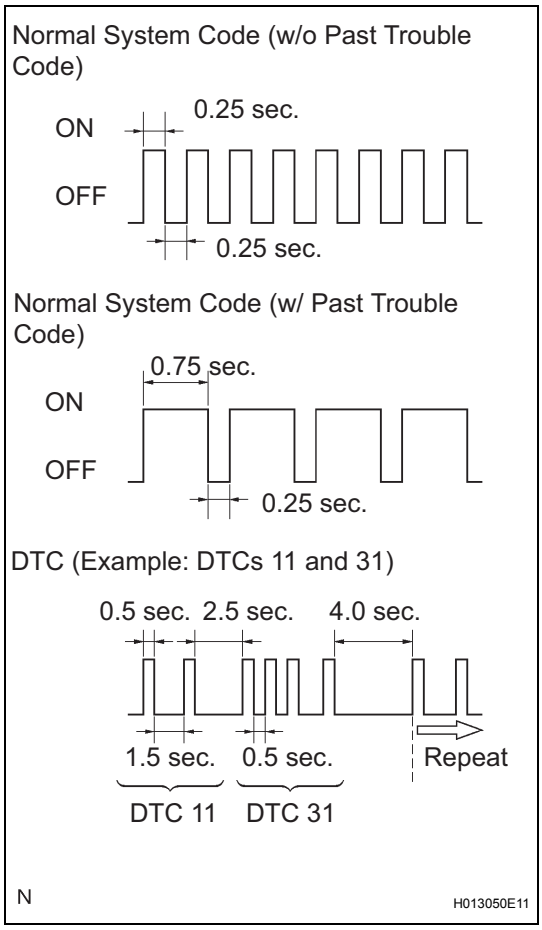
(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(2) Turn the ignition switch to the ON position, and wait for approximately 60 seconds.



(c) Read the DTCs.

(1) Read the blinking patterns of the DTCs.
Examples of the blinking patterns for a normal system code and DTCs 11 and 31 are shown in the illustration.

- Normal system code indication (w/o past trouble code)
  The light blinks twice per second.
- Normal system code indication (w/ past trouble code)
  When the past trouble code is stored in the center airbag sensor assembly, the light blinks only once per second.
- Trouble code indication
  The first blinking pattern indicates the first DTC. If there is more than 1 code, there will be a 2.5-second pause between each code. After all codes are shown, there will be a 4.0-second pause, and they all will be repeated.

HINT:

- If 2 or more malfunctions are found, the indication begins with the smaller numbered code.
- If DTCs are indicated without connecting the terminals, proceed to the "TC and CG Terminal Circuit" (see page RS-283).

2. CLEAR DTC (USING SST CHECK WIRE)

(a) Clear the DTCs.

(1) When the ignition switch is turned OFF, the DTCs are cleared.
HINT:
Depending on the DTC, the code may not be cleared by turning OFF the ignition switch. In this case, proceed to the next procedure.

(2) Using SST, connect terminals TC and CG of the DLC3, and then turn the ignition switch to the ON position.
SST 09843-18040

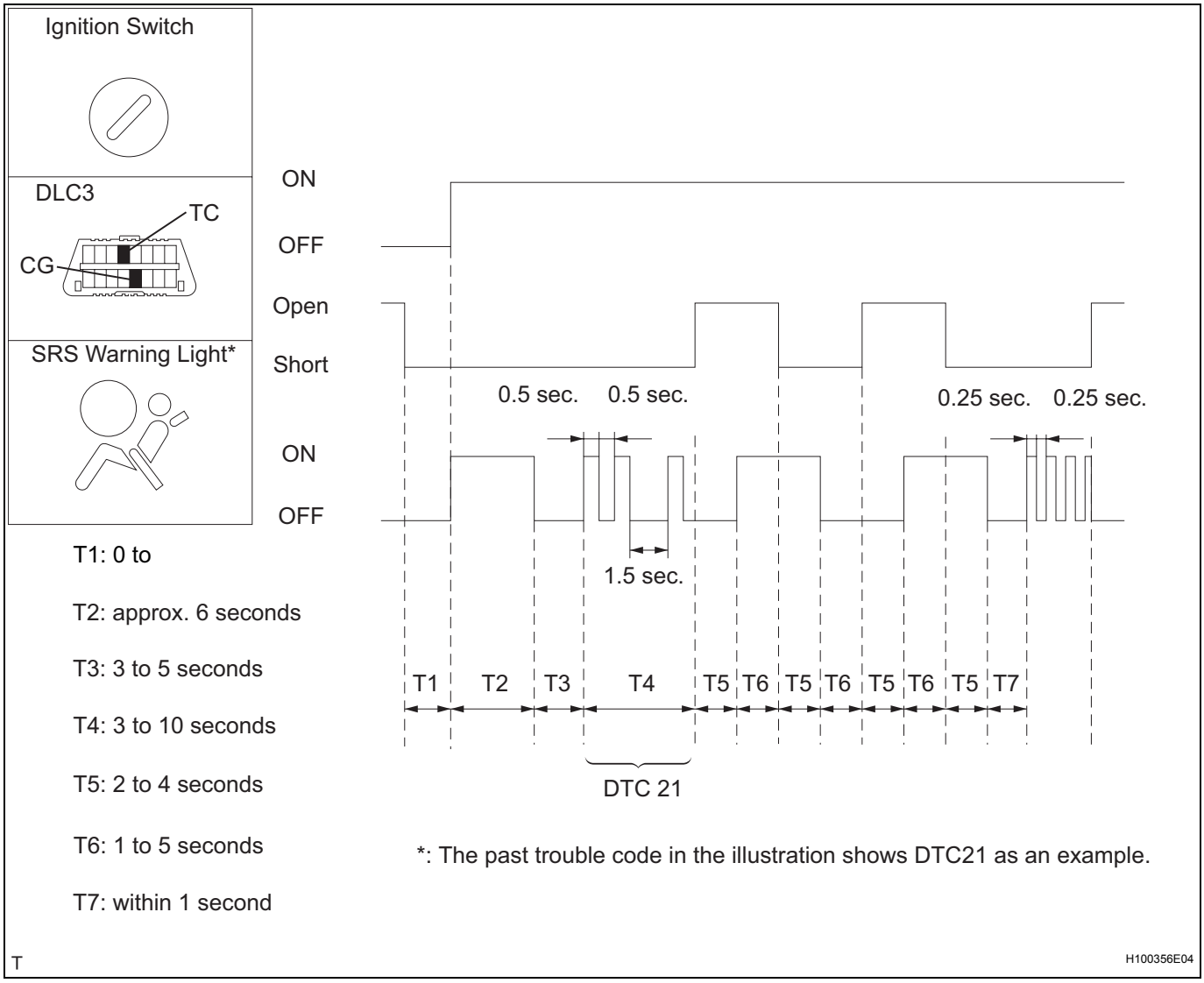
(3) Disconnect terminal TC of the DLC3 within 3 to 10 seconds after the DTCs are output, and check if the SRS warning light comes on after 3 seconds.

(4) Within 2 to 4 seconds after the SRS warning light comes on, connect terminals TC and CG of the DLC3.

(5) The SRS warning light should go off within 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Then disconnect terminal TC within 2 to 4 seconds after the SRS warning light goes off.

(6) The SRS warning light comes on again within 2 to 4 seconds after disconnecting terminal TC. Then, reconnect terminals TC and CG within 2 to 4 seconds after the SRS warning light comes on.

(7) Check if the SRS warning light goes off within 2 to 4 seconds after connecting terminals TC and CG of the DLC3, and the normal system code is output within 1 second after the SRS warning light goes off.
If DTCs are not cleared, repeat this procedure until the codes are cleared.



T1: 0 to

T2: approx. 6 seconds

T3: 3 to 5 seconds

T4: 3 to 10 seconds

T5: 2 to 4 seconds

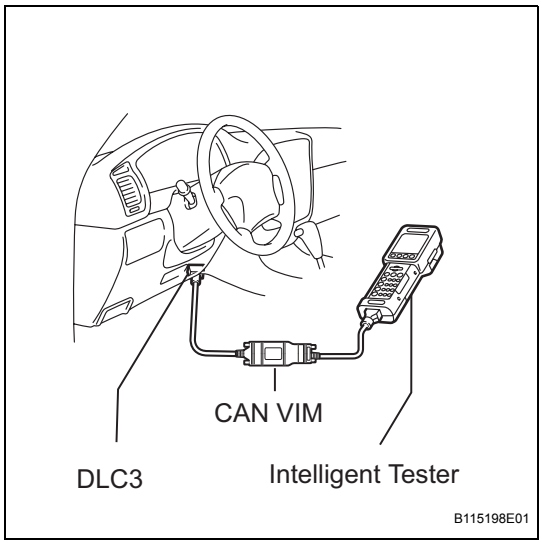
T6: 1 to 5 seconds

T7: within 1 second

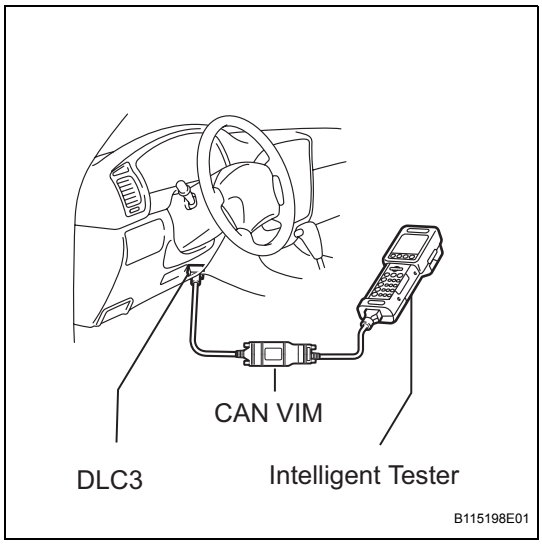
*: The past trouble code in the illustration shows DTC21 as an example.

T

H100356E04



3. **DTC CHECK (USING INTELLIGENT TESTER)**
   (a) Connect the intelligent tester (with CAN VIM) to the DLC3.
   (b) Turn the ignition switch to the ON position.
   (c) Read the DTCs by following the prompts on the tester screen.
   HINT:
   Refer to the intelligent tester operator's manual for further details.
4. **CLEAR DTC (USING INTELLIGENT TESTER)**
   (a) Connect the intelligent tester (with CAN VIM) to the DLC3.
   (b) Turn the ignition switch to the ON position.
   (c) Clear the DTCs by following the prompts on the tester screen.
   HINT:
   Refer to the intelligent tester operator's manual for further details.



CHECK MODE PROCEDURE

1. **CHECK MODE (SIGNAL CHECK) DTC CHECK**
   (a) Connect the intelligent tester (with CAN VIM) to the DLC3.
   (b) Turn the ignition switch ON.
   (c) Select the Signal Check, and check using the intelligent tester.
   HINT:
   - Check mode is more sensitive to malfunctions than normal mode.
   - If the normal system code is output in normal mode even when a sensor signal malfunction is suspected, perform the inspection in check mode.

DTC	B0138/72	Short to B+ in Front Pretensioner Squib LH Circuit

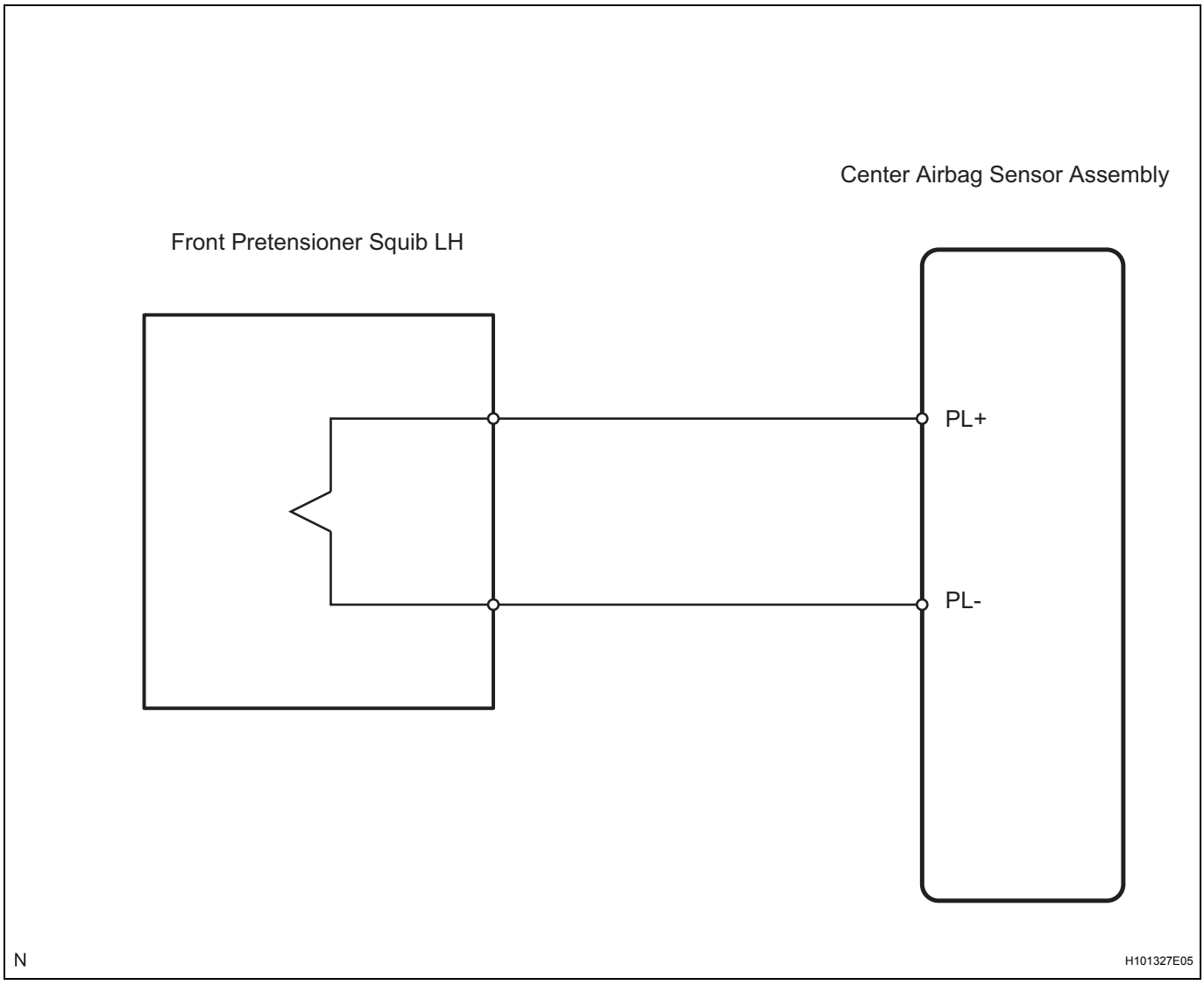
DESCRIPTION

RS

The front pretensioner squib LH circuit consists of the center airbag sensor and front seat outer belt assembly LH (seat belt pretensioner LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0138/72 is recorded when a B+ short is detected in the front pretensioner squib LH circuit.

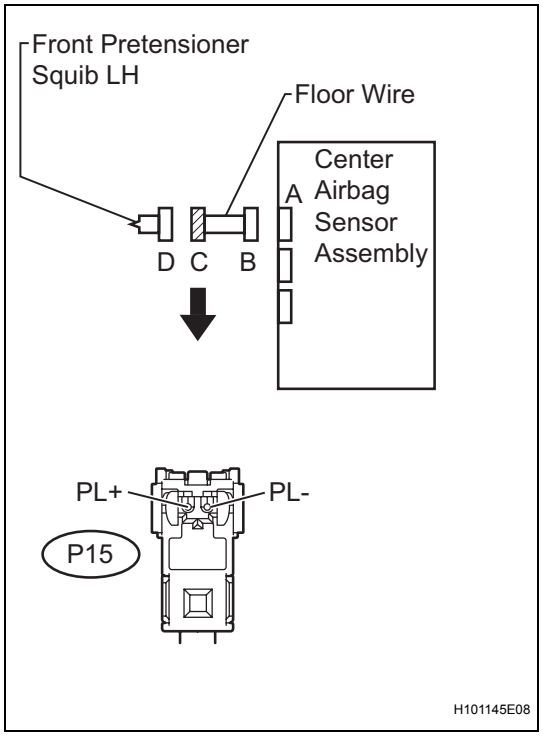
DTC No.	DTC Detection Condition	Trouble Area
B0138/72	• Short in front pretensioner squib LH circuit (to B+) • Front pretensioner squib LH malfunction • Center airbag sensor malfunction	• Front seat outer belt assembly LH (front pretensioner squib LH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK FLOOR WIRE (FRONT PRETENSIONER SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front seat outer belt assembly LH.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON.
(f) Measure the voltage according to the value(s) in the table below.

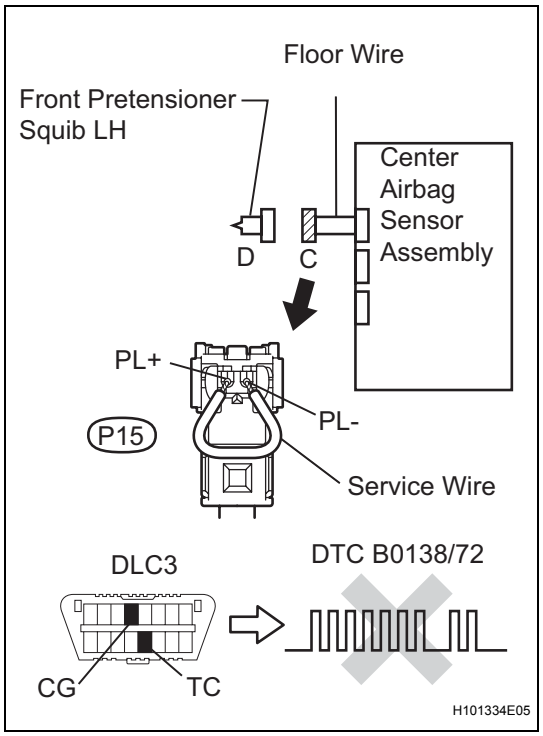
Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
P15-1 (PL+) - Body ground	Ignition switch ON	Below 1 V
P15-2 (PL-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect terminals PL+ and PL- of connector "C".

NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:
DTC B0138/72 is not output.

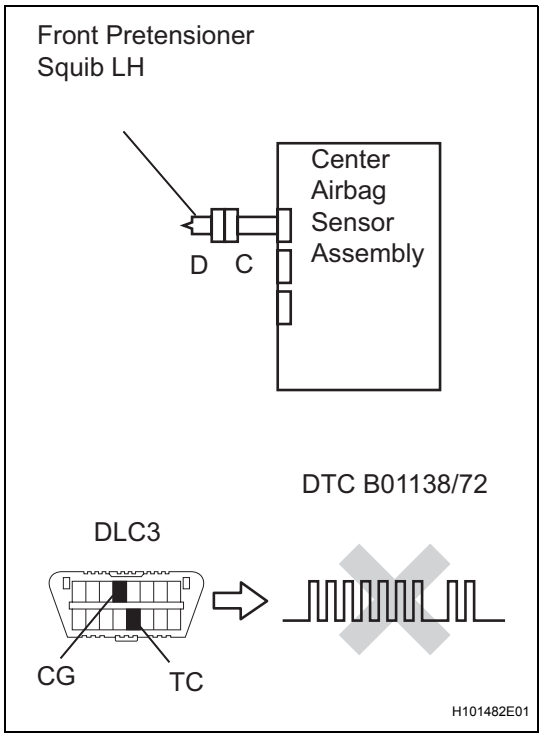
HINT:
Codes other than code B0138/72 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

RS

OK

3	CHECK FRONT SEAT OUTER BELT ASSEMBLY LH (FRONT PRETENSIONER SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the front seat outer belt LH (front pretensioner squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B0138/72 is not output.
HINT:
Codes other than code B0138/72 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY LH**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B1100/31	Center Airbag Sensor Assembly Malfunction

DESCRIPTION

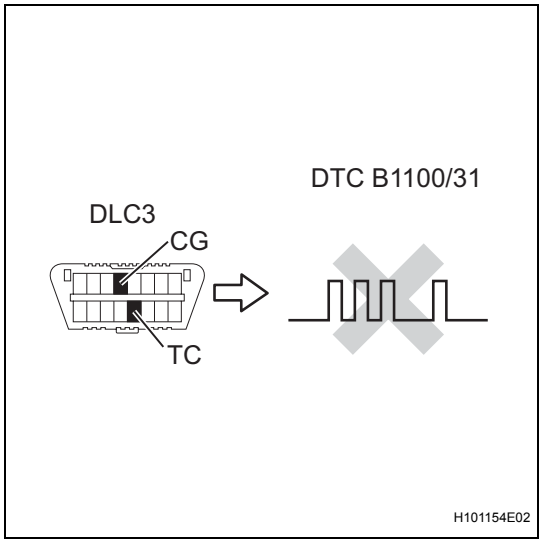
The center airbag sensor consists of the airbag sensor, safing sensor, drive circuit, diagnosis circuit and ignition control.
It receives signals from the airbag sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunctions.
DTC B1100/31 is recorded when occurrence of a malfunction in the center airbag sensor is detected.

DTC No.	DTC Detection Condition	Trouble Area
B1100/31	• Center airbag sensor malfunction • Malfunction of electrical connection check mechanism of center airbag sensor connector*	• Center airbag sensor assembly • Electrical connection check mechanism*

HINT:
- *: w/ Side airbag
- When a malfunction code other than code B1100/31 is displayed at the same time, first repair the malfunction indicated by the malfunction code other than code B1100/31.

INSPECTION PROCEDURE

1	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the stored DTCs in the memory (see page RS-30).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page RS-30).
OK:
DTC B1100/31 is not output.
HINT:
Codes other than code B1100/31 may be output at this time, but they are not related to this check.

NG → **USE SIMULATION METHOD TO CHECK**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor.

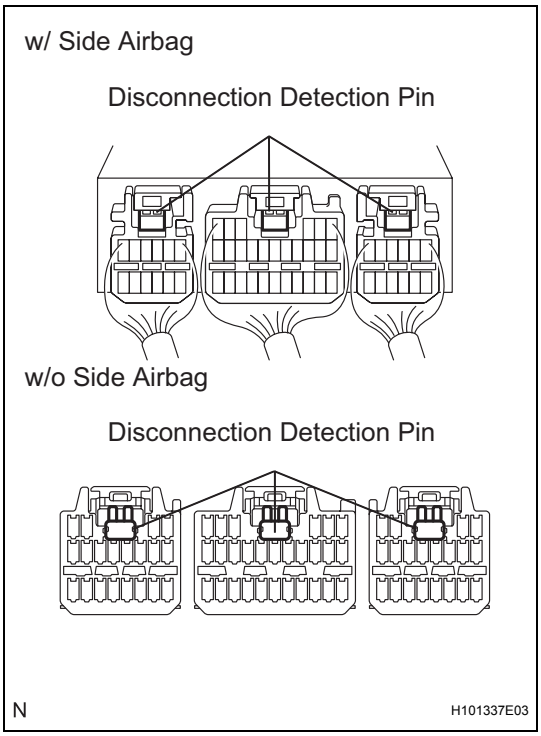
OK:
The connectors are connected.

NG → **Go to step 4**

OK

RS

3	PERFORM VISUAL CHECK OF DISCONNECTION DETECTION PIN

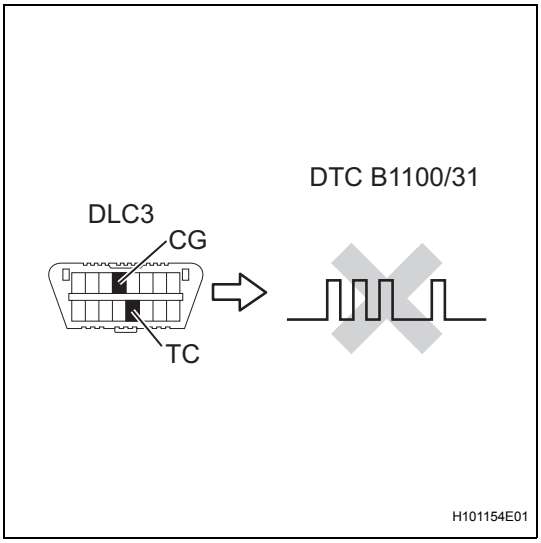


(a) Disconnect the connectors from the center airbag sensor.
(b) Check the disconnection detection pin of the connector.
HINT:
Compare the one connector with the other 2 connectors.
OK:
No deformation is identified.

NG → **REPAIR OR REPLACE CENTER AIRBAG SENSOR ASSEMBLY CONNECTOR**

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the stored DTCs in the memory (see page RS-30).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page RS-30).
OK:
DTC B1100/31 is not output.
HINT:
Codes other than code B1100/31 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

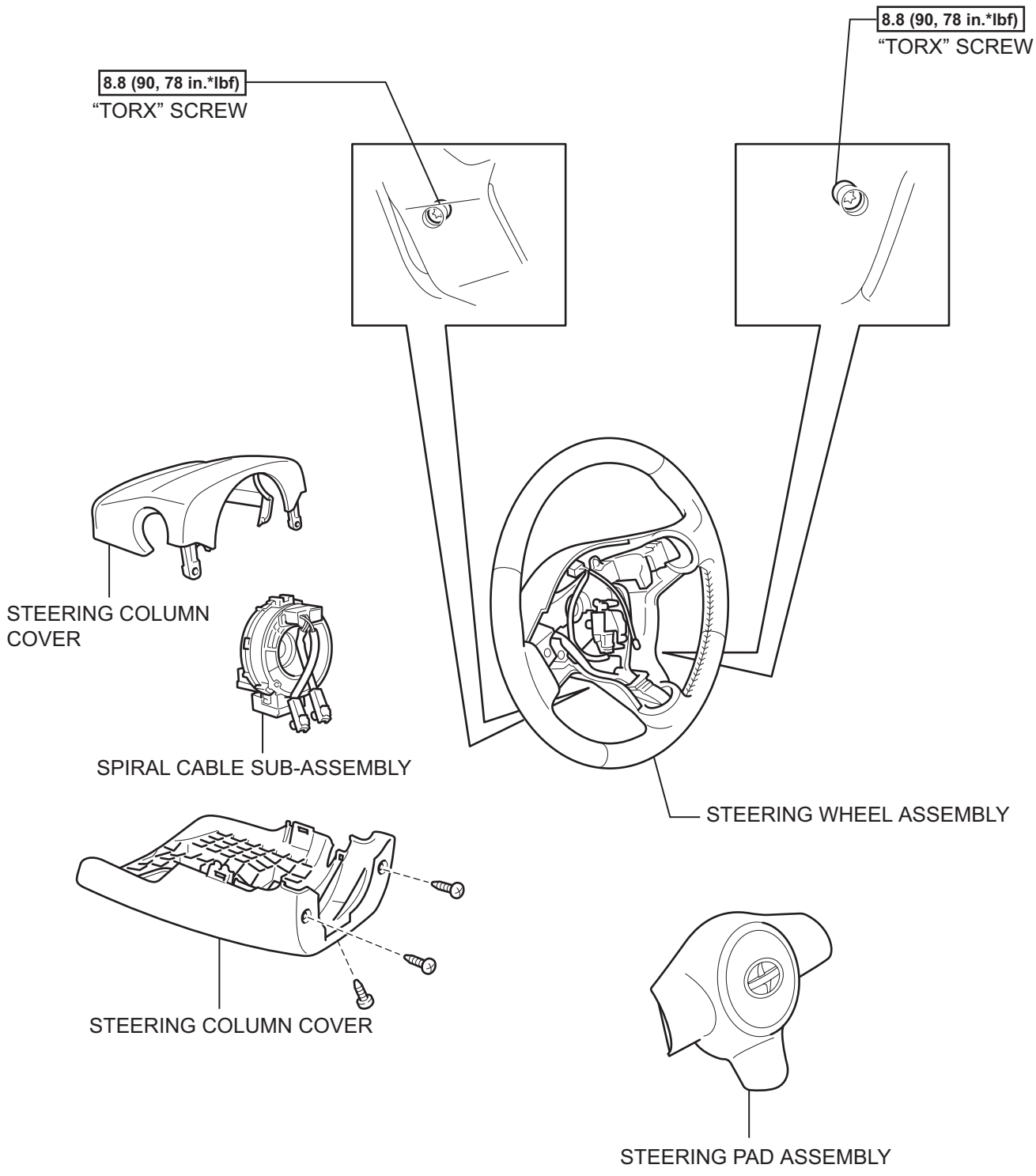
OK

USE SIMULATION METHOD TO CHECK

SPIRAL CABLE

COMPONENTS

RS



N*m (kgf*cm, ft.*lbf) : Specified torque

T

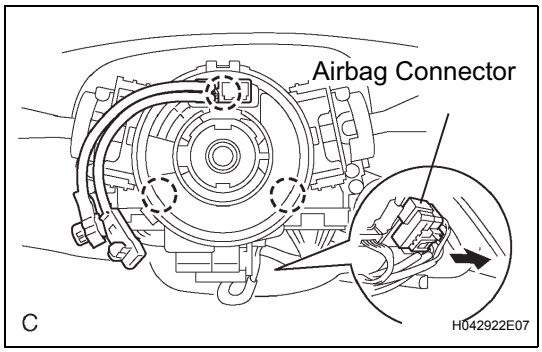
C119024E09

RS

REMOVAL

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE STEERING PAD ASSEMBLY (See page RS-288)**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-7)**
5. **REMOVE STEERING COLUMN COVER (See page SR-7)**
6. **REMOVE SPIRAL CABLE SUB-ASSEMBLY**
   (a) Disconnect the airbag connector.
   NOTICE:
   When handling the airbag connector, do not damage the airbag wire harness.
   (b) Detach the 3 claws and remove the spiral cable.



DTC	B1140/32	Side Airbag Sensor Assembly RH Circuit Malfunction

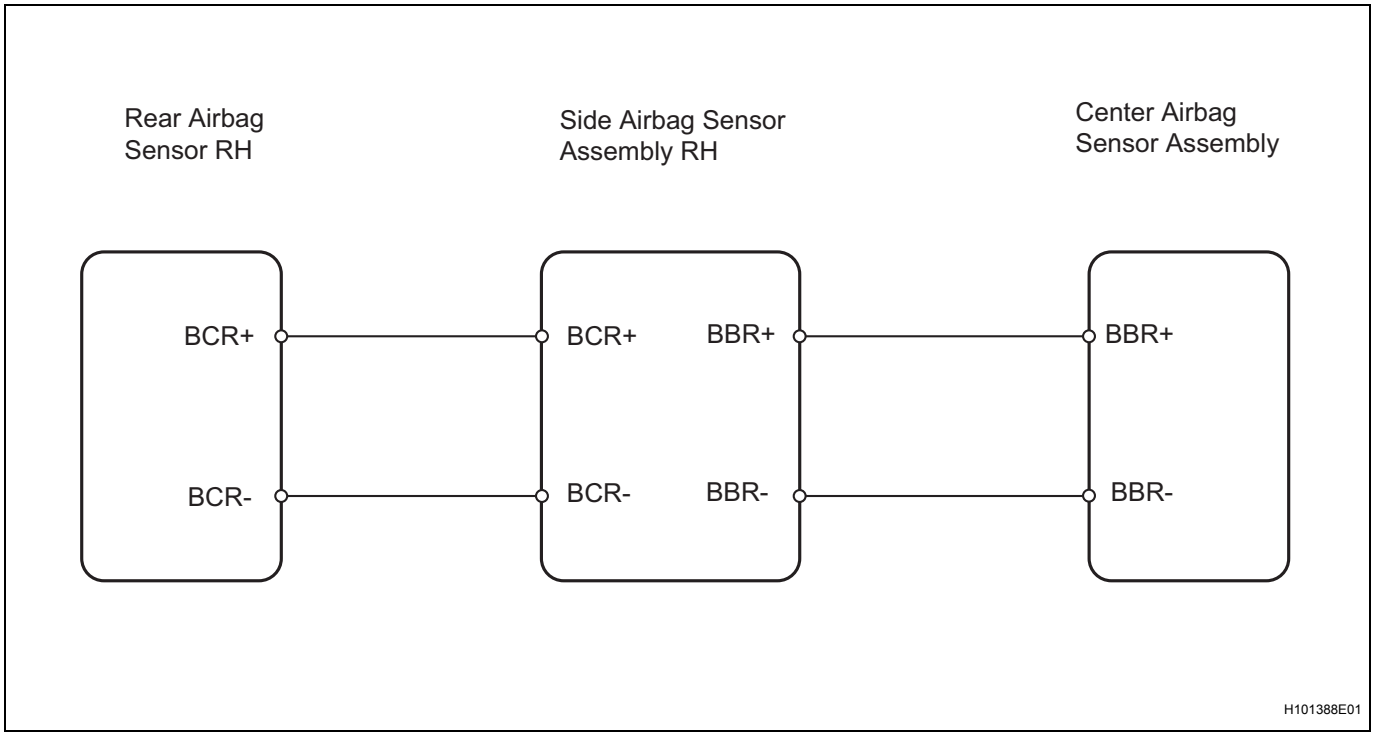
DESCRIPTION

RS

The side and curtain shield airbag sensor RH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunctions.
DTC B1140/32 is recorded when occurrence of a malfunction in the side and curtain shield airbag sensor RH is detected.

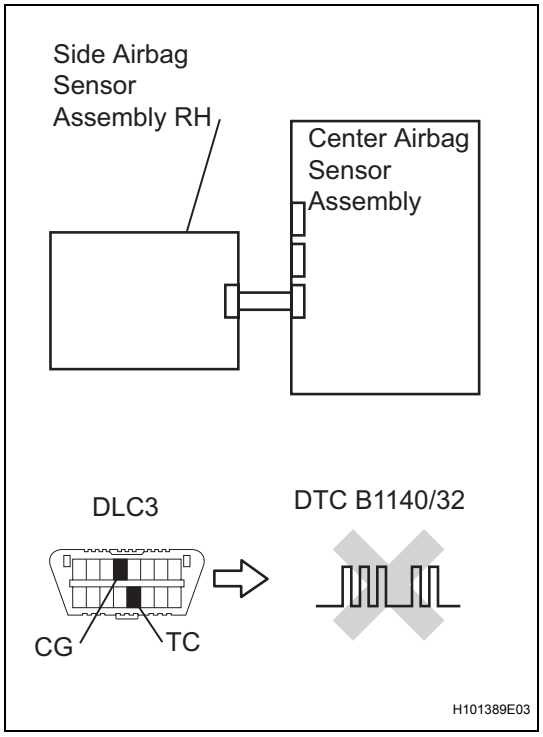
DTC No.	DTC Detection Condition	Trouble Area
B1140/32	• Short circuit in side airbag sensor RH wire harness (to ground) • Short circuit in side airbag sensor RH wire harness (to B+) • Short circuit in rear airbag sensor RH wire harness (to ground) • Short circuit in rear airbag sensor RH wire harness (to B+) • Open circuit in BBR+ wire harness or BBR- wire harness of side airbag sensor RH • Side airbag sensor RH malfunction • Center airbag sensor malfunction	• Side airbag sensor assembly RH • Center airbag sensor assembly • Rear airbag sensor RH • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the stored DTCs in the memory (see page RS-30).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page RS-30).

OK:

DTC B1140/32 is output.

HINT:

Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

OK → **USE SIMULATION METHOD TO CHECK**

NG

2	CHECK CONNECTION OF CONNECTOR

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor and the side airbag sensor RH.

OK:

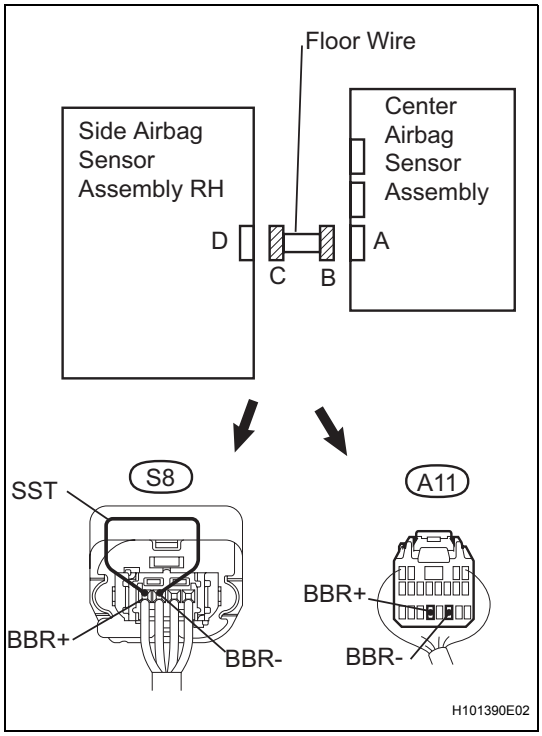
The connectors are connected.

NG → **CONNECT CONNECTORS**

OK

RS

3	CHECK FLOOR WIRE (OPEN)



(a) Disconnect the connectors from the center airbag sensor and the side airbag sensor RH.
(b) Using SST, connect terminals BBR+ and BBR- of connector "C".
SST 09843-18040

NOTICE:
Do not forcibly insert SST(s) into the terminals of the connector when connecting.

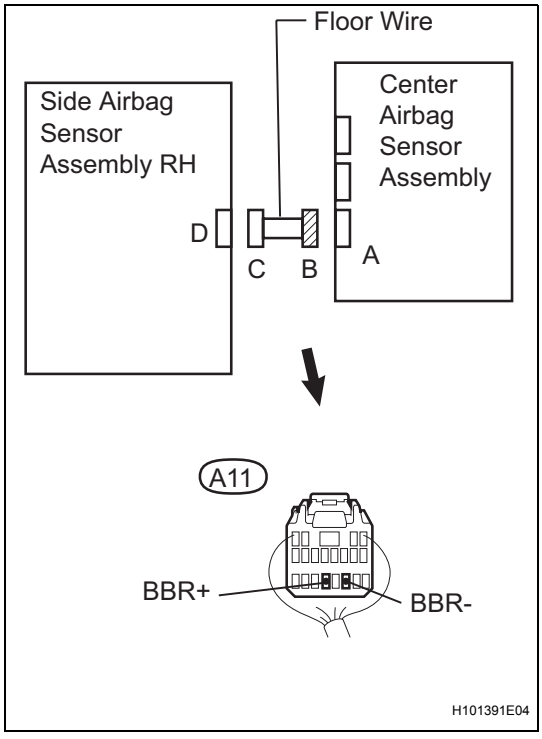
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A11-17 (BBR+) - A11-15 (BBR-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4	CHECK FLOOR WIRE (SHORT)



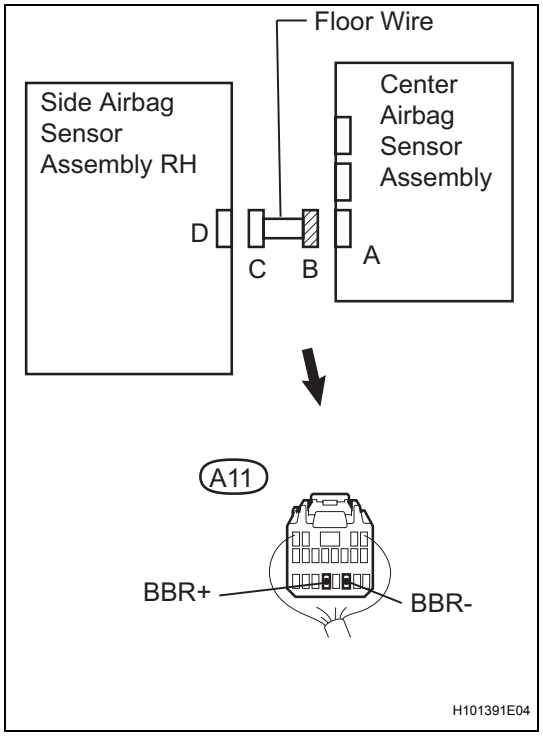
(a) Disconnect the service wire from the connector "C".
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A11-17 (BBR+) - A11-15 (BBR-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

5 CHECK FLOOR WIRE (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

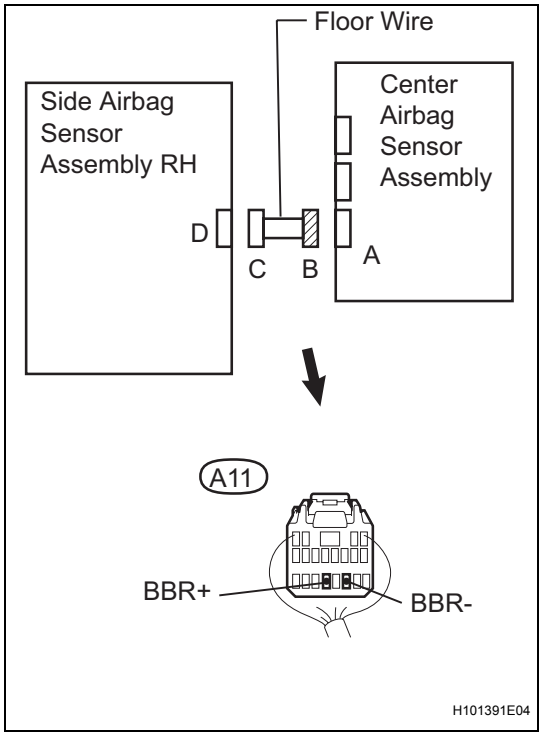
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A11-17 (BBR+) - Body ground	1 MΩ or higher
A11-15 (BBR-) - Body ground	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

6 CHECK FLOOR WIRE (TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

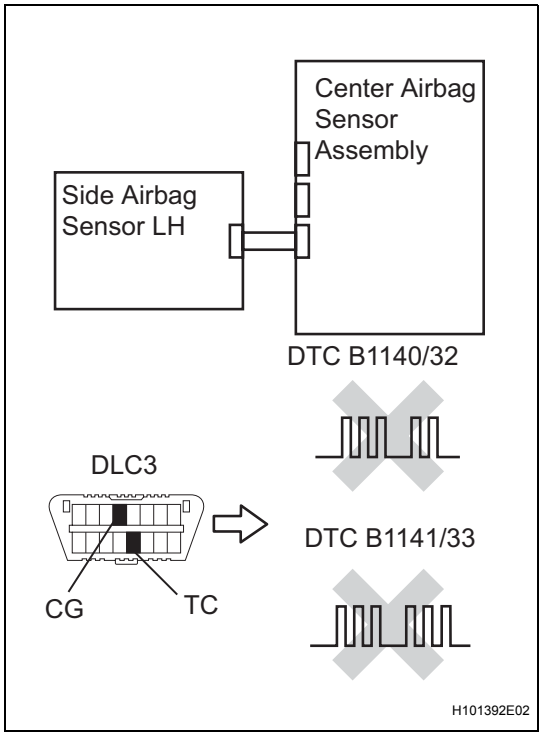
Tester Connection (Connector "B")	Condition	Specified Condition
A11-17 (BBR+) - Body ground	Ignition switch ON	Below 1 V
A11-15 (BBR-) - Body ground	Ignition switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

7	CHECK SIDE AIRBAG SENSOR ASSEMBLY RH



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Interchange the side airbag sensor assembly RH with LH and connect the connectors to them.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

A:
DTC B1140/32 is output or both DTC B1140/32 and DTC B1141/33 are output.

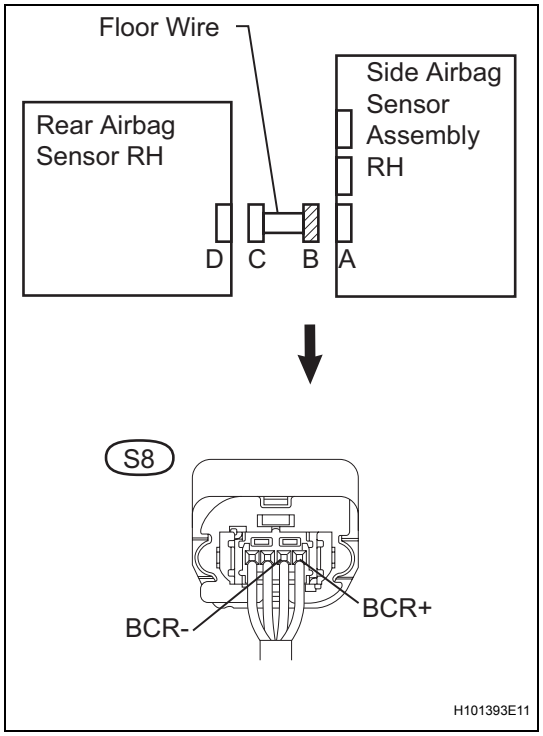
B:
DTC B1141/33 is output.

C:
DTC B1140/32 and DTC B1141/33 are not output.

B	**REPLACE SIDE AIRBAG SENSOR ASSEMBLY RH**
C	**USE SIMULATION METHOD TO CHECK**

A

8 CHECK FLOOR WIRE (SHORT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Return the interchanged side airbag sensor RH and LH back to their original positions and connect the connectors.
(d) Disconnect the connectors from the side airbag sensor RH and the rear airbag sensor RH.
(e) Measure the resistance according to the value(s) in the table below.

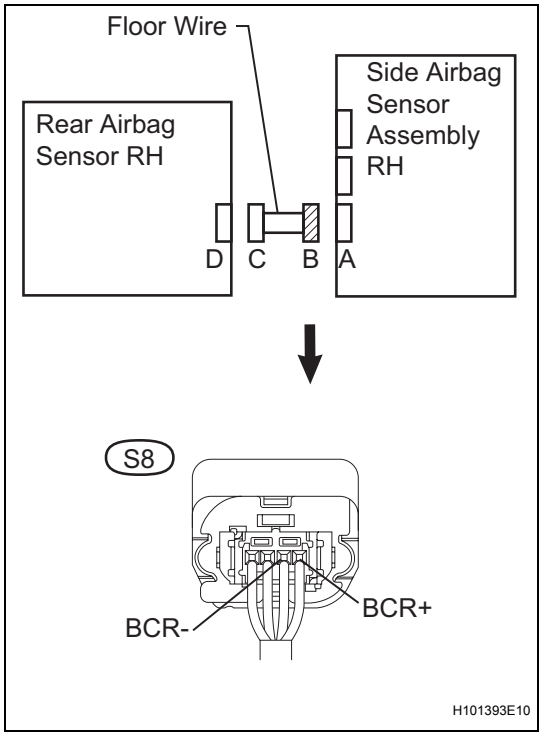
Standard resistance

Tester Connection (Connector "B")	Specified Condition
S8-1 (BCR+) - S8-2 (BCR-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

9 CHECK FLOOR WIRE (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

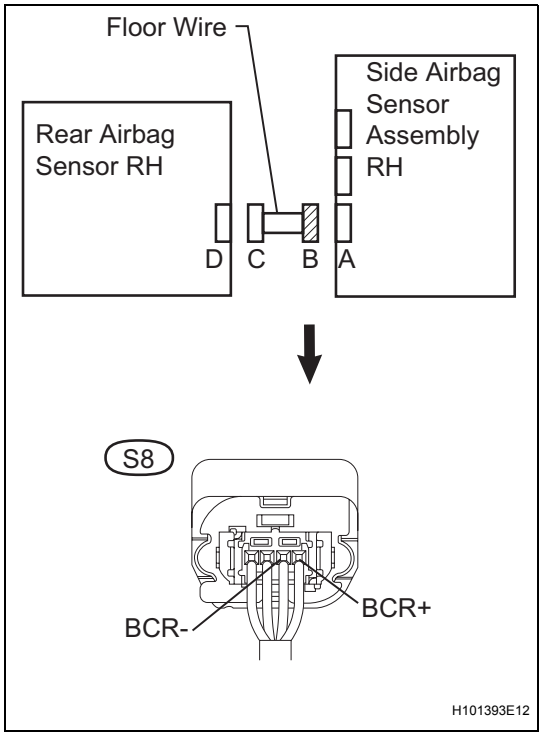
Tester Connection (Connector "B")	Specified Condition
S8-1 (BCR+) - Body ground	1 MΩ or higher
S8-2 (BCR-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

10 CHECK FLOOR WIRE (TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(b) Measure the voltage according to the value(s) in the table below.

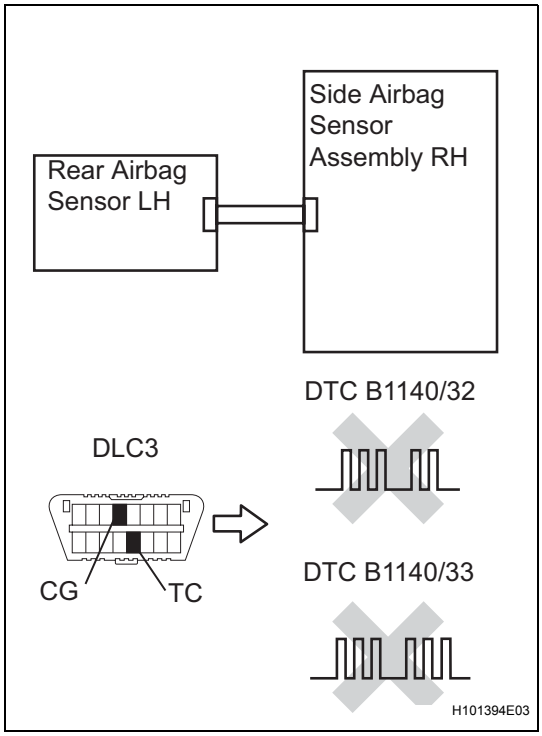
Standard voltage

Tester Connection (Connector "B")	Condition	Specified Condition
S8 (BCR+) - Body ground	Ignition switch ON	Below 1 V
S8 (BCR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

11 CHECK REAR AIRBAG SENSOR RH



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Interchange the rear airbag sensor RH with LH and connect the connectors to them..
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

A:
DTC B1140/32 is output or both DTC B1140/32 and DTC B1141/33 are output.

B:
DTC B1141/33 is output.

C:
DTC B1140/32 and DTC B1141/33 are not output.

A → REPLACE CENTER AIRBAG SENSOR ASSEMBLY

B → REPLACE REAR AIRBAG SENSOR RH

C

USE SIMULATION METHOD TO CHECK

DTC	B1141/33	Side Airbag Sensor Assembly LH Malfunction

DESCRIPTION

The side and curtain shield airbag sensor LH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor.

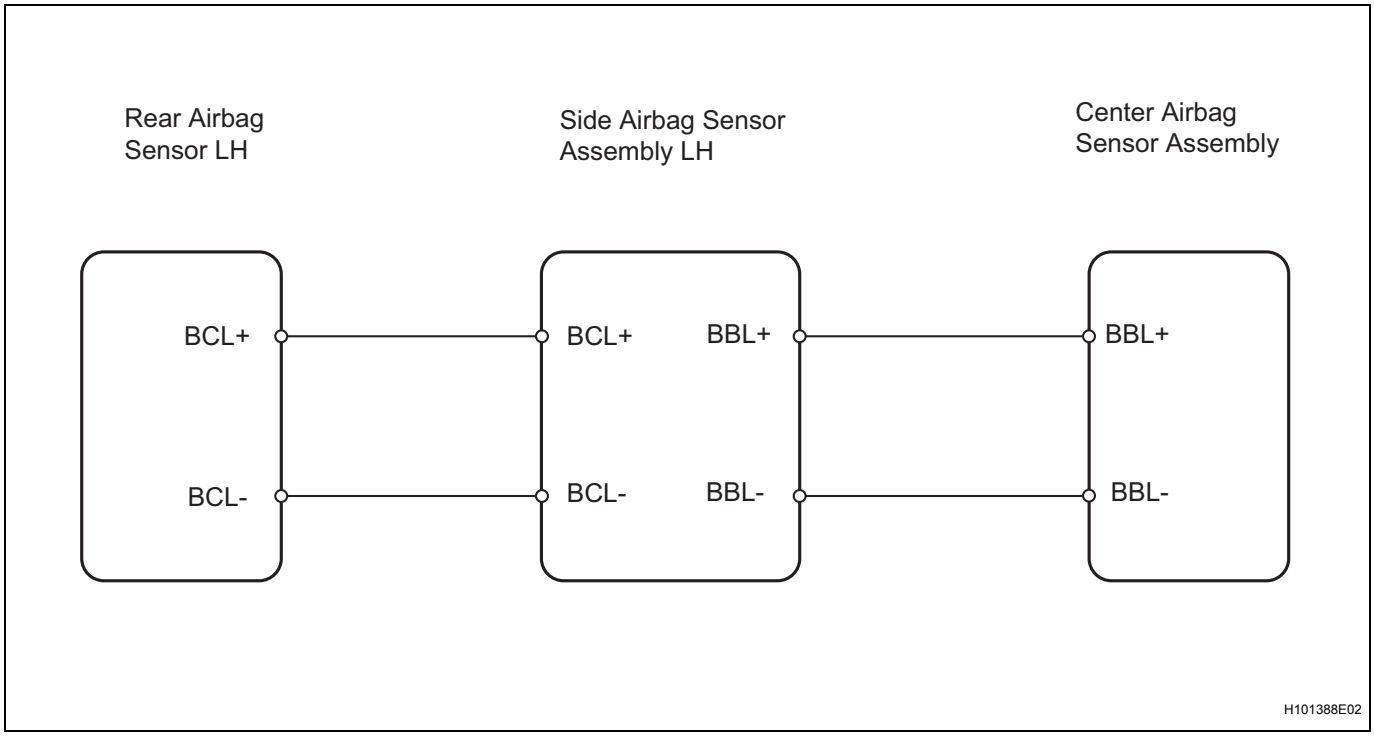
RS

It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunctions.

DTC B1141/33 is recorded when occurrence of a malfunction in the side and curtain shield airbag sensor LH is detected.

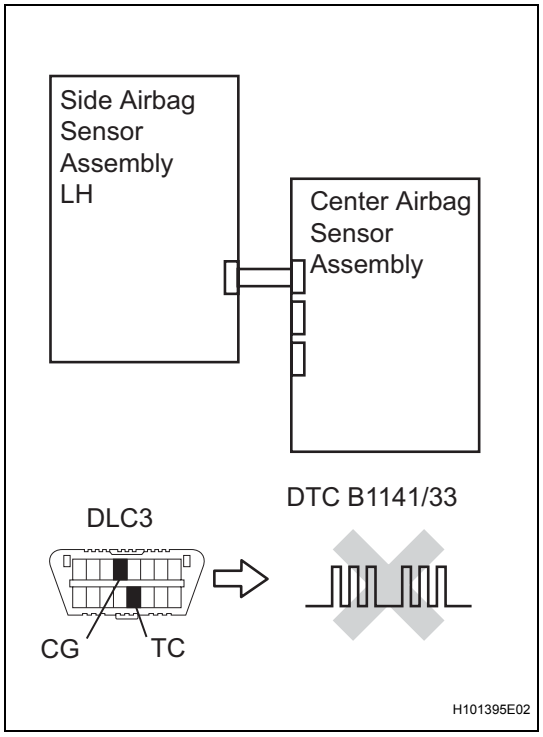
DTC No.	DTC Detection Condition	Trouble Area
B1141/33	• Short circuit in side airbag sensor LH wire harness (to ground) • Short circuit in side airbag sensor LH wire harness (to B+) • Short circuit in rear airbag sensor LH wire harness (to ground) • Short circuit in rear airbag sensor LH wire harness (to B+) • Open circuit in BBL+ wire harness or BBL- wire harness of side airbag sensor LH • Side airbag sensor LH malfunction • Center airbag sensor malfunction	• Side airbag sensor assembly LH • Center airbag sensor assembly • Rear airbag sensor LH • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the stored DTCs in the memory (see page RS-30).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page RS-30).

OK:

DTC B1141/33 is output.

HINT:

Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

OK → **USE SIMULATION METHOD TO CHECK**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor and the side airbag sensor LH.

OK:

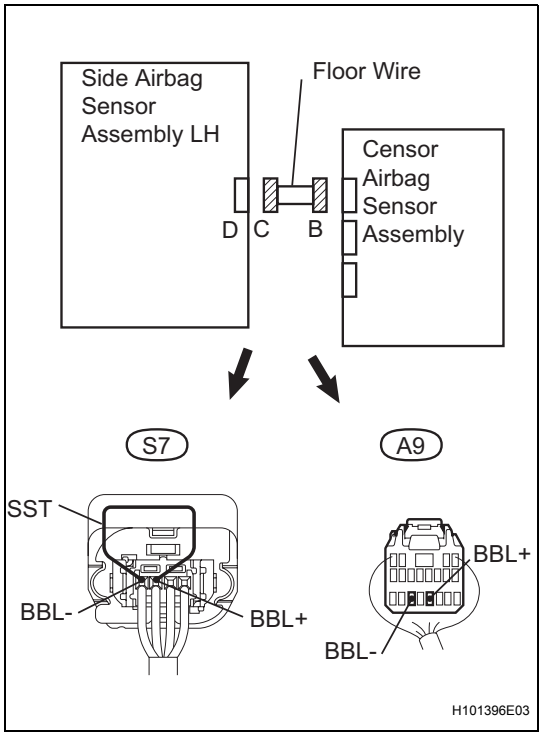
The connectors are connected.

NG → **CONNECT CONNECTORS**

OK

RS

3	CHECK FLOOR WIRE (OPEN)



(a) Disconnect the connectors from the center airbag sensor and the side airbag sensor LH.
(b) Using SST, connect terminals BBL+ and BBL- of connector "C".
SST 09843-18040

NOTICE:
Do not forcibly insert SST(s) into the terminals of the connector when connecting.

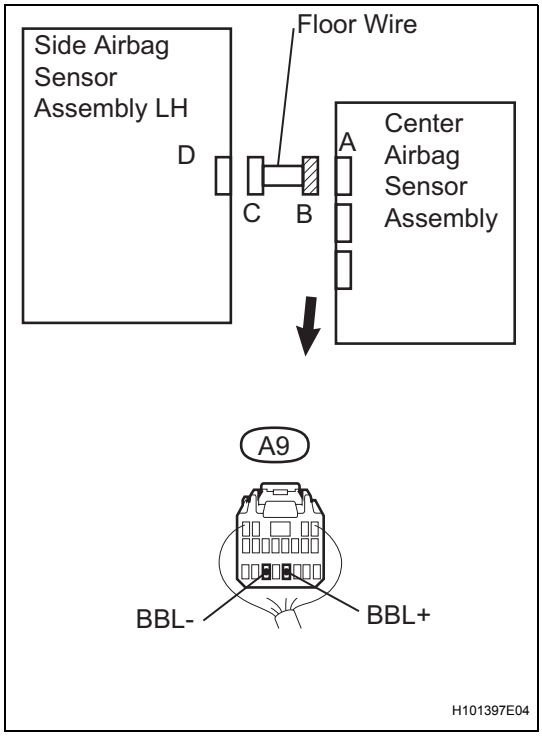
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A9-16 (BBL+) - A9-18 (BBL-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4	CHECK FLOOR WIRE (SHORT)



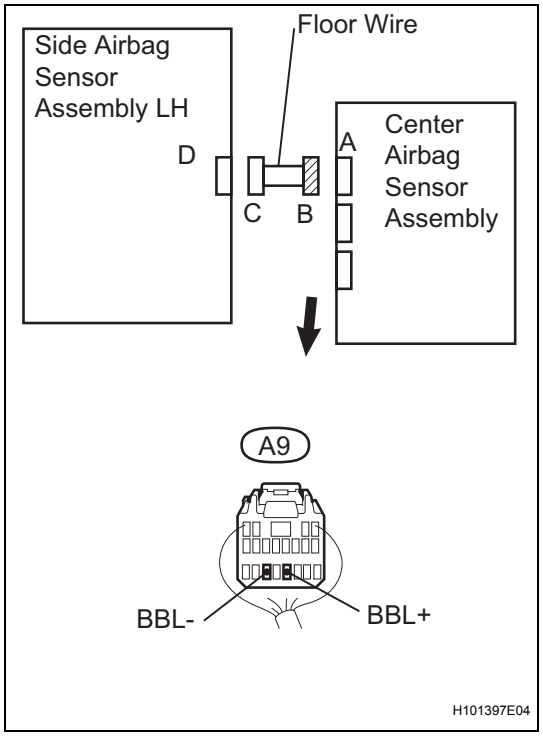
(a) Disconnect the service wire from the connector "C".
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A9-16 (BBL+) - A9-18 (BBL-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

5 CHECK FLOOR WIRE (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

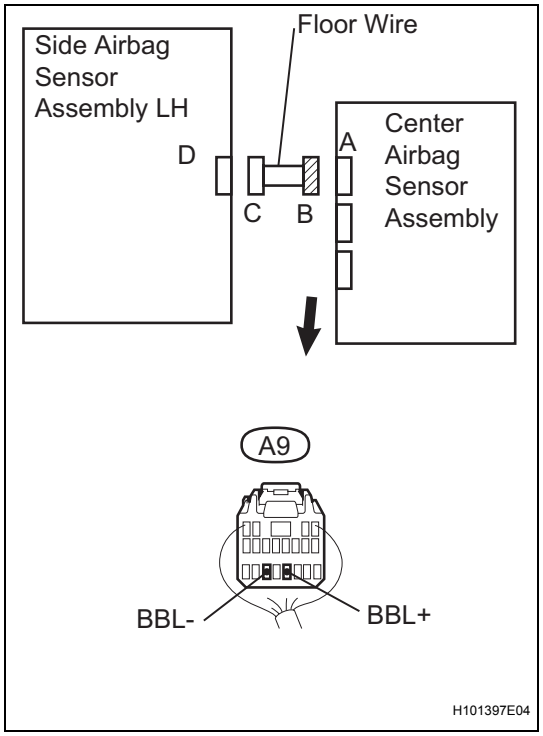
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A9-16 (BBL+) - Body ground	1 MΩ or higher
A9-18 (BBL-) - Body ground	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

6 CHECK FLOOR WIRE (TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

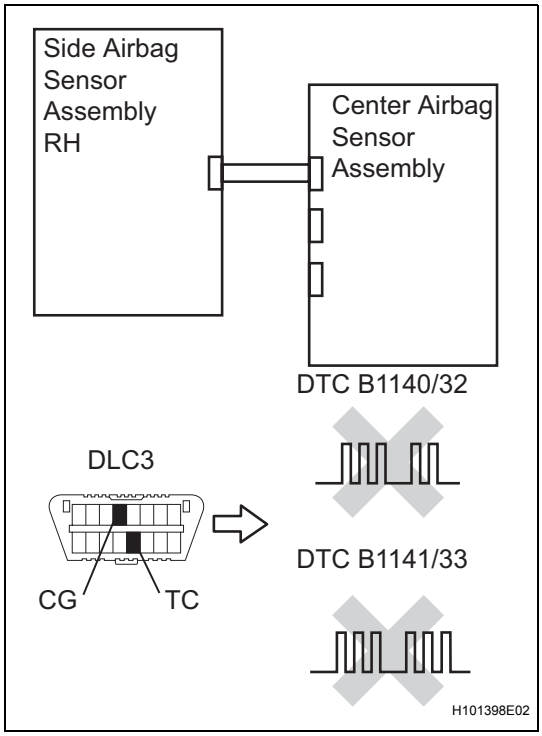
Tester Connection (Connector "B")	Condition	Specified Condition
A9-16 (BBL+) - Body ground	Ignition switch ON	Below 1 V
A9-18 (BBL-) - Body ground	Ignition switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

7	CHECK SIDE AIRBAG SENSOR ASSEMBLY LH



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Interchange the side airbag sensor assembly RH with LH and connect the connectors to them.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

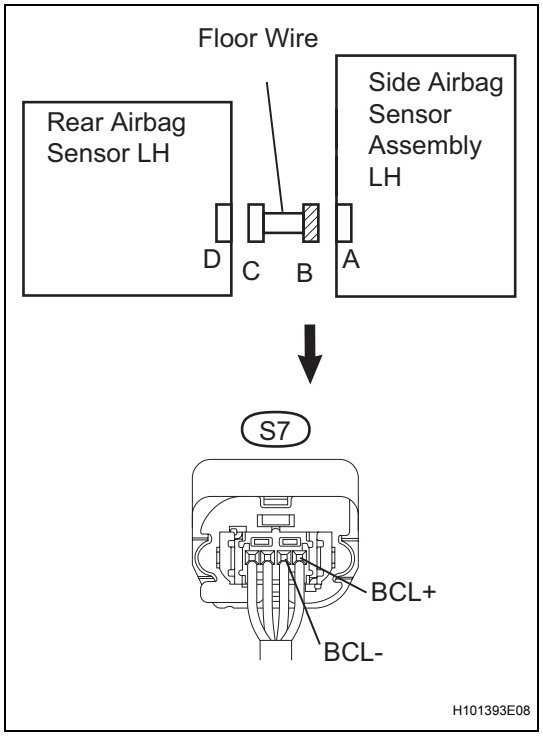
A:
DTC B1140/32 is output.
B:
DTC B1141/33 is output or both DTC B1140/32 and DTC B1141/33 are output.
C:
DTC B1140/32 and DTC B1141/33 are not output.

A	**REPLACE SIDE AIRBAG SENSOR ASSEMBLY LH**
C	**USE SIMULATION METHOD TO CHECK**

B

RS

8 CHECK FLOOR WIRE (SHORT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Return the interchanged side airbag sensor RH and LH back to their original positions and connect the connectors.
(d) Disconnect the connectors from the side airbag sensor LH and the rear airbag sensor LH.
(e) Measure the resistance according to the value(s) in the table below.

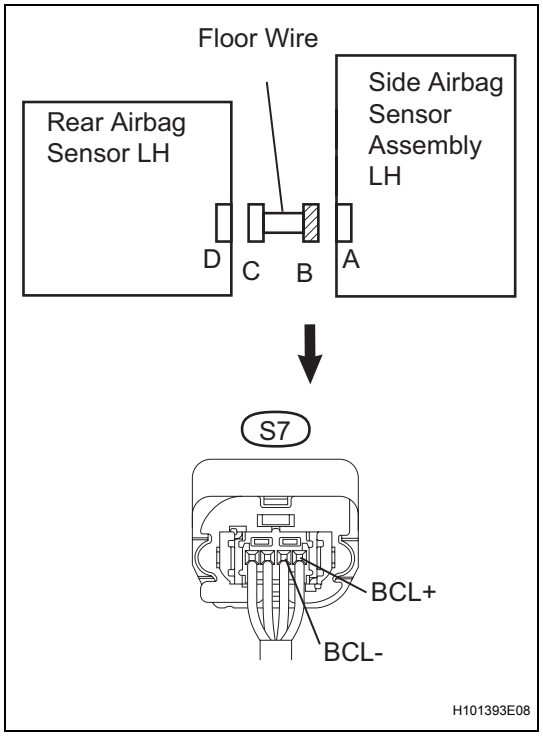
Standard resistance

Tester Connection (Connector "B")	Specified Condition
S7-1 (BCL+) - S7-2 (BCL-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

9 CHECK FLOOR WIRE (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

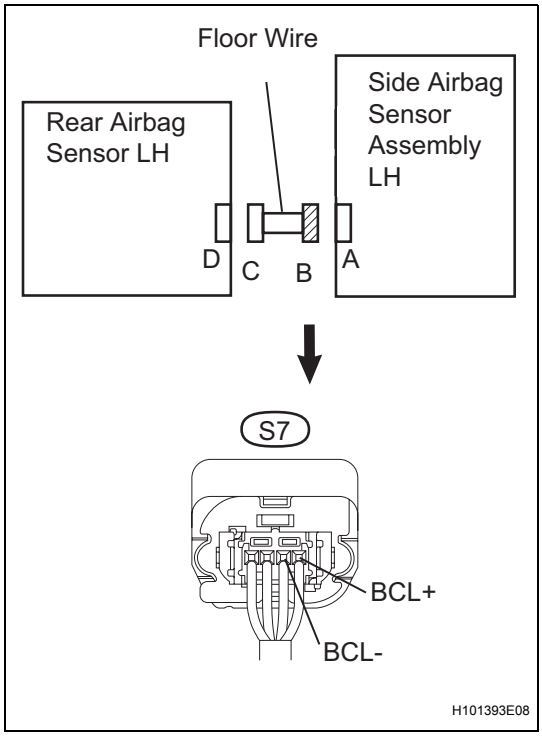
Tester Connection (Connector "B")	Specified Condition
S7-1 (BCL+) - Body ground	1 MΩ or higher
S7-2 (BCL-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

10 CHECK FLOOR WIRE (TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(b) Measure the voltage according to the value(s) in the table below.

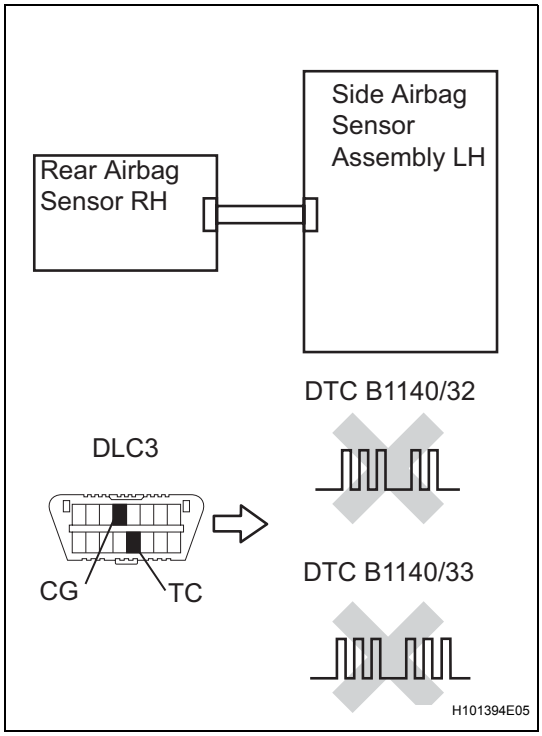
Standard voltage

Tester Connection (Connector "B")	Condition	Specified Condition
S7 (BCL+) - Body ground	Ignition switch ON	Below 1 V
S7 (BCL-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

11 CHECK REAR AIRBAG SENSOR LH



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

A:
DTC B1140/32 is output.
B:
DTC B1141/33 is output or both DTC B1140/32 and DTC B1141/33 are output.
C:
DTC B1140/32 and DTC B1141/33 are not output.

A → **REPLACE REAR AIRBAG SENSOR LH**

B → REPLACE CENTER AIRBAG SENSOR ASSEMBLY

C

USE SIMULATION METHOD TO CHECK

DTC	B1153/25	Seat Position Airbag Sensor Circuit Malfunction

DESCRIPTION

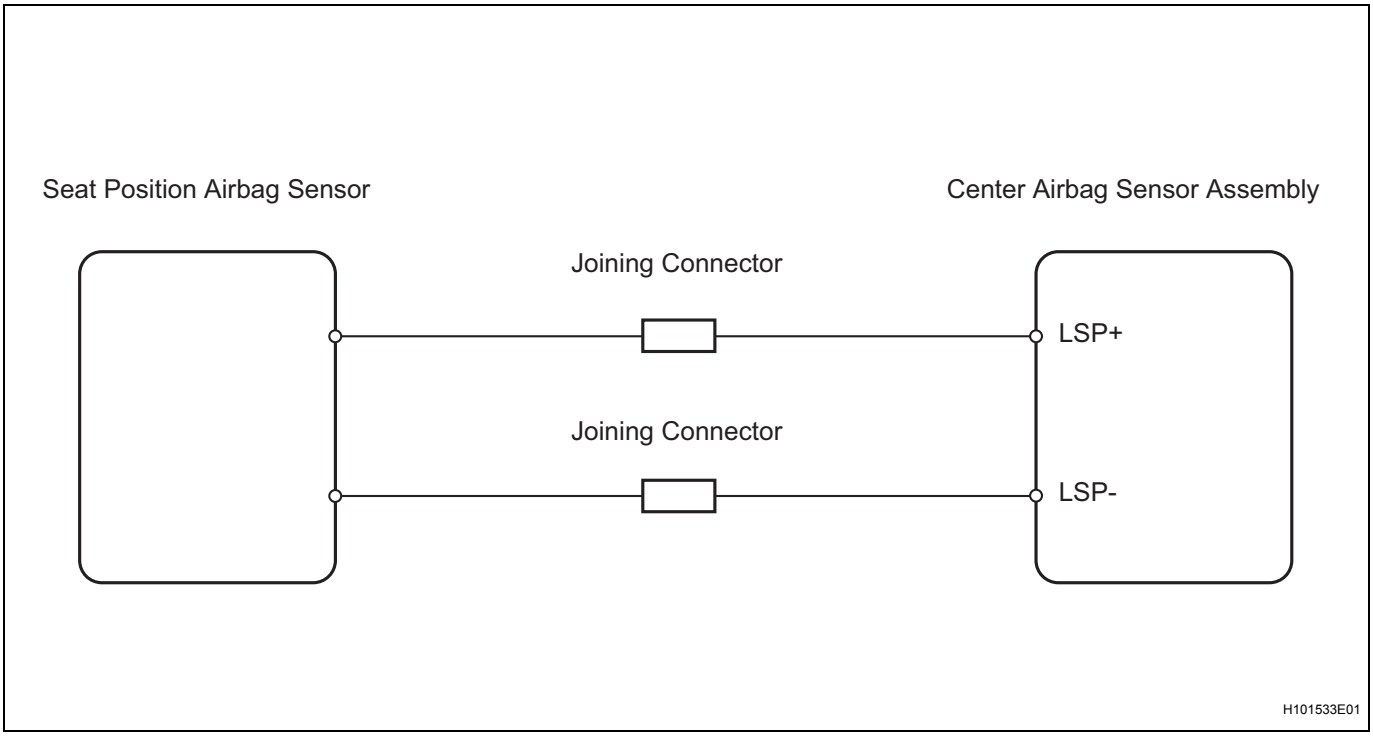
RS

The seat position airbag sensor circuit consists of the center airbag sensor and the seat position airbag sensor.

DTC B1153/25 is recorded when a malfunction is detected in the seat position airbag sensor circuit.

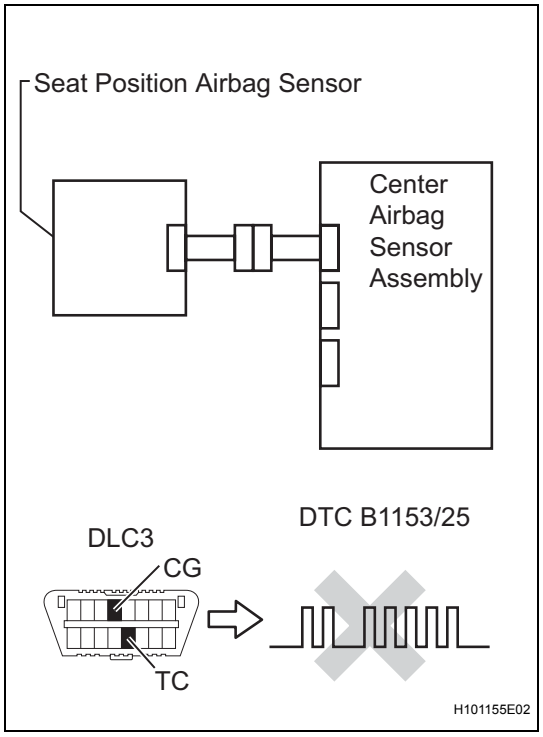
DTC No.	DTC Detection Condition	Trouble Area
B1153/25	• Open circuit in LSP+ wire harness or LSP- wire harness of seat position airbag sensor • Short circuit in seat position airbag sensor wire harness (to B+) • Seat position airbag sensor malfunction • Center airbag sensor malfunction	• Seat position airbag sensor • Center airbag sensor assembly • Floor wire • Front seat inner belt assembly LH

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK SEAT POSITION AIRBAG SENSOR



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

OK:

DTC B1153/25 is output.

HINT:

Codes other than code B1153/25 may be output at this time, but they are not relevant to this check.

OK → **USE SIMULATION METHOD TO CHECK**

NG

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY CONNECTOR

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor.

OK:

The connectors are connected.

NG → **CONNECT CONNECTORS**

OK

3	CHECK SEAT POSITION AIRBAG SENSOR CONNECTOR

(a) Check that the connector is properly connected to the seat position airbag sensor.

OK:

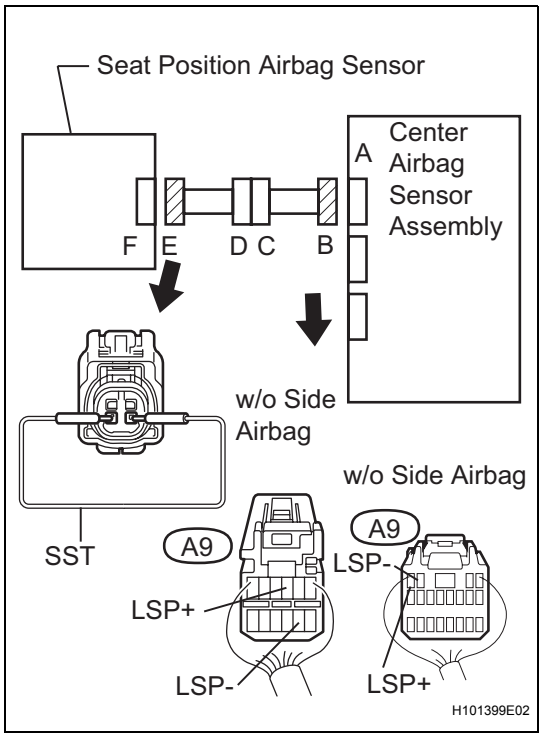
The connector is connected.

NG → **CONNECT CONNECTOR**

OK

4	CHECK SEAT POSITION AIRBAG SENSOR CIRCUIT (OPEN) (CENTER AIRBAG SENSOR - SEAT POSITION AIRBAG SENSOR)

RS



(a) Disconnect the connectors from the center airbag sensor and the seat position airbag sensor.
(b) Using SST, connect the terminals of connector "E".
SST 09843-18040

NOTICE:
Do not forcibly insert SST into the terminals of the connector when connecting.

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
w/o Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-3 (LSP+) - A9-8 (LSP-)	Below 1 Ω

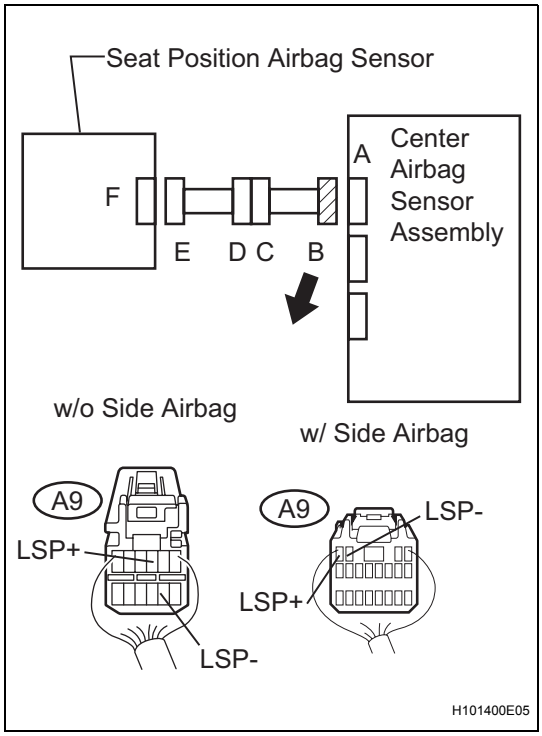
w/ Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-4 (LSP+) - A9-3 (LSP-)	Below 1 Ω

NG → **Go to step 11**

OK

5	CHECK SEAT POSITION AIRBAG SENSOR CIRCUIT (TO GROUND) (CENTER AIRBAG SENSOR - SEAT POSITION AIRBAG SENSOR)



(a) Disconnect the connectors from the center airbag sensor and the seat position airbag sensor.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance:
w/o Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-3 (LSP+) - Body ground	1 MΩ or higher
A9-8 (LSP-) - Body ground	1 MΩ or higher

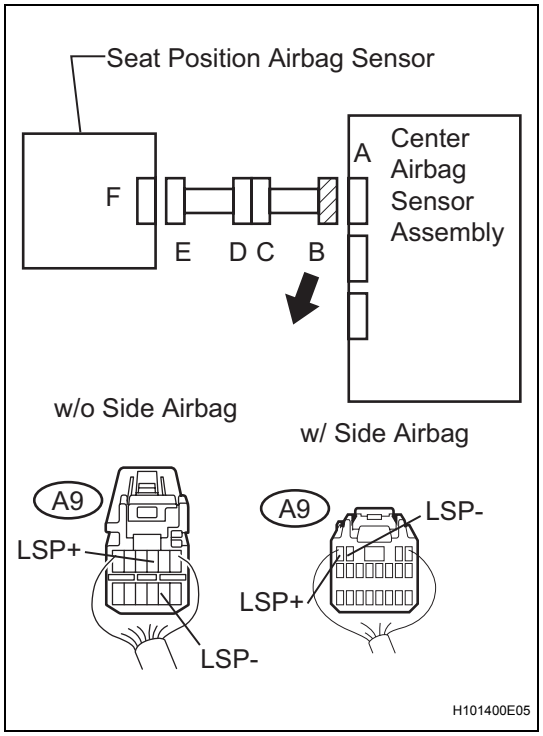
w/ Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-4 (LSP+) - Body ground	1 MΩ or higher
A9-3 (LSP-) - Body ground	1 MΩ or higher

NG → **Go to step 12**

OK

6	CHECK SEAT POSITION AIRBAG SENSOR ASSEMBLY (CENTER AIRBAG SENSOR - SEAT POSITION AIRBAG SENSOR)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

w/o Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-3 (LSP+) - A9-8 (LSP-)	1 MΩ or higher

w/ Side airbag

Tester Connection (Connector "B")	Specified Condition
A9-4 (LSP+) - A9-3 (LSP-)	1 MΩ or higher

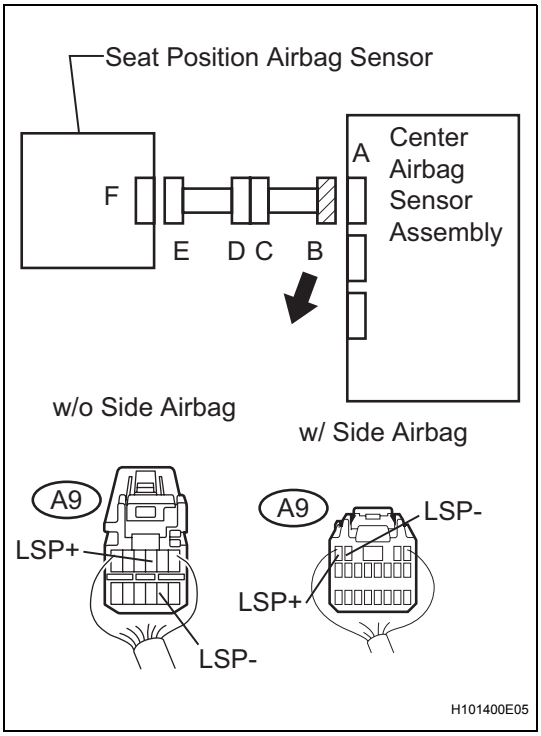
OK → Go to step 13

NG

RS

RS

7	CHECK SEAT POSITION AIRBAG SENSOR CIRCUIT (TO B+) (CENTER AIRBAG SENSOR ASSEMBLY - SEAT POSITION AIRBAG SENSOR)



(a) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(b) Measure the resistance according to the value(s) in the table below.

Standard voltage:

w/o Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A9-3 (LSP+) - Body ground	Ignition switch ON	Below 1 V
A9-8 (LSP-) - Body ground	Ignition switch ON	Below 1 V

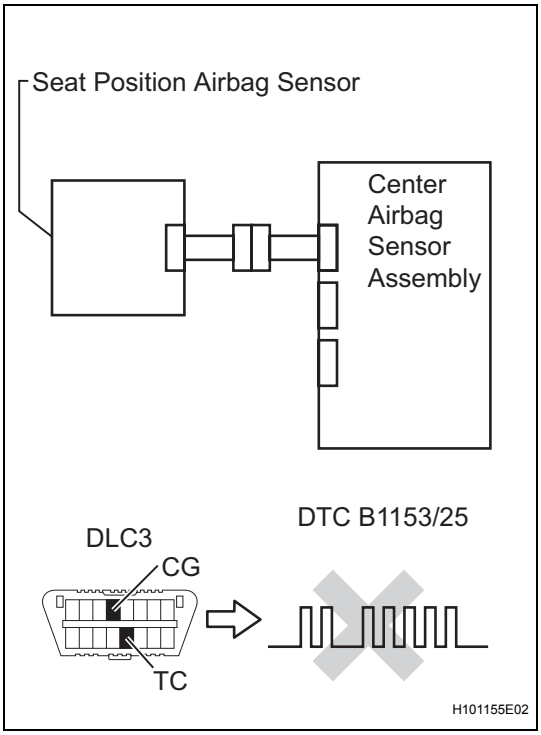
w/ Side airbag

Tester Connection (Connector "B")	Condition	Specified Condition
A9-4 (LSP+) - Body ground	Ignition switch ON	Below 1 V
A9-3 (LSP-) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 14**

OK

8	CHECK SEAT POSITION AIRBAG SENSOR



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the seat position airbag sensor and the center airbag sensor.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B1153/25 is output.

HINT:

Codes other than code B1153/25 may be output at this time, but they are not relevant to this check.

OK → **USE SIMULATION METHOD TO CHECK**

NG

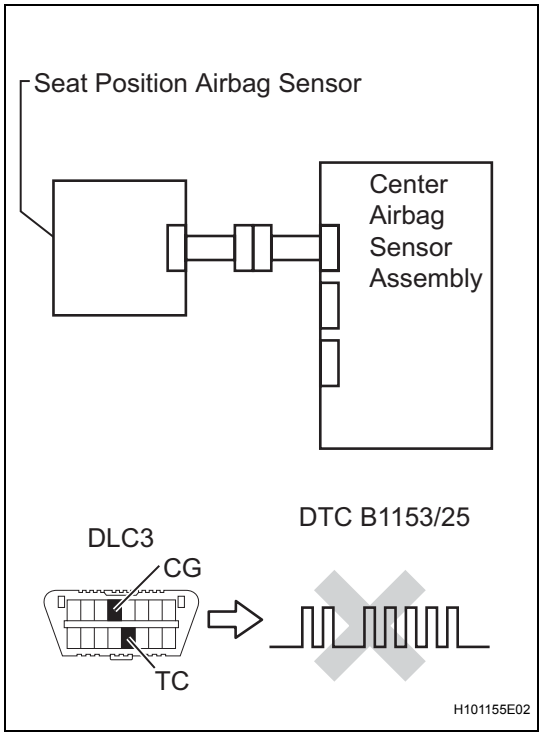
9	REPLACE SEAT POSITION AIRBAG SENSOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery and wait for at least 90 seconds.
(c) Replace the seat position airbag sensor.

RS

NEXT

10	CHECK CENTER AIRBAG SENSOR ASSEMBLY (TO GROUND)



(a) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(b) Turn the ignition switch to ON, and wait at least for 60 seconds.
(c) Clear the DTC stored in memory (see page RS-30).
(d) Turn the ignition switch to LOCK.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Check the DTC (see page RS-30).
OK:
DTC B1153/25 is output.
HINT:
Codes other than code B1153/25 may be output at this time, but they are not relevant to this check.

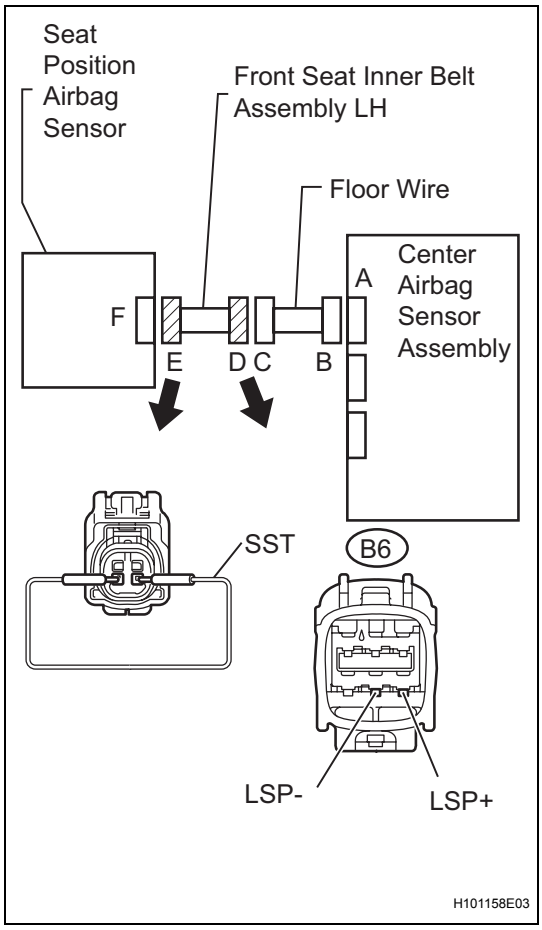
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

END

11	CHECK WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT ASSEMBLY LH)

RS



(a) Disconnect the front seat inner belt LH connector from the floor wire.
HINT:
The terminals of connector "E" have already been connected with each other using SST.
SST 09843-18040

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

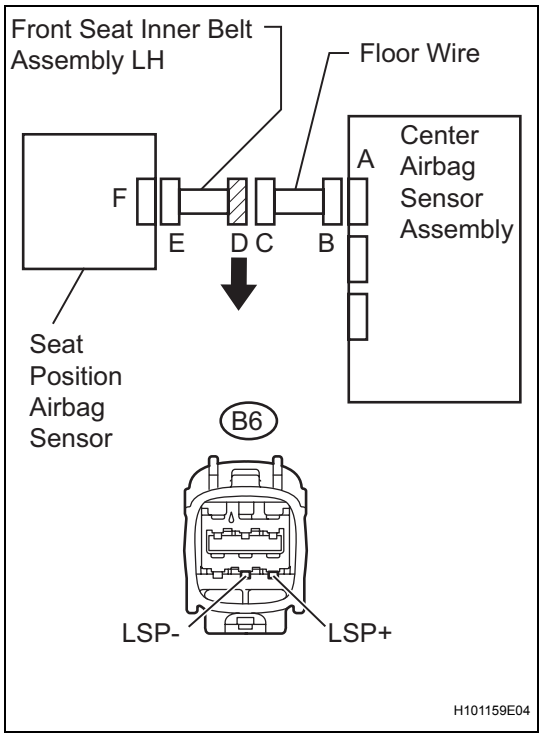
Tester Connection (Connector "D")	Specified Condition
B6-4 (LSP+) - B6-5 (LSP-)	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT LH)**

OK

REPAIR OR REPLACE FLOOR WIRE (CENTER AIRBAG SENSOR - FRONT SEAT INNER BELT LH)

12	CHECK WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT LH)



(a) Disconnect the front seat inner belt LH connector from the floor wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "D")	Specified Condition
B6-4 (LSP+) - Body ground	1 MΩ or higher
B6-5 (LSP-) - Body ground	1 MΩ or higher

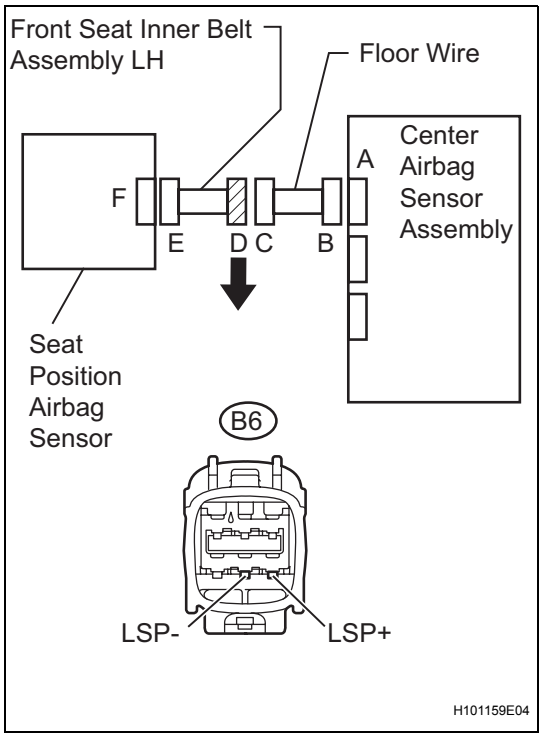
NG → **REPAIR OR REPLACE WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT LH)**

OK

REPAIR OR REPLACE FLOOR WIRE (CENTER AIRBAG SENSOR - FRONT SEAT INNER BELT LH)

13	CHECK WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT LH)

RS



(a) Disconnect the front seat inner belt LH connector from the floor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

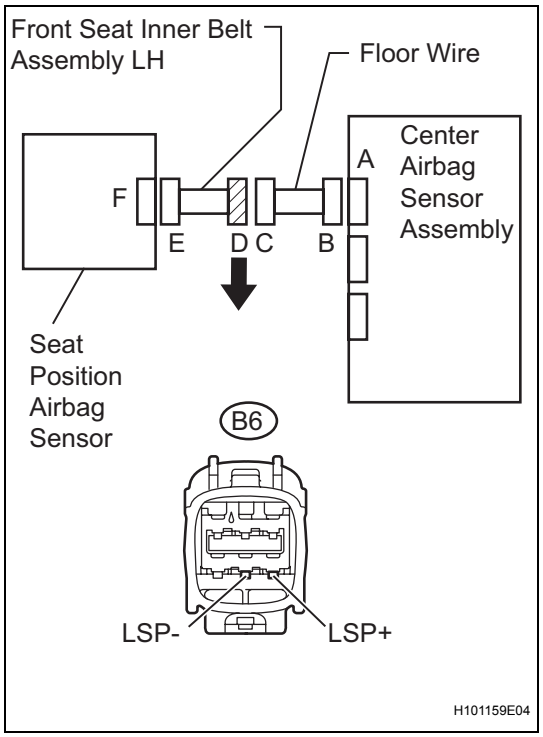
Tester Connection (Connector "D")	Specified Condition
B6-4 (LSP+) - B6-5 (LSP-)	1 MΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT LH)**

OK

REPAIR OR REPLACE FLOOR WIRE (CENTER AIRBAG SENSOR - FRONT SEAT INNER BELT LH)

14	CHECK WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the front seat inner belt LH connector from the floor wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the resistance according to the value(s) in the table below.

Standard voltage

Tester Connection (Connector "D")	Condition	Specified Condition
B6-4 (LSP+) - Body ground	Ignition switch ON	Below 1 V
B6-5 (LSP-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS (SEAT POSITION AIRBAG SENSOR - FRONT SEAT INNER BELT LH)**

OK

REPAIR OR REPLACE FLOOR WIRE (CENTER AIRBAG SENSOR - FRONT SEAT INNER BELT LH)

DTC	B1154/38	Rear Airbag Sensor RH Circuit Malfunction

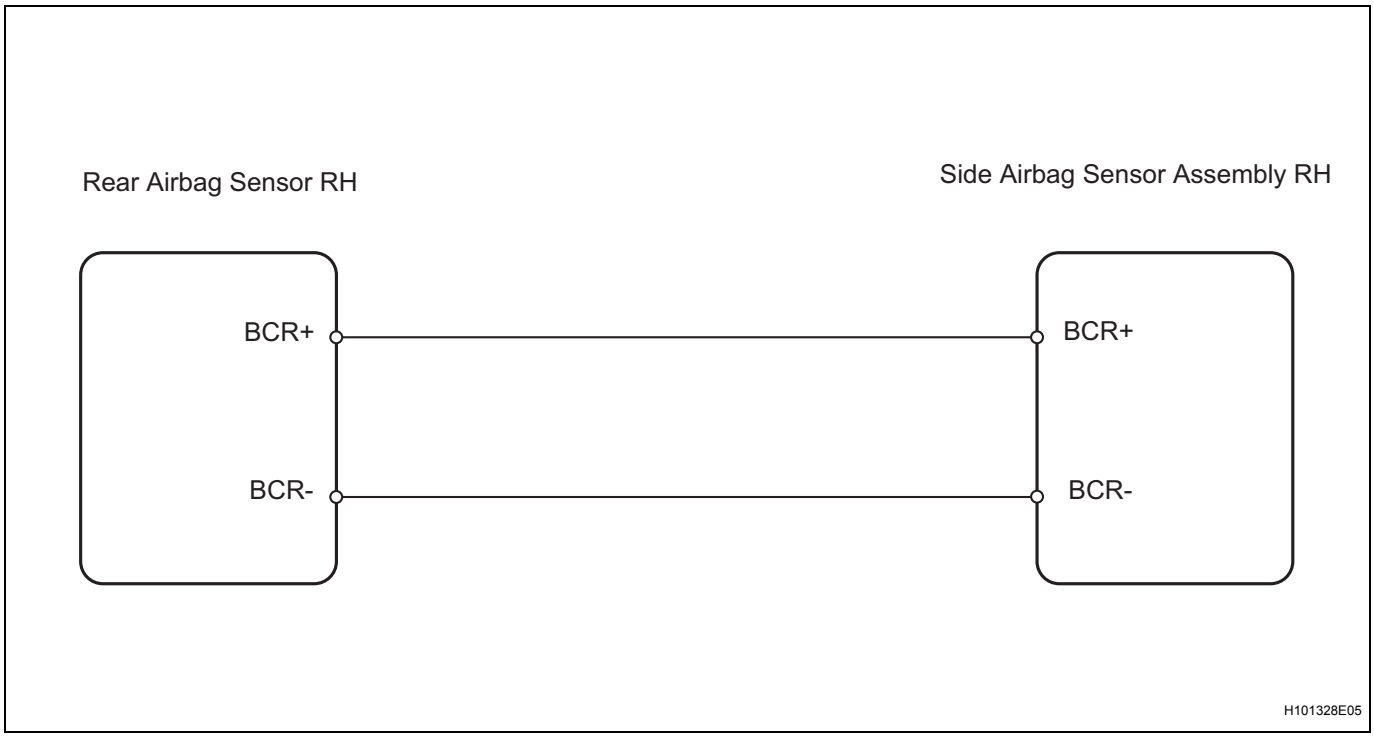
DESCRIPTION

The rear airbag sensor RH consists of the safing sensor, diagnosis circuit, and lateral deceleration sensor. If the center airbag sensor assembly receives the signals from the lateral deceleration sensor signal in the rear airbag sensor RH, it judges whether or not the SRS should be activated.
DTC B1154/38 is recorded when occurrence of a malfunction in the rear airbag sensor RH is detected.

DTC No.	DTC Detection Condition	Trouble Area
B1154/38	• Open circuit in BCR+ wire harness or BCR- wire harness of rear airbag sensor RH • Rear airbag sensor RH malfunction	• Rear airbag sensor RH • Side airbag sensor assembly RH • Center airbag sensor assembly • Floor wire

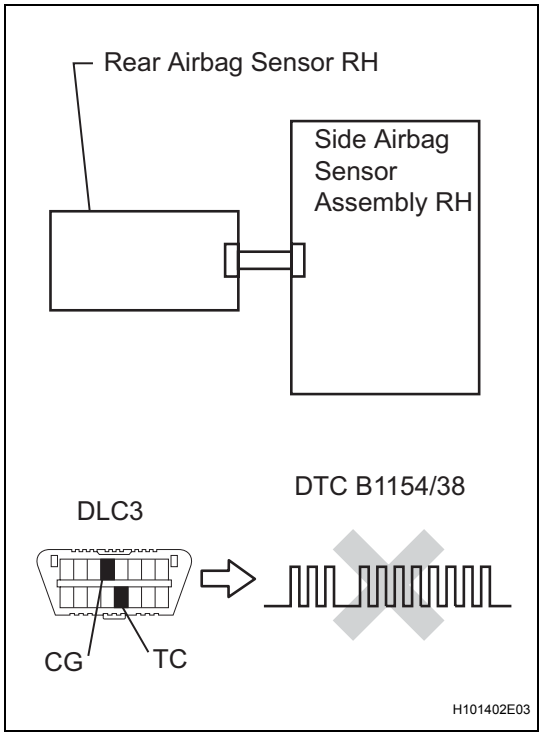
HINT:
DTC B1154/38 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

OK:

DTC B1154/38 is output.

HINT:

Codes other than code B1154/38 may be output at this time, but they are not relevant to this check.

OK → **USE SIMULATION METHOD TO CHECK**

NG

2	CHECK CONNECTION OF CONNECTOR

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the side airbag sensor RH and the rear airbag sensor RH.

OK:

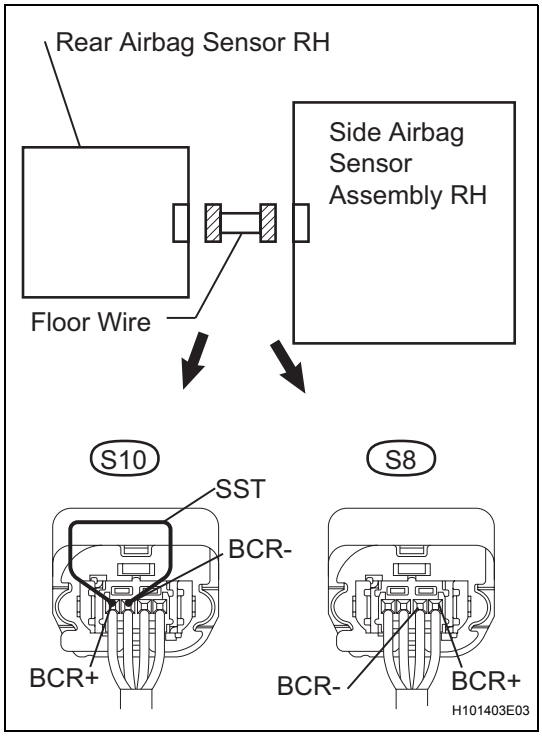
The connectors are connected.

NG → **CONNECT CONNECTOR**

OK

RS

3 CHECK FLOOR WIRE (OPEN)



(a) Disconnect the connectors from the side airbag sensor RH and the rear airbag sensor RH.
(b) Using SST, connect terminals BCR+ and BCR- of connector "C".
SST 09843-18040

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

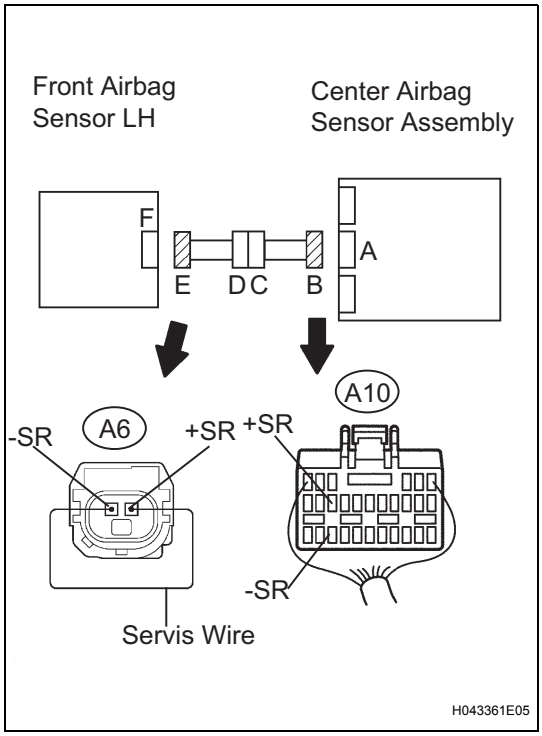
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "B")	Specified Condition
S8-1 (BCR+) - S8-2 (BCR-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4 CHECK REAR AIRBAG SENSOR RH



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the side airbag sensor RH.
(d) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

A:
DTC B1154/38 is output or DTC B1154/38 and DTC B1155/39 are output.

B:
DTC B1155/39 is output.

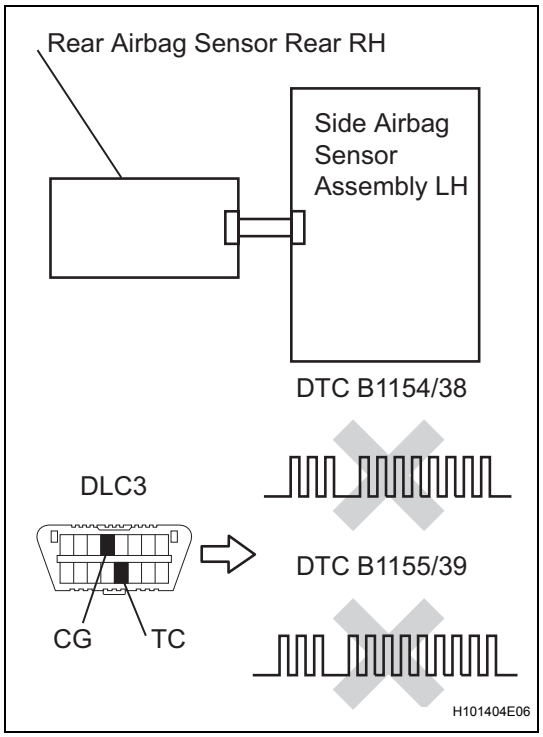
C:
DTC B1154/38 and DTC B1155/39 are not output.

B → **REPLACE REAR AIRBAG SENSOR RH**

C → USE SIMULATION METHOD TO CHECK

A

5 CHECK SIDE AIRBAG SENSOR ASSEMBLY RH (TO GROUND)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Return the interchanged rear airbag sensor RH and LH to their original positions and connect the connectors.
(d) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

A:
DTC B1154/38 is output or DTC B1154/38 and DTC B1155/39 are output.

B:
DTC B1155/39 is output.

C:
DTC B1154/38 and DTC B1155/39 are not output.

A → REPLACE CENTER AIRBAG SENSOR ASSEMBLY

B → REPLACE SIDE AIRBAG SENSOR ASSEMBLY RH

C

USE SIMULATION METHOD TO CHECK

DTC	B1155/39	Rear Airbag Sensor LH Circuit Malfunction

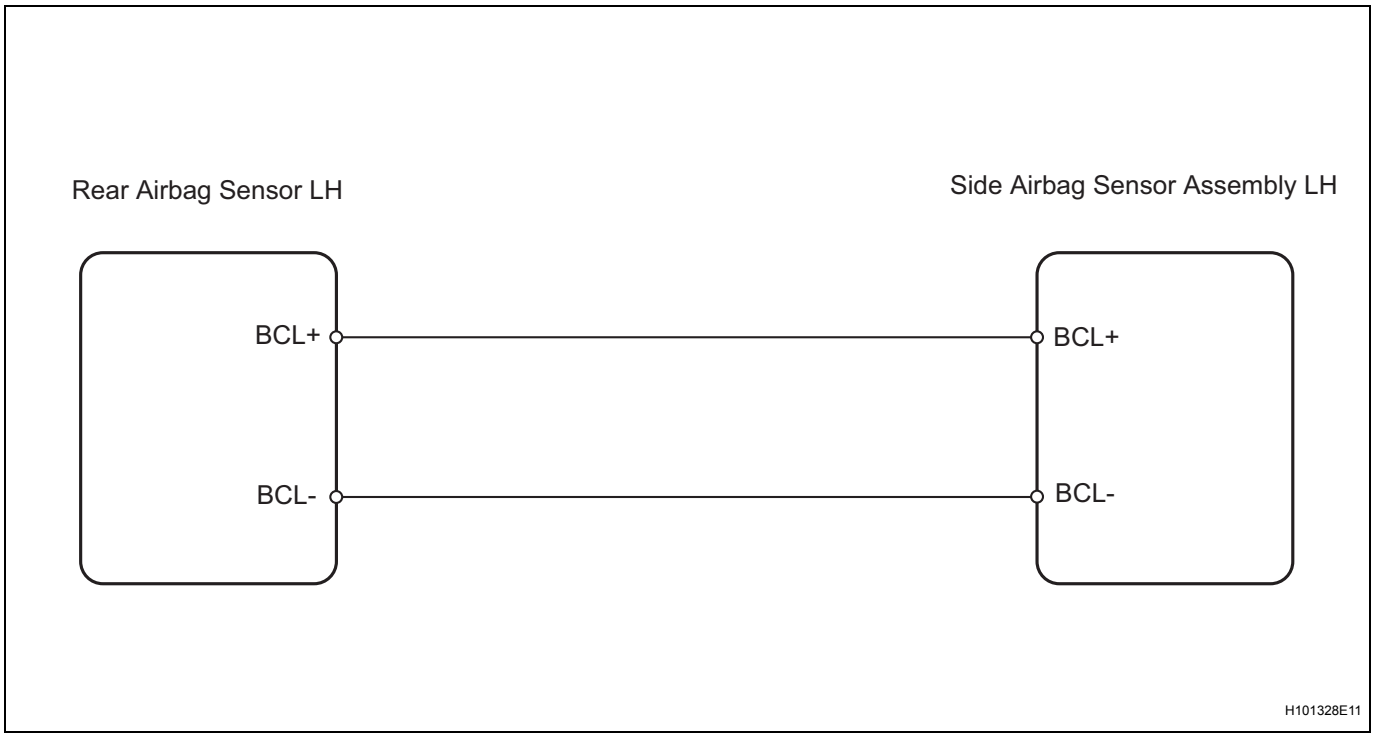
DESCRIPTION

The rear airbag sensor LH consists of the safing sensor, diagnosis circuit, and lateral deceleration sensor. If the center airbag sensor assembly receives the signals from the lateral deceleration sensor signal in the rear airbag sensor LH, it judges whether or not the SRS should be activated.
DTC B1155/39 is recorded when occurrence of a malfunction in the rear airbag sensor LH is detected.

DTC No.	DTC Detection Condition	Trouble Area
B1155/39	• Open circuit in BCL+ wire harness or BCL- wire harness of rear airbag sensor LH • Rear airbag sensor LH malfunction	• Rear airbag sensor LH • Side airbag sensor assembly LH • Center airbag sensor assembly • Floor wire

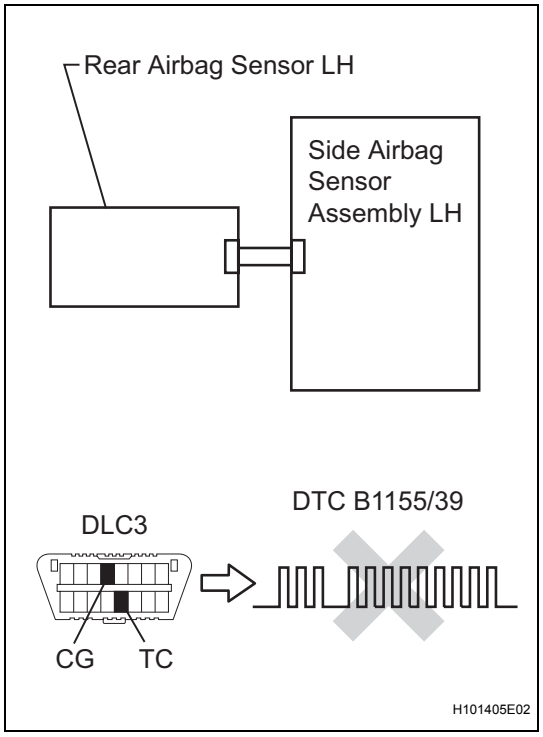
HINT:
DTC B1155/39 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

OK:

DTC B1155/39 is output.

HINT:

Codes other than code B1155/39 may be output at this time, but they are not relevant to this check.

OK → **USE SIMULATION METHOD TO CHECK**

NG

2	CHECK CONNECTION OF CONNECTOR

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the side airbag sensor LH and the rear airbag sensor LH.

OK:

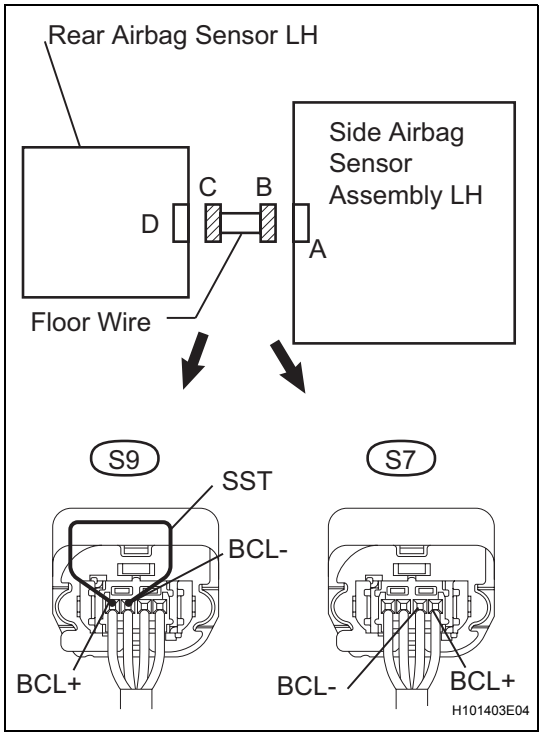
The connectors are connected.

NG → **CONNECT CONNECTOR**

OK

RS

3 CHECK FLOOR WIRE (OPEN)



(a) Disconnect the connectors from the side airbag sensor LH and the rear airbag sensor LH.
(b) Using SST, connect terminals BCL+ and BCL- of connector "C".

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Measure the resistance according to the value(s) in the table below.

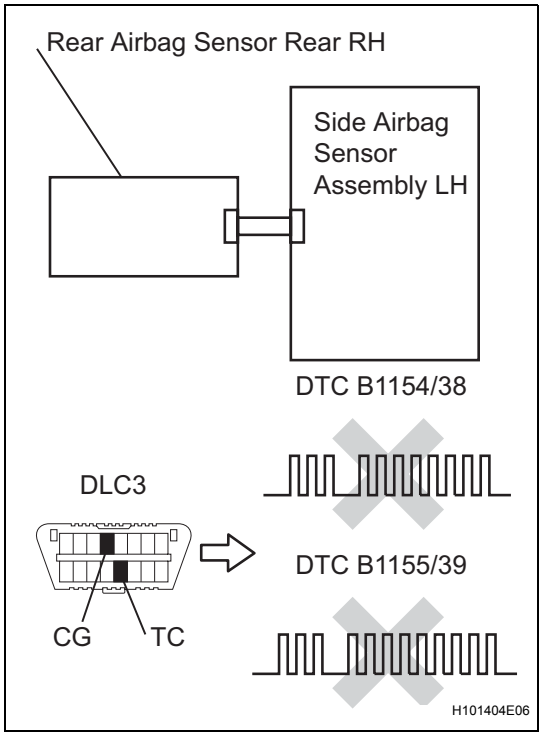
Standard resistance

Tester Connection (Connector "B")	Specified Condition
S7-1 (BCL+) - S7-2 (BCL-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4 CHECK REAR AIRBAG SENSOR LH



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the side airbag sensor LH.
(d) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

A:
DTC B1154/38 is output.

B:
DTC B1155/39 is output or DTC B1154/38 and DTC B1155/39 are output.

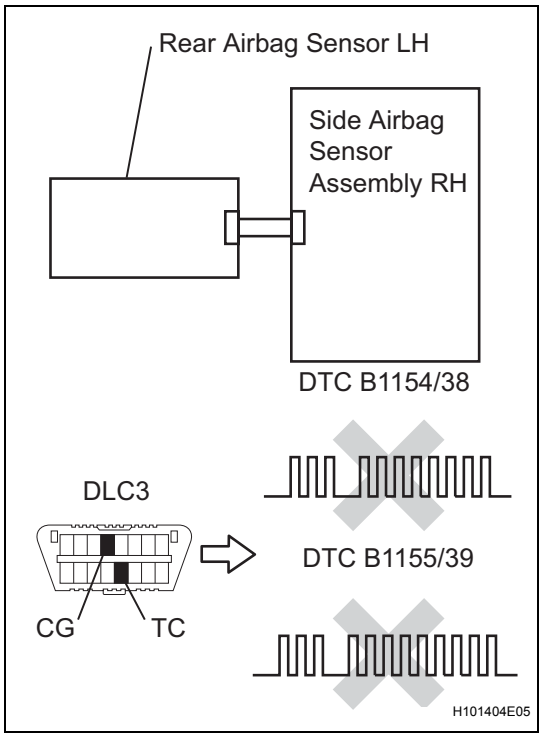
C:
DTC B1154/38 and DTC B1155/39 are not output.

A → **REPLACE REAR AIRBAG SENSOR LH**

C → USE SIMULATION METHOD TO CHECK

B

5 CHECK SIDE AIRBAG SENSOR ASSEMBLY RH (TO GROUND)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Return the interchanged rear airbag sensor RH and LH to their original positions and connect the connectors.
(d) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

A:
DTC B1154/38 is output.

B:
DTC B1155/39 is output or DTC B1154/38 and DTC B1155/39 are output.

C:
DTC B1154/38 and DTC B1155/39 are not output.

A → REPLACE SIDE AIRBAG SENSOR ASSEMBLY LH

B → CENTER AIRBAG SENSOR ASSEMBLY

C

USE SIMULATION METHOD TO CHECK

DTC	B1156/15	Front Airbag Sensor RH Malfunction

DTC	B1157/15	Front Airbag Sensor RH Malfunction

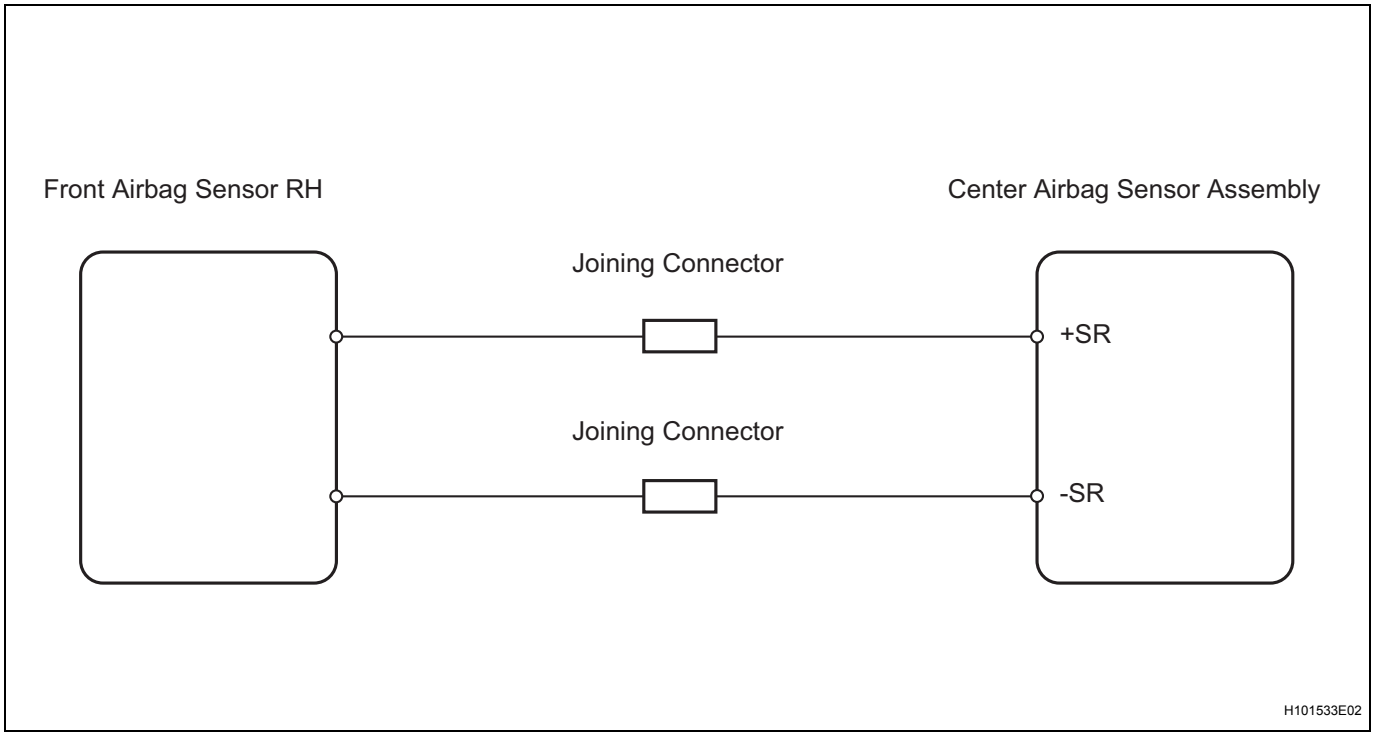
RS

DESCRIPTION

The front airbag sensor RH circuit consists of the center airbag sensor assembly and front airbag sensor RH. DTC B1156/15 or B1157/15 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

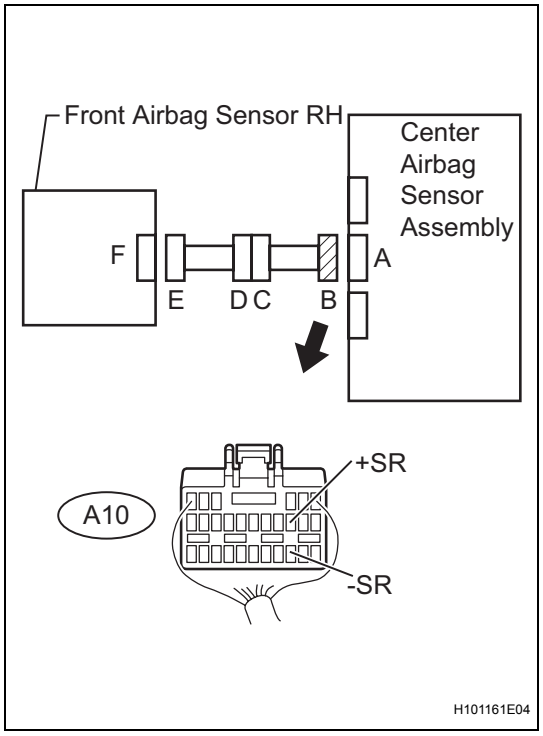
DTC No.	DTC Detecting Condition	Trouble Area
B1156/15 B1157/15	• Short circuit in front airbag sensor RH wire harness (to B+) • Short circuit in front airbag sensor RH wire harness (to ground) • Short circuit between +SR wire harness and -SR wire harness of front airbag sensor RH • Open circuit in +SR wire harness or -SR wire harness of front airbag sensor RH • Front airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Front airbag sensor RH • Center airbag sensor assembly • Instrument panel wire • Engine room main wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (TO B+) (CENTER AIRBAG SENSOR - FRONT AIRBAG SENSOR RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors between the center airbag sensor assembly and the front airbag sensor RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

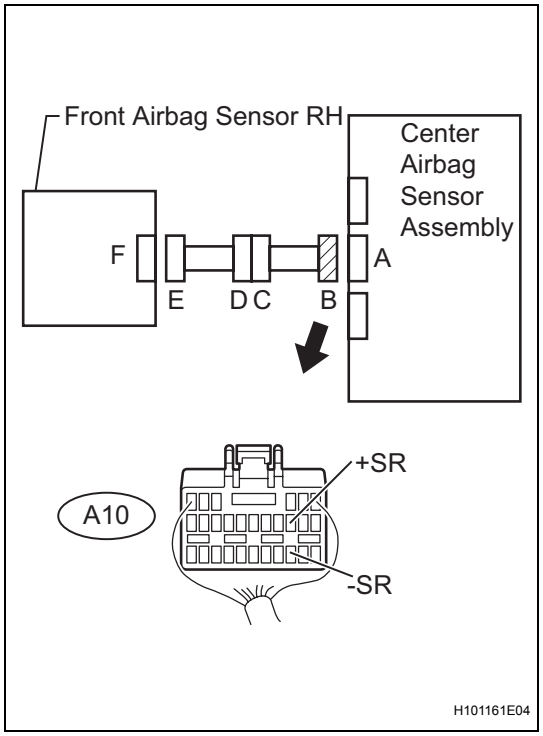
Standard voltage

Tester Connection (Connector "B")	Condition	Specified Condition
A10-9 (+SR) - Body ground	Ignition switch ON	Below 1 V
A10-20 (-SR) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 7**

OK

2	CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (TO GROUND) (CENTER AIRBAG SENSOR - FRONT AIRBAG SENSOR RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

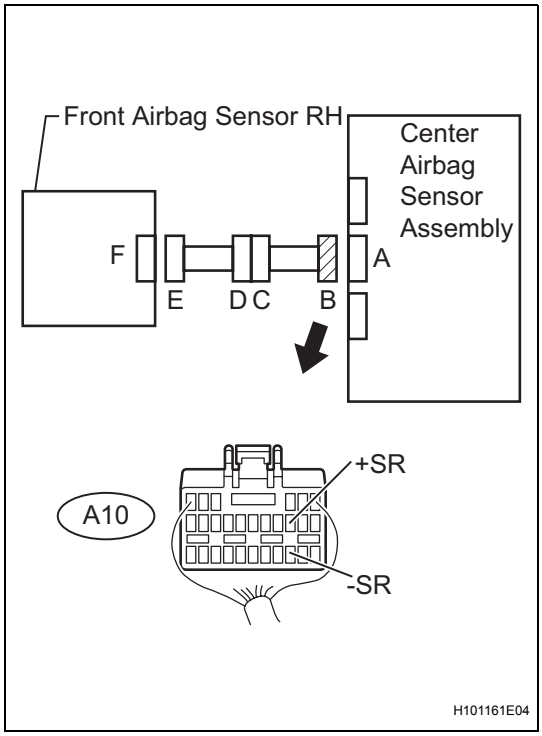
Tester Connection (Connector "B")	Specified Condition
A10-9 (+SR) - Body ground	1 MΩ or Higher
A10-20 (-SR) - Body ground	1 MΩ or Higher

NG → **Go to step 8**

OK

3	CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (SHORT) (CENTER AIRBAG SENSOR - FRONT AIRBAG SENSOR RH)

RS



(a) Measure the resistance according to the value(s) in the table below.

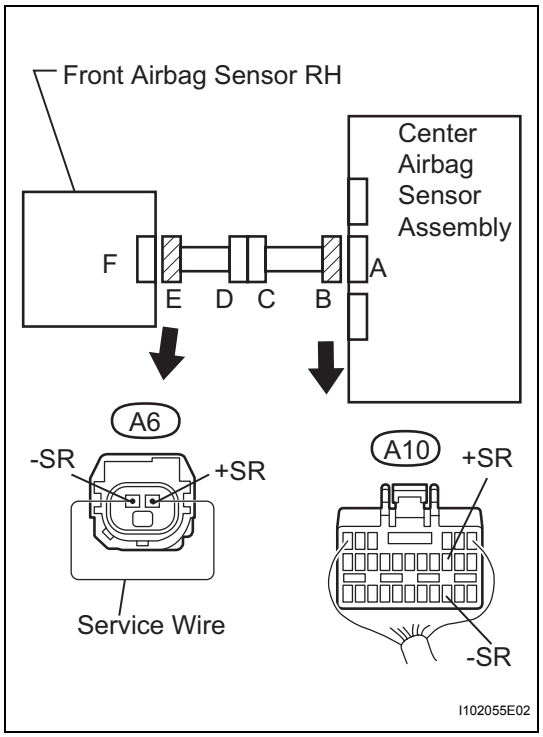
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A10-9 (+SR) - A10-20 (-SR)	1 MΩ or higher

NG → **Go to step 9**

OK

4	CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (OPEN) (CENTER AIRBAG SENSOR ASSEMBLY - FRONT AIRBAG SENSOR RH)



(a) Using a service wire, connect terminals +SR and -SR of connector "E".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

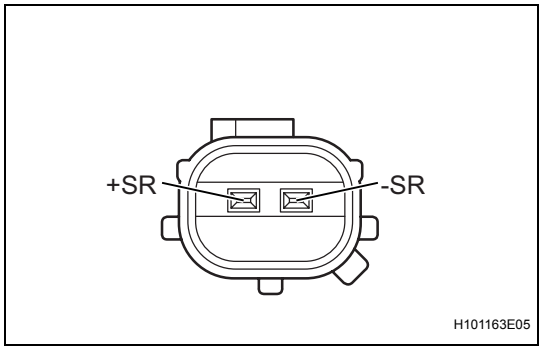
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A10-9 (+SR) - A10-20 (-SR)	Below 1 Ω

NG → **Go to step 10**

OK

5	INSPECT FRONT AIRBAG SENSOR RH



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

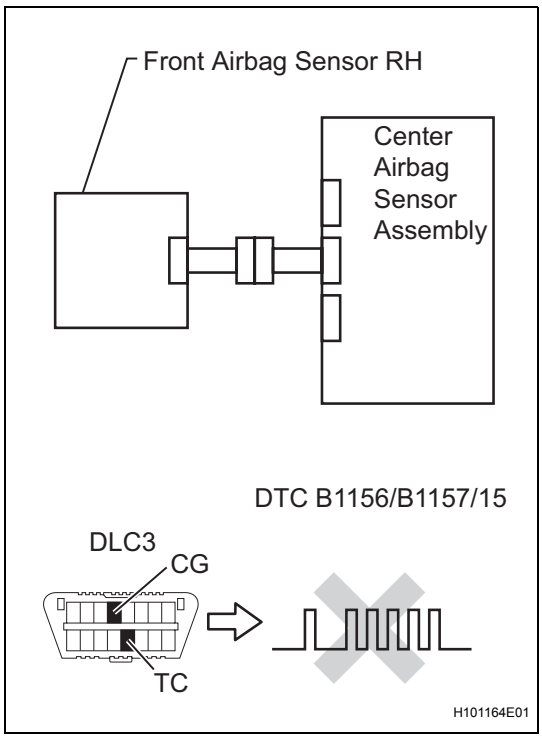
Tester Connection	Specified Condition
+SR - -SR	738 to 902 Ω

NG → **REPLACE FRONT AIRBAG SENSOR RH**

OK

RS

6	CHECK CENTER AIRBAG SENSOR ASSEMBLY



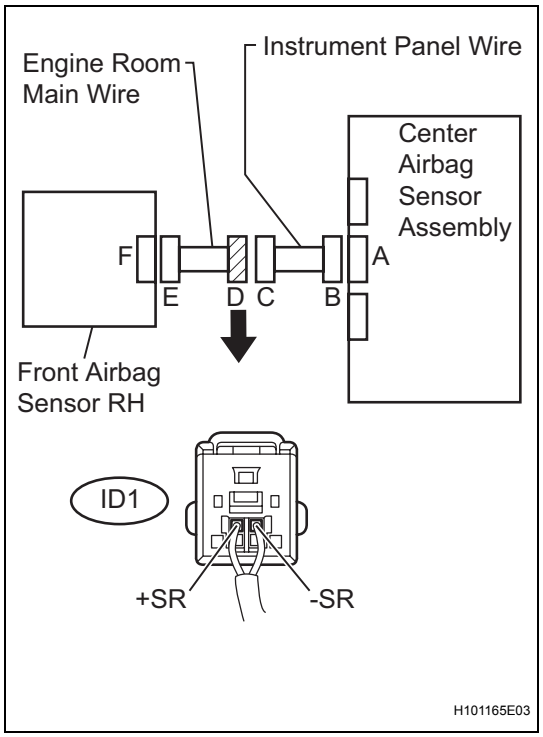
(a) Connect the connectors to the front airbag sensor RH and the center airbag sensor assembly.
(b) Reconnect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the stored DTCs in the memory (see page RS-30).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page RS-30).
OK:
DTC B1156/15 or B1157/15 is not output.
HINT:
Codes other than code B1156/15 or B1157/15 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

7	CHECK ENGINE ROOM MAIN WIRE (TO B+) (CONNECTOR - FRONT AIRBAG SENSOR RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the engine room main wire connector from the instrument panel wire.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Connector "D")	Condition	Specified Condition
ID1-2 (+SR) - Body ground	Ignition switch ON	Below 1 V
ID1-1 (-SR) - Body ground	Ignition switch ON	Below 1 V

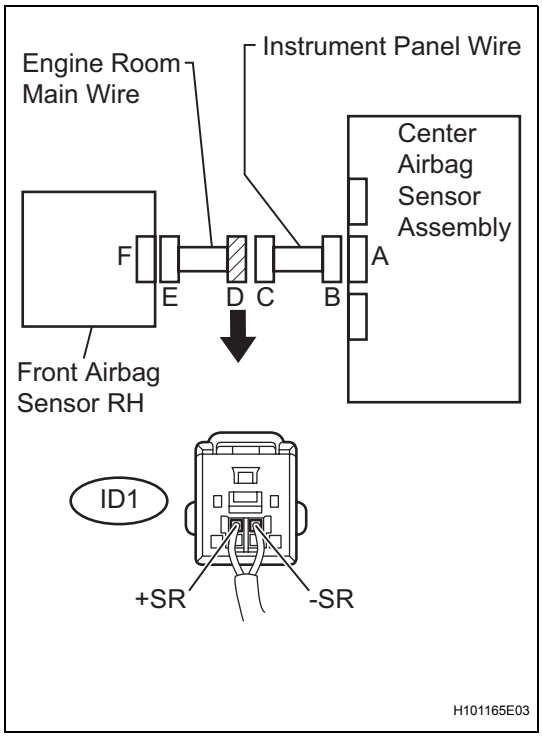
NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

8	CHECK ENGINE ROOM MAIN WIRE (TO GROUND) (CONNECTOR - FRONT AIRBAG SENSOR RH)

RS



(a) Disconnect the engine room main wire connector from the instrument panel wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

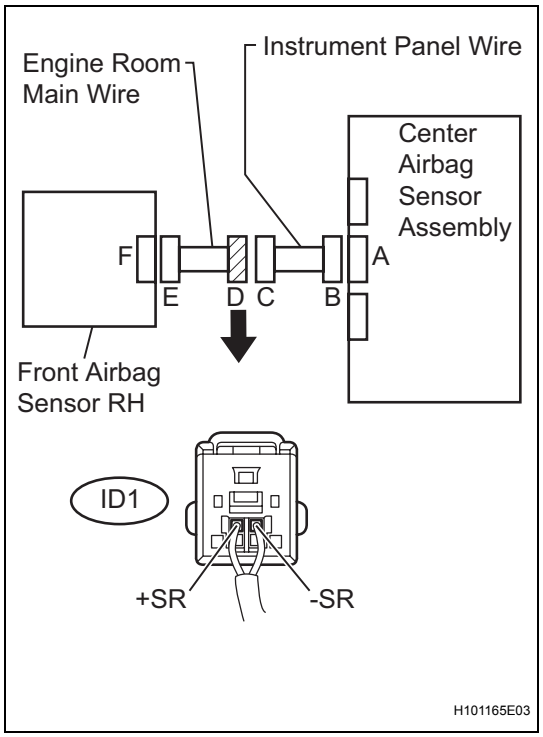
Tester Connection (Connector "D")	Specified Condition
ID1-2 (+SR) - Body ground	1 MΩ or higher
ID1-1 (-SR) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

9	CHECK ENGINE ROOM MAIN WIRE (SHORT) (CONNECTOR - FRONT AIRBAG SENSOR RH)



(a) Disconnect the engine room main wire connector from the instrument panel wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "D")	Specified Condition
ID1-2 (+SR) - ID1-1 (-SR)	1 MΩ or higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

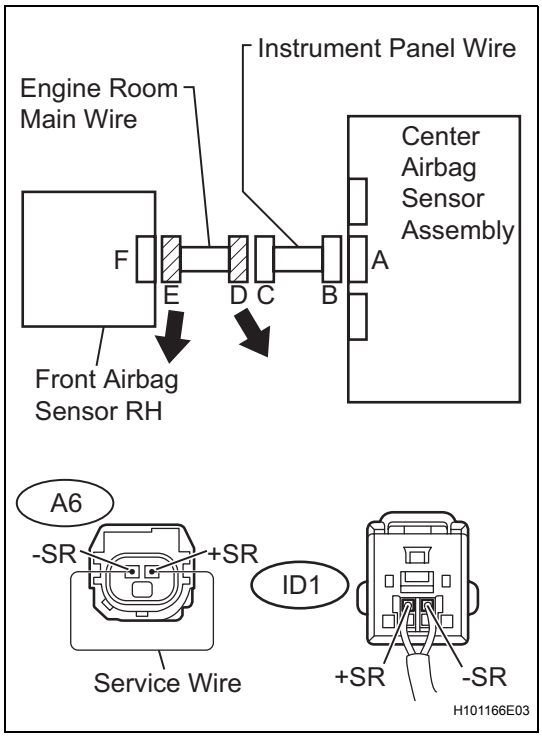
OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

RS

10	CHECK ENGINE ROOM MAIN WIRE (OPEN) (CONNECTOR - FRONT AIRBAG SENSOR RH)

RS



(a) Disconnect the engine room main wire connector from the instrument panel wire.
HINT:
Terminals +SR and -SR of connector "E" have already been connected with each other using the service wire.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "D")	Specified Condition
ID1-2 (+SR) - ID1-1 (-SR)	Below 1 Ω

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

DTC	B1158/16	Front Airbag Sensor LH Malfunction

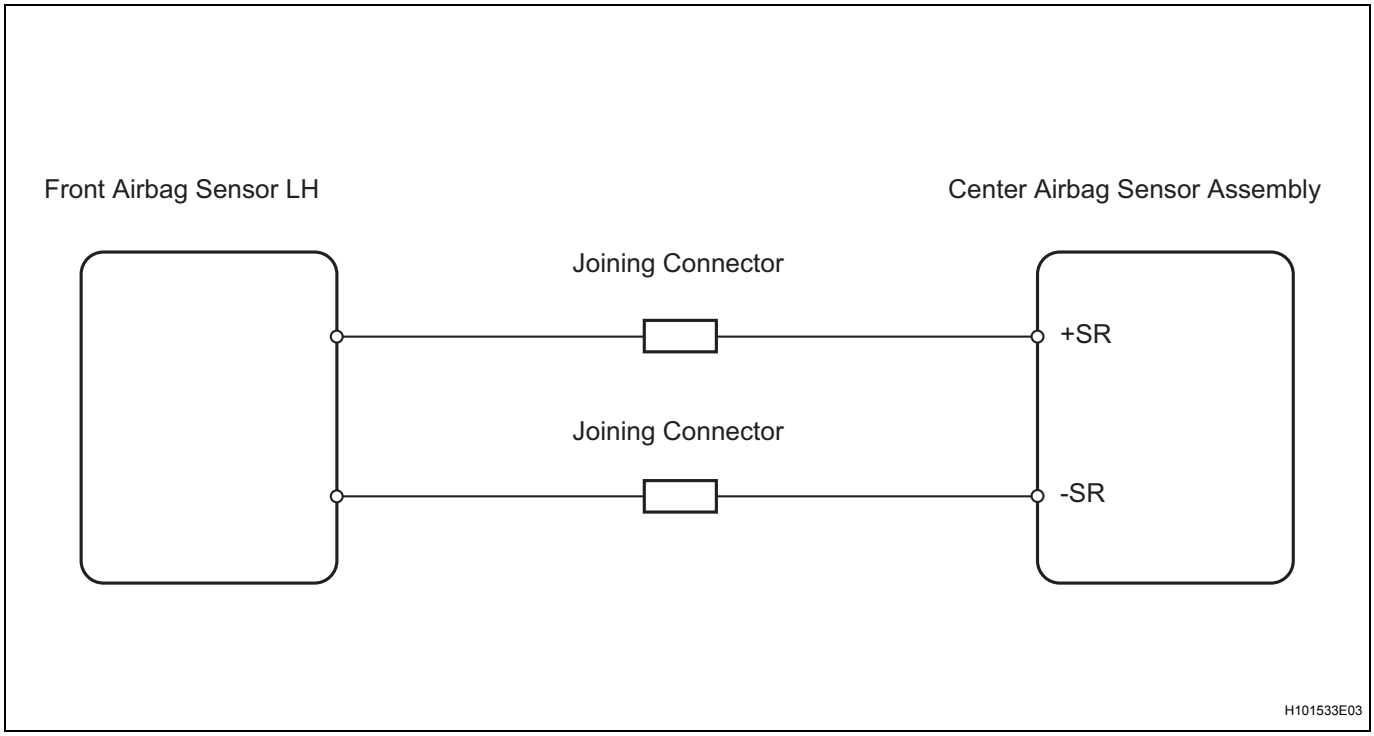
DTC	B1159/16	Front Airbag Sensor LH Malfunction

DESCRIPTION

The front airbag sensor LH circuit consists of the center airbag sensor assembly and front airbag sensor LH. DTC B1158/16 or B1159/16 is recorded when malfunction is detected in the front airbag sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1158/16 B1159/16	• Short circuit in front airbag sensor LH wire harness (to B+) • Short circuit in front airbag sensor LH wire harness (to ground) • Short circuit between +SL wire harness and -SL wire harness of front airbag sensor LH • Open circuit in +SL wire harness or -SL wire harness of front airbag sensor LH • Front airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Front airbag sensor LH • Center airbag sensor assembly • Instrument panel wire • Engine room main wire

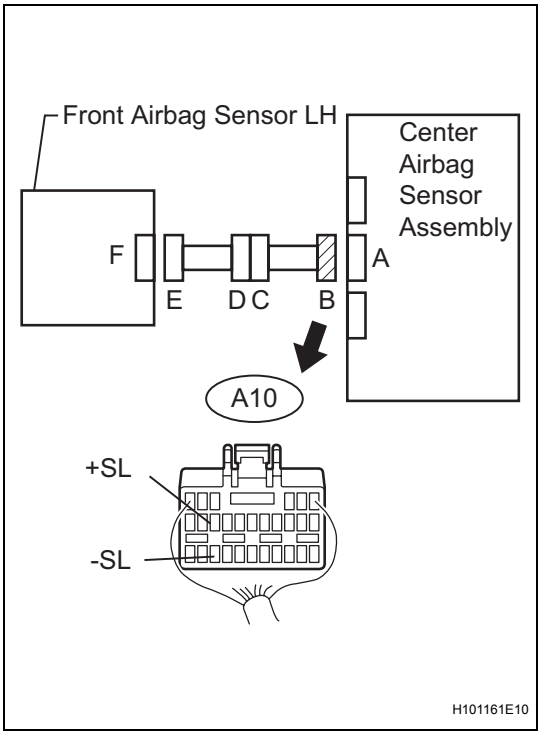
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT (TO B+) (CENTER AIRBAG SENSOR - FRONT AIRBAG SENSOR LH)

RS



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors between the center airbag sensor assembly and the front airbag sensor LH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

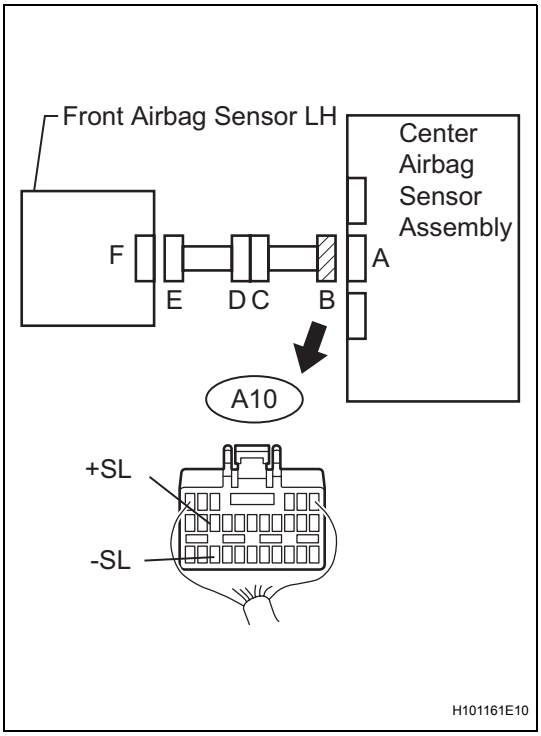
Standard voltage

Tester Connection (Connector "B")	Condition	Specified Condition
A10-15 (+SL) - Body ground	Ignition switch ON	Below 1 V
A10-26 (-SL) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 7**

OK

2	CHECK FRONT AIRBAG (LH) CIRCUIT (TO GROUND) (CENTER AIRBAG SENSOR ASSEMBLY - FRONT AIRBAG SENSOR LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

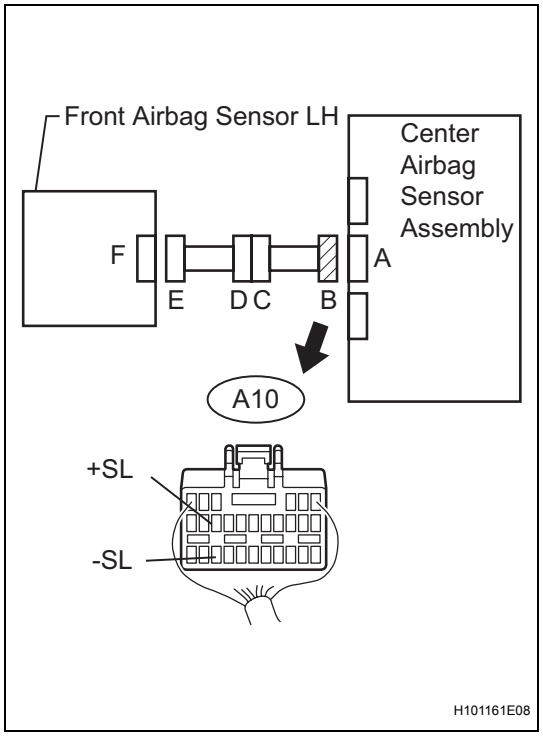
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A10-15 (+SL) - Body ground	1 MΩ or higher
A10-26 (-SL) - Body ground	1 MΩ or higher

NG → **Go to step 8**

OK

3	CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT (SHORT) (CENTER AIRBAG SENSOR - FRONT AIRBAG SENSOR LH)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

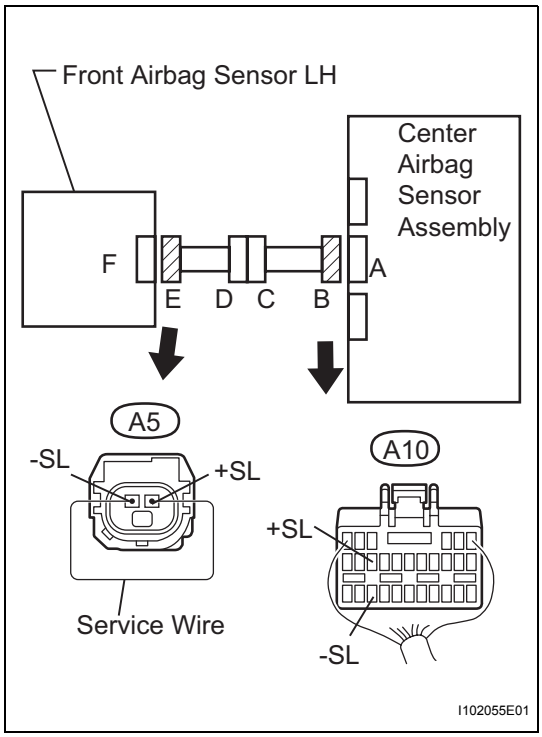
Tester Connection (Connector "B")	Specified Condition
A10-15 (+SL) - A10-26 (-SL)	1 MΩ or higher

NG → Go to step 9

OK

4	CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT (OPEN) (CENTER AIRBAG SENSOR ASSEMBLY - FRONT AIRBAG SENSOR LH)

RS



(a) Using a service wire, connect terminals +SL and -SL of connector "E".
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

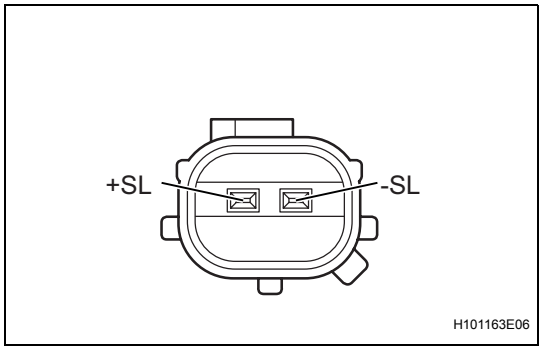
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "B")	Specified Condition
A10-15 (+SL) - A10-26 (-SL)	Below 1 Ω

NG → **Go to step 10**

OK

5	INSPECT FRONT AIRBAG SENSOR LH



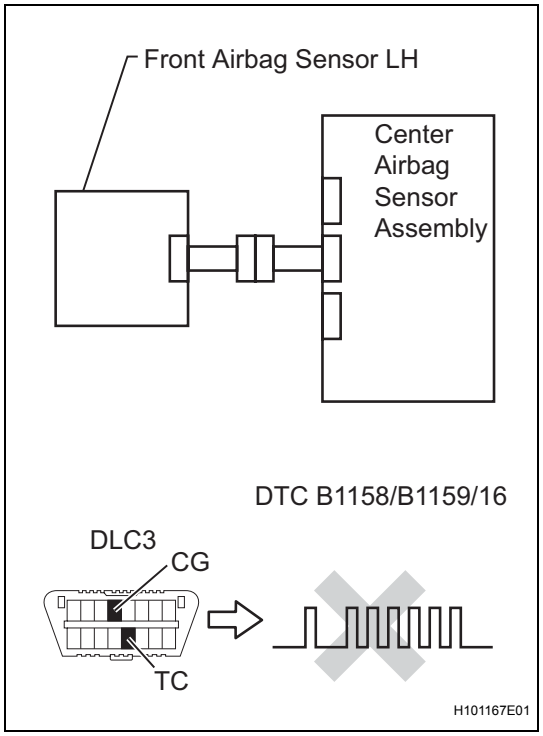
(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
+SL - -SL	738 to 902 Ω

NG → **REPLACE FRONT AIRBAG SENSOR LH**

OK

6	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front airbag sensor LH and the center airbag sensor assembly.
(b) Reconnect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (see page RS-30).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page RS-30).

OK:

DTC B1158/16 or B1159/16 is not output.

HINT:

Codes other than code B1158/16 or B1159/16 may be output at this time, but they are not related to this check.

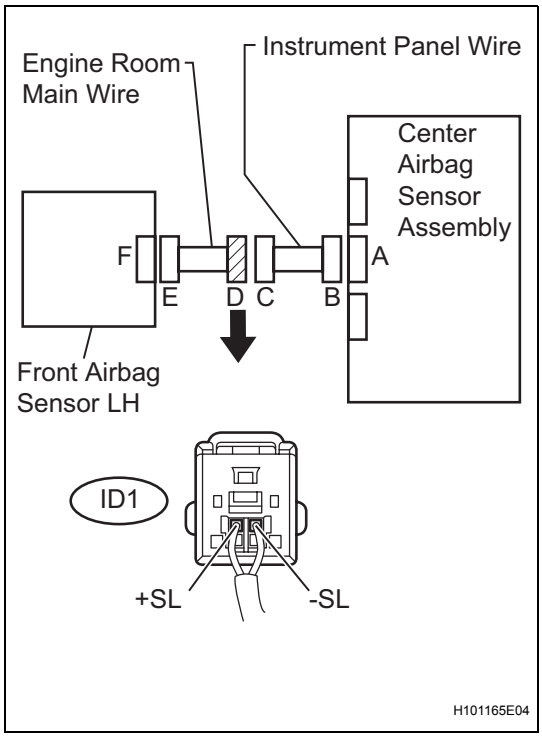
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

7	CHECK ENGINE ROOM MAIN WIRE (TO B+) (CONNECTOR - FRONT AIRBAG SENSOR LH)

RS



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the engine room main wire connector from the instrument panel wire.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

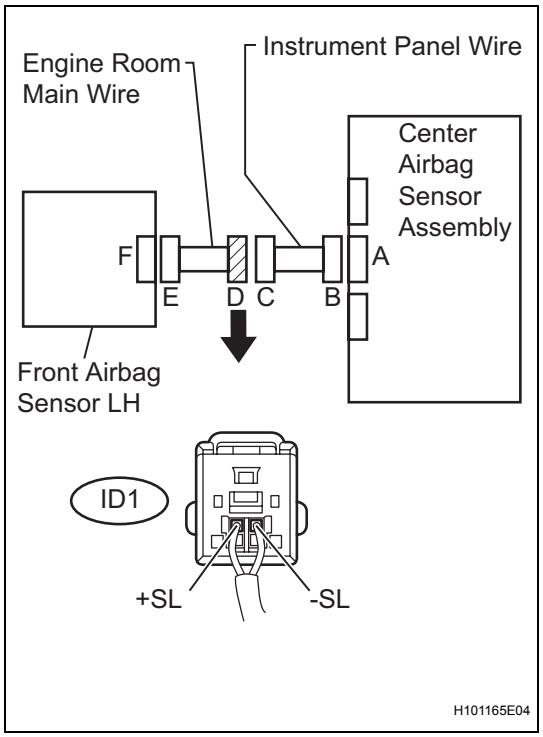
Tester Connection (Connector "D")	Condition	Specified Condition
ID1-4 (+SL) - Body ground	Ignition switch ON	Below 1 V
ID1-3 (-SL) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

8	CHECK ENGINE ROOM MAIN WIRE (TO GROUND) (CONNECTOR - FRONT AIRBAG SENSOR LH)



(a) Disconnect the engine room main wire connector from the instrument panel wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "D")	Specified Condition
ID1-4 (+SL) - Body ground	1 MΩ or higher
ID1-3 (-SL) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

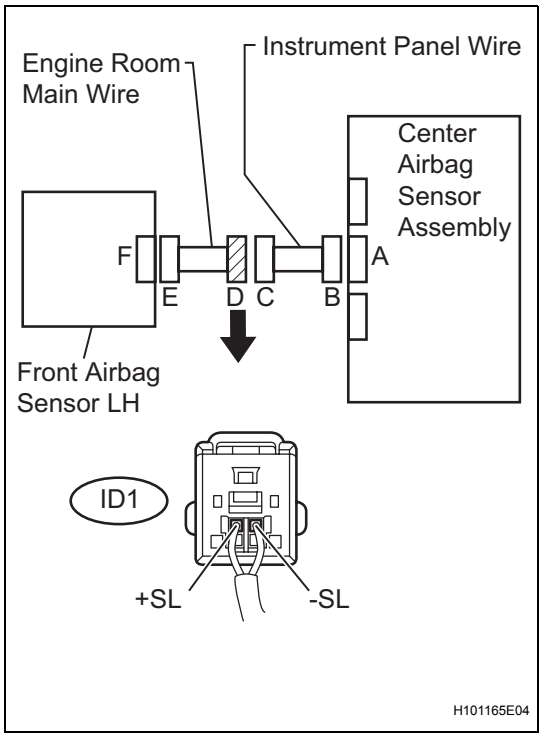
OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

RS

9	CHECK ENGINE ROOM MAIN WIRE (SHORT) (CONNECTOR - FRONT AIRBAG SENSOR LH)

RS



(a) Disconnect the engine room main wire connector from the instrument panel wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

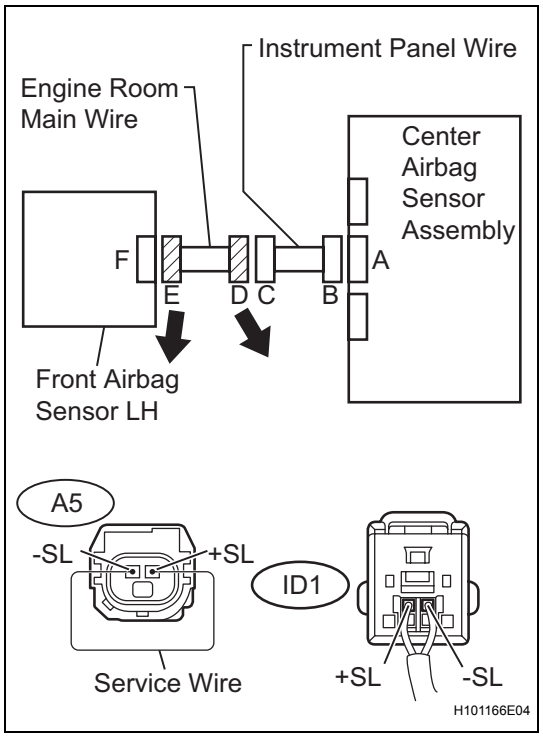
Tester Connection (Connector "D")	Specified Condition
ID1-4 (+SL) - ID1-3 (-SL)	1 MΩ or higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

10	CHECK ENGINE ROOM MAIN WIRE (OPEN) (CONNECTOR - FRONT AIRBAG SENSOR LH)



(a) Disconnect the engine room main wire connector from the instrument panel wire.
HINT:
Terminals +SL and -SL of connector "E" have already been connected with each other using the service wire.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "D")	Specified Condition
ID1-4 (+SL) - ID1-3 (-SL)	Below 1 Ω

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE INSTRUMENT PANEL WIRE

DTC	B1160/83	Short in Curtain Shield Squib RH Circuit

DESCRIPTION

The curtain shield squib RH circuit consists of the center airbag sensor and the curtain shield airbag RH. The circuit instructs the SRS to deploy when deployment conditions are met.

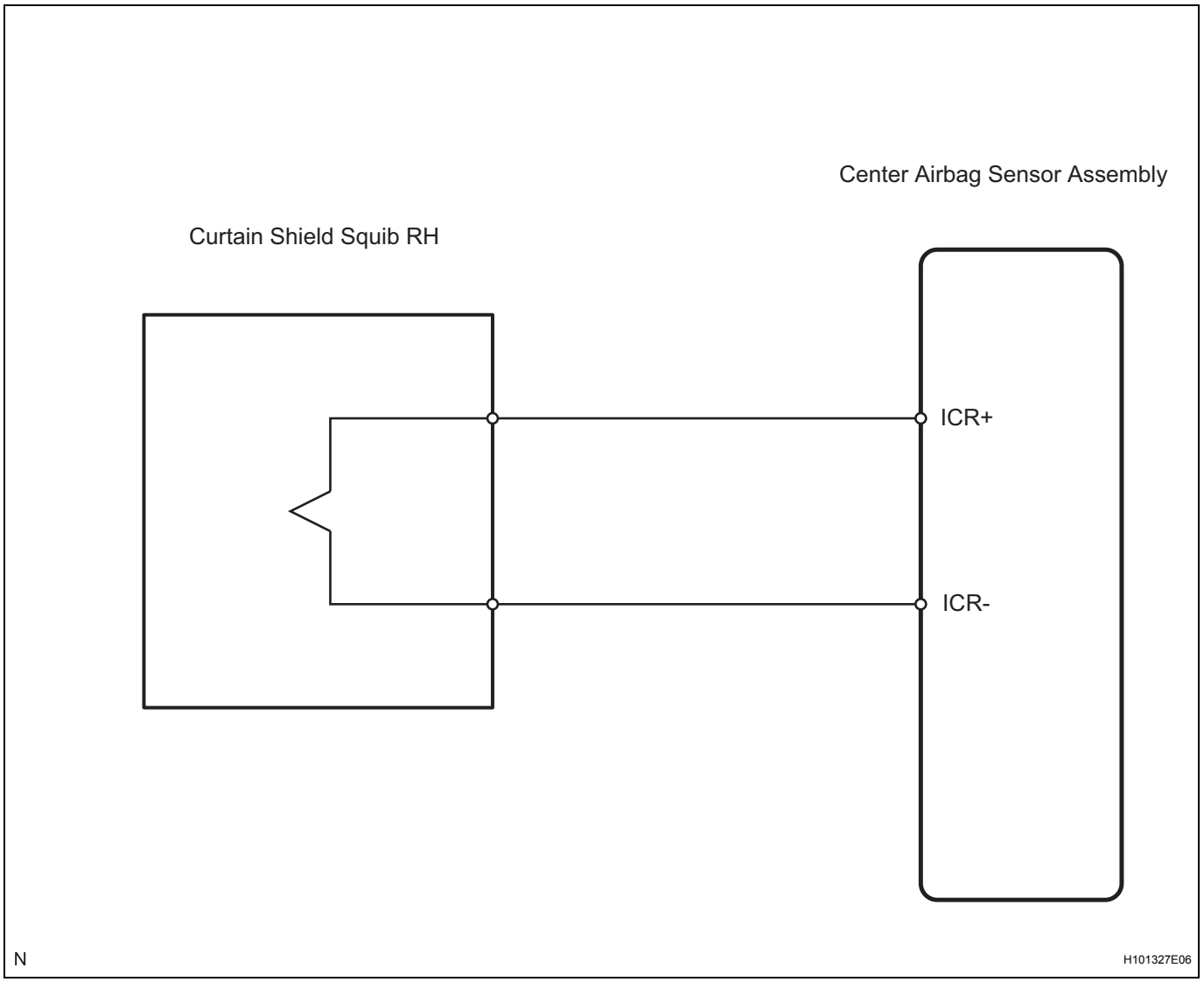
RS

DTC B1160/83 is recorded when a short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1160/83	• Short circuit between ICR+ wire harness and ICR- wire harness of curtain shield squib RH • Curtain shield squib RH malfunction • Center airbag sensor malfunction	• Curtain shield airbag assembly RH (Curtain shield squib RH) • Center airbag sensor assembly • Floor wire

HINT:
DTC B1160/83 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

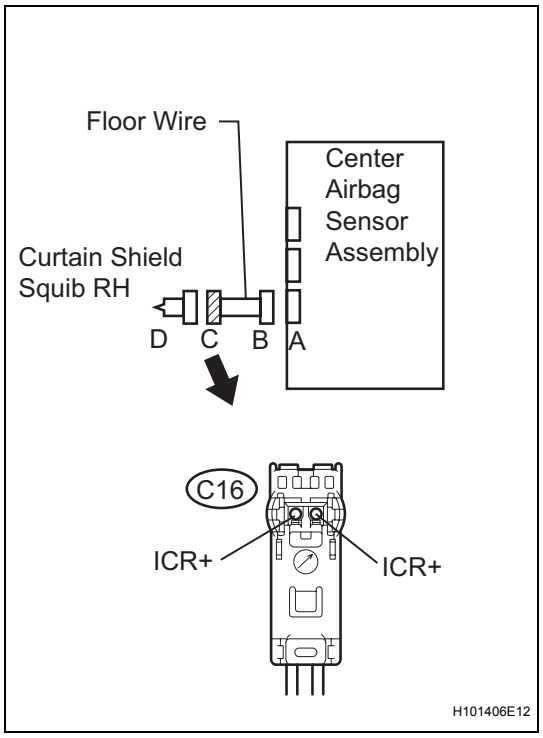
1	CHECK CONNECTOR

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the curtain shield airbag RH.
(d) Check that the floor wire connector (on the curtain shield airbag RH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the connector from the center airbag sensor.
(c) Release the activation prevention mechanism built into connector "B" (see page RS-18).
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance

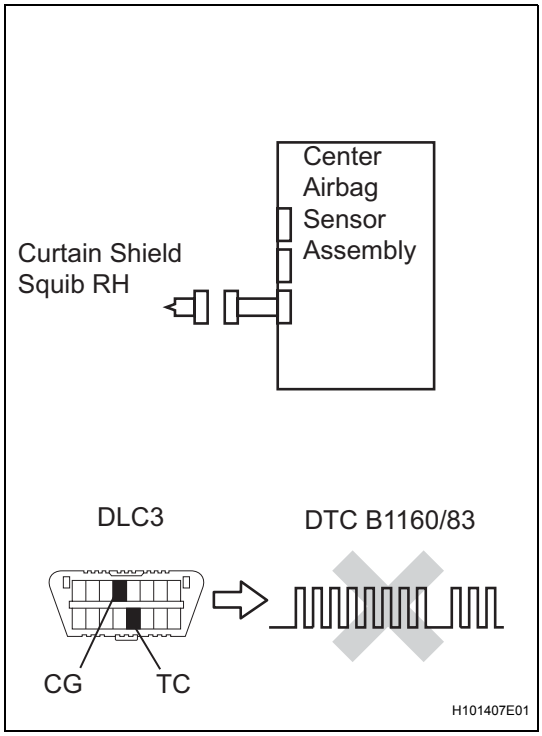
Tester connection (Connector "C")	Specified Condition
C16-1 (ICR+) - C16-2 (ICR-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

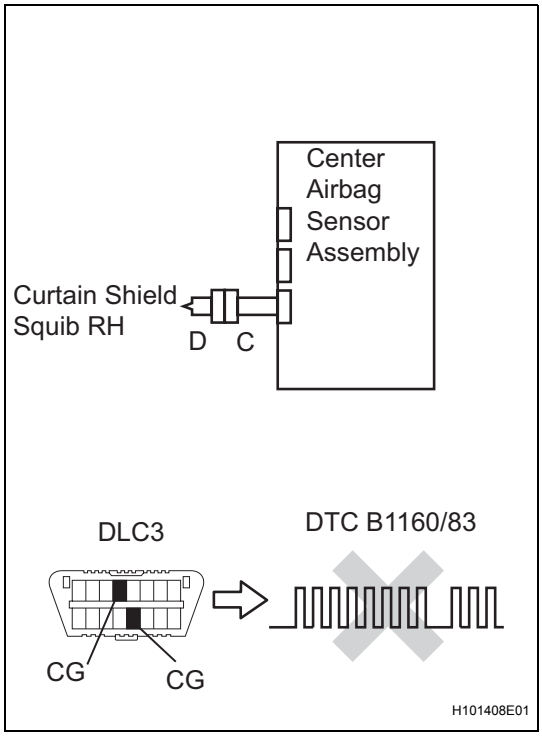
DTC B1160/83 is not output.

HINT:
Codes other than code B1160/83 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

4	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY RH (CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag RH (curtain shield squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B1160/83 is not output.

HINT:
Codes other than code B1160/83 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY RH**

OK

USE SIMULATION METHOD TO CHECK

DATA LIST / ACTIVE TEST

HINT:
By accessing the DATA LIST displayed on the intelligent tester, you can perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST is the first step of troubleshooting and is one method to save time.

1. DATA LIST FOR CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Following the display on the tester screen, read the "DATA LIST".

Center airbag sensor assembly:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
D SEAT POSITION	Seat position (Driver side)/ FORWARD: Seat is in position that is toward front BKWARD: Seat is in position that is toward rear FAIL: Failure detected	FORWARD/BKWARD	-
PASSENGER DETEC	Passenger detection/ NG: Data is not determined NONE: No passenger DETECT: Passenger exists FAIL: Failure detected	NONE/DETECT	-
L BUCKLE SW	Buckle switch (Left side)/ UNSET: Seat belt is not fastened SET: Seat belt is fastened NG: Data is not determined	UNSET/SET	-
R BUCKLE SW	Buckle switch (Right side)/ UNSET: Seat belt is not fastened SET: Seat belt is fastened NG: Data is not determined	UNSET/SET	-
DISPLAY TYPE	Display type identification information/ LR: Display is indicated by LH/RH DP: Display is indicated by Driver/ Passenger	LR	-
PAST CODES	Number of past trouble codes/ Min.: 0, Max.: 255	0	-

DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	SRS Warning Light	See page
B0100/13	Short in Driver Side Squib Circuit	- Steering pad assembly - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-40
B0101/14	Open in Driver Side Squib Circuit	- Steering pad assembly - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-45
B0102/11	Short to GND in Driver Side Squib Circuit	- Steering pad assembly - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-51
B0103/12	Short to B+ in Driver Side Squib Circuit	- Steering pad assembly - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-57
B0105/53	Short in Front Passenger Side Squib Circuit	- Front passenger airbag assembly (P squib) - Center airbag sensor assembly - Instrument panel wire	ON	RS-63
B0106/54	Open in Front Passenger Side Squib Circuit	- Front passenger airbag assembly (P squib) - Center airbag sensor assembly - Instrument panel wire	ON	RS-66
B0107/51	Short to GND in Front Passenger Side Squib Circuit	- Front passenger airbag assembly (P squib) - Center airbag sensor assembly - Instrument panel wire	ON	RS-70
B0108/52	Short to B+ in Front Passenger Side Squib Circuit	- Front passenger airbag assembly (P squib) - Center airbag sensor assembly - Instrument panel wire	ON	RS-74
B0110/43	Short in Side Squib RH Circuit	- Front seat side airbag assembly RH (Side squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-78
B0111/44	Open in Side Squib RH Circuit	- Front seat side airbag assembly RH (Side squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-82
B0112/41	Short to GND in Side Squib RH Circuit	- Front seat side airbag assembly RH (Side squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-86

DTC No.	Detection Item	Trouble Area	SRS Warning Light	See page
B0113/42	Short to B+ in Side Squib RH Circuit	- Front seat side airbag assembly RH (Side squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-90
B0115/47	Short in Side Squib LH Circuit	- Front seat side airbag assembly LH (Side squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-94
B0116/48	Open in Side Squib LH Circuit	- Front seat side airbag assembly LH (Side squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-98
B0117/45	Short to GND in Side Squib LH Circuit	- Front seat side airbag assembly LH (Side squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-102
B0118/46	Short to B+ in Side Squib LH Circuit	- Front seat side airbag assembly LH (Side squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-106
B0121/26	Seat Belt Buckle Switch RH Circuit Malfunction	- Front seat inner belt assembly RH (Seat belt buckle switch RH) - Center airbag sensor assembly - Floor wire	ON	RS-110
B0126/27	Seat Belt Buckle Switch LH Circuit Malfunction	- Front seat inner belt assembly LH (Seat belt buckle switch LH) - Center airbag sensor assembly - Floor wire	ON	RS-115
B0130/63	Short in Front Pretensioner Squib RH Circuit	- Front seat outer belt assembly RH (P/T squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-120
B0131/64	Open in Front Pretensioner Squib RH Circuit	- Front seat outer belt assembly RH (P/T squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-124
B0132/61	Short to GND in Front Pretensioner Squib RH Circuit	- Front seat outer belt assembly RH (P/T squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-128

DTC No.	Detection Item	Trouble Area	SRS Warning Light	See page
B0133/62	Short to B+ in Front Pretensioner Squib RH Circuit	- Front seat outer belt assembly RH (P/T squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-132
B0135/73	Short in Front Pretensioner Squib LH Circuit	- Front seat outer belt assembly LH (P/T squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-136
B0136/74	Open in Front Pretensioner Squib LH Circuit	- Front seat outer belt assembly LH (P/T squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-140
B0137/71	Short to GND in Front Pretensioner Squib LH Circuit	- Front seat outer belt assembly LH (P/T squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-144
B0138/72	Short to B+ in Front Pretensioner Squib LH Circuit	- Front seat outer belt assembly LH (P/T squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-148
B1100/31	Center Airbag Sensor Assembly Malfunction	- Center airbag sensor assembly - Electrical connection check mechanism*	ON	RS-151
B1140/32	Side Airbag Sensor Assembly RH Circuit Malfunction	- Side airbag sensor assembly RH - Center airbag sensor assembly - Rear airbag sensor RH - Floor wire	Blinks	RS-154
B1141/33	Side Airbag Sensor Assembly LH Malfunction	- Side airbag sensor assembly LH - Center airbag sensor assembly - Rear airbag sensor LH - Floor wire	Blinks	RS-162
B1153/25	Seat Position Airbag Sensor Circuit Malfunction	- Seat position airbag sensor - Center airbag sensor assembly - Floor wire - Front seat inner belt assembly LH	ON	RS-170
B1154/38	Rear Airbag Sensor RH Circuit Malfunction	- Rear airbag sensor RH - Side airbag sensor assembly RH - Center airbag sensor assembly - Floor wire	Blinks	RS-180
B1155/39	Rear Airbag Sensor LH Circuit Malfunction	- Rear airbag sensor RH - Side airbag sensor assembly RH - Center airbag sensor assembly - Floor wire	Blinks	RS-184

DTC No.	Detection Item	Trouble Area	SRS Warning Light	See page
B1156/15	Front Airbag Sensor RH Malfunction	- Front airbag sensor RH - Center airbag sensor assembly - Instrument panel wire - Engine room wire	ON	RS-188
B1157/15	Front Airbag Sensor RH Malfunction	- Front airbag sensor RH - Center airbag sensor assembly - Instrument panel wire - Engine room wire	ON	RS-188
B1158/16	Front Airbag Sensor LH Malfunction	- Front airbag sensor LH - Center airbag sensor assembly - Instrument panel wire - Engine room wire	ON	RS-197
B1159/16	Front Airbag Sensor LH Malfunction	- Front airbag sensor LH - Center airbag sensor assembly - Instrument panel wire - Engine room wire	ON	RS-197
B1160/83	Short in Curtain Shield Squib RH Circuit	- Curtain shield airbag assembly RH (Curtain shield squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-206
B1161/84	Open in Curtain Shield Squib RH Circuit	- Curtain shield airbag assembly RH (Curtain shield squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-210
B1162/81	Short to GND in Curtain Shield Squib RH Circuit	- Curtain shield airbag assembly RH (Curtain shield squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-214
B1163/82	Short to B+ in Curtain Shield Squib RH Circuit	- Curtain shield airbag assembly RH (Curtain shield squib RH) - Center airbag sensor assembly - Floor wire	Blinks	RS-217
B1165/87	Short in Curtain Shield Squib LH Circuit	- Curtain shield airbag assembly LH (Curtain shield squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-221
B1166/88	Open in Curtain Shield Squib LH Circuit	- Curtain shield airbag assembly LH (Curtain shield squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-225
B1167/85	Short to GND in Curtain Shield Squib LH Circuit	- Curtain shield airbag assembly LH (Curtain shield squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-228

RS

DTC No.	Detection Item	Trouble Area	SRS Warning Light	See page
B1168/86	Short to B+ in Curtain Shield Squib LH Circuit	- Curtain shield airbag assembly LH (Curtain shield squib LH) - Center airbag sensor assembly - Floor wire	Blinks	RS-232
B1180/17	Short in Driver Side Squib 2nd Step Circuit	- Steering pad assembly (D squib, 2nd step) - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-236
B1181/18	Open in Driver Side Squib 2nd Step Circuit	- Steering pad assembly (D squib, 2nd step) - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-241
B1182/19	Short to GND in Driver Side Squib 2nd Step Circuit	- Steering pad assembly (D squib, 2nd step) - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-247
B1183/22	Short to B+ in Driver Side Squib 2nd Step Circuit	- Steering pad assembly (D squib, 2nd step) - Spiral cable sub-assembly - Center airbag sensor assembly - Instrument panel wire	ON	RS-253
B1185/57	Short in Front Passenger Side Squib 2nd Step Circuit	- Front passenger airbag assembly (P squib, 2nd step) - Center airbag sensor assembly - Instrument panel wire	ON	RS-259
B1186/58	Open in Front Passenger Side Squib 2nd Step Circuit	- Front passenger airbag assembly (P squib, 2nd step) - Center airbag sensor assembly - Instrument panel wire	ON	RS-263
B1187/55	Short to GND in Front Passenger Side Squib 2nd Step Circuit	- Front passenger airbag assembly (P squib, 2nd step) - Center airbag sensor assembly - Instrument panel wire	ON	RS-267
B1188/56	Short to B+ in Front Passenger Side Squib 2nd Step Circuit	- Front passenger airbag assembly (P squib, 2nd step) - Center airbag sensor assembly - Instrument panel wire	ON	RS-271

HINT:

- *: w/ Side Airbag

- When the SRS warning light remains on and the DTC output is the normal system code, a voltage source drop is likely to occur. This malfunction is not stored in the memory of the center airbag sensor assembly. If the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more codes are indicated, the code with the lower number appears first.
- If the displayed code is not shown in the chart, the center airbag sensor assembly may be malfunctioning.
- In the case of any malfunction concerning an open circuit, short to ground, or short to B+ due to a squib, other malfunction codes may not be detected. In this case, repair the malfunction currently indicated and then perform the malfunction diagnosis again.

DTC	B1161/84	Open in Curtain Shield Squib RH Circuit

DESCRIPTION

The curtain shield squib RH circuit consists of the center airbag sensor and the curtain shield airbag RH. The circuit instructs the SRS to deploy when deployment conditions are met.

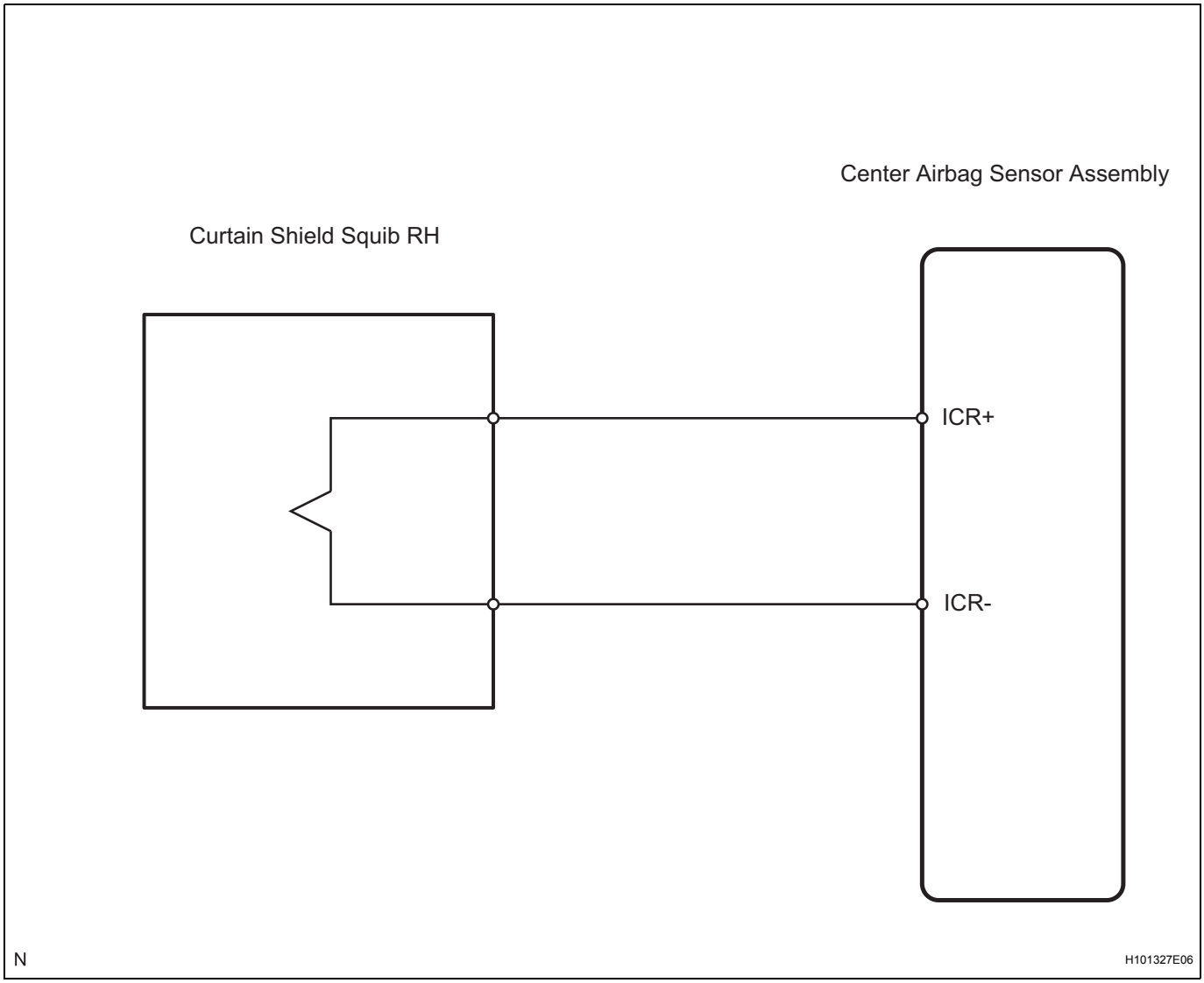
RS

DTC B1161/84 is recorded when an open is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1161/84	• Open circuit in ICR+ wire harness or ICR- wire harness of curtain shield squib RH • Curtain shield squib RH malfunction • Center airbag sensor malfunction	• Curtain shield airbag RH (curtain shield squib RH) • Center airbag sensor assembly • Floor wire

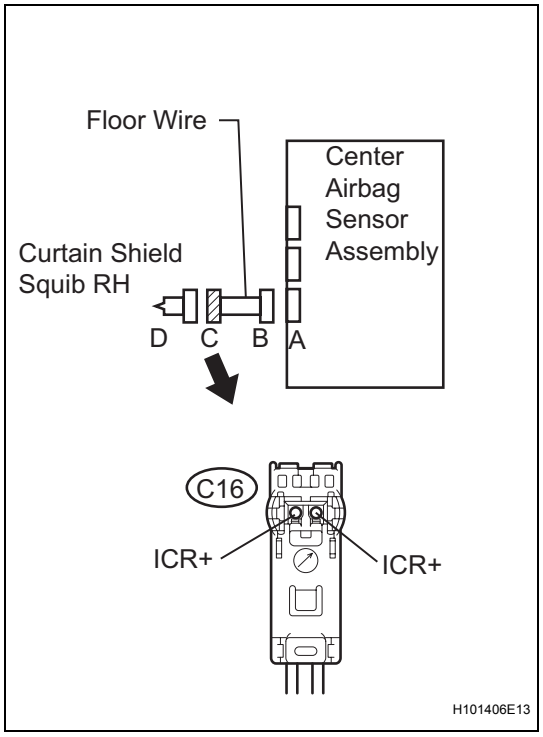
HINT:
DTC B1161/84 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the curtain shield airbag RH.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

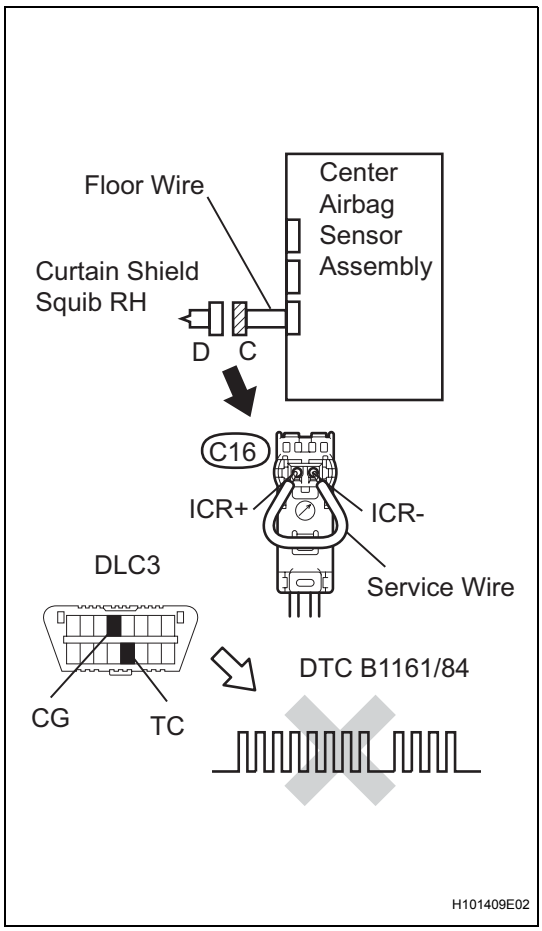
Tester Connection (Connector "C")	Specified Condition
C16-1 (ICR+) - C16-2 (ICR-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK →

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



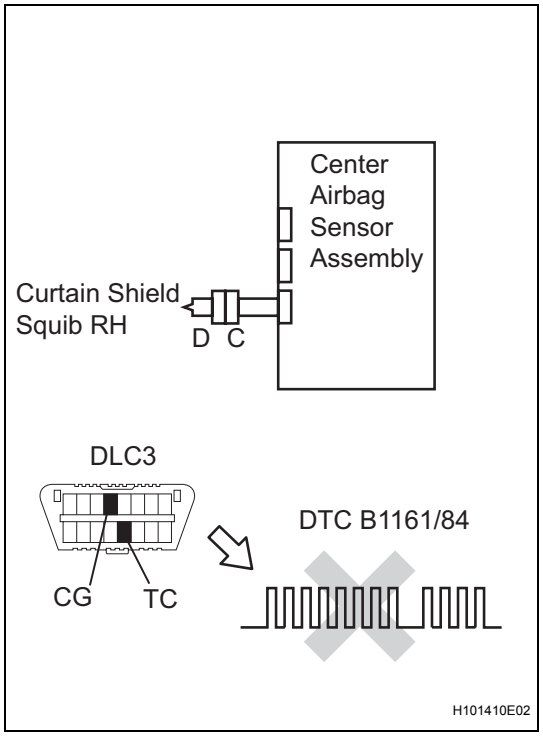
(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals ICR+ and ICR- of connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B1161/84 is not output.
HINT:
Codes other than code B1161/84 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY RH (CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the curtain shield airbag RH (curtain shield squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1161/84 is not output.

HINT:

Codes other than code B1161/84 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY RH**

OK

USE SIMULATION METHOD TO CHECK

RS

DTC	B1162/81	Short to GND in Curtain Shield Squib RH Circuit

DESCRIPTION

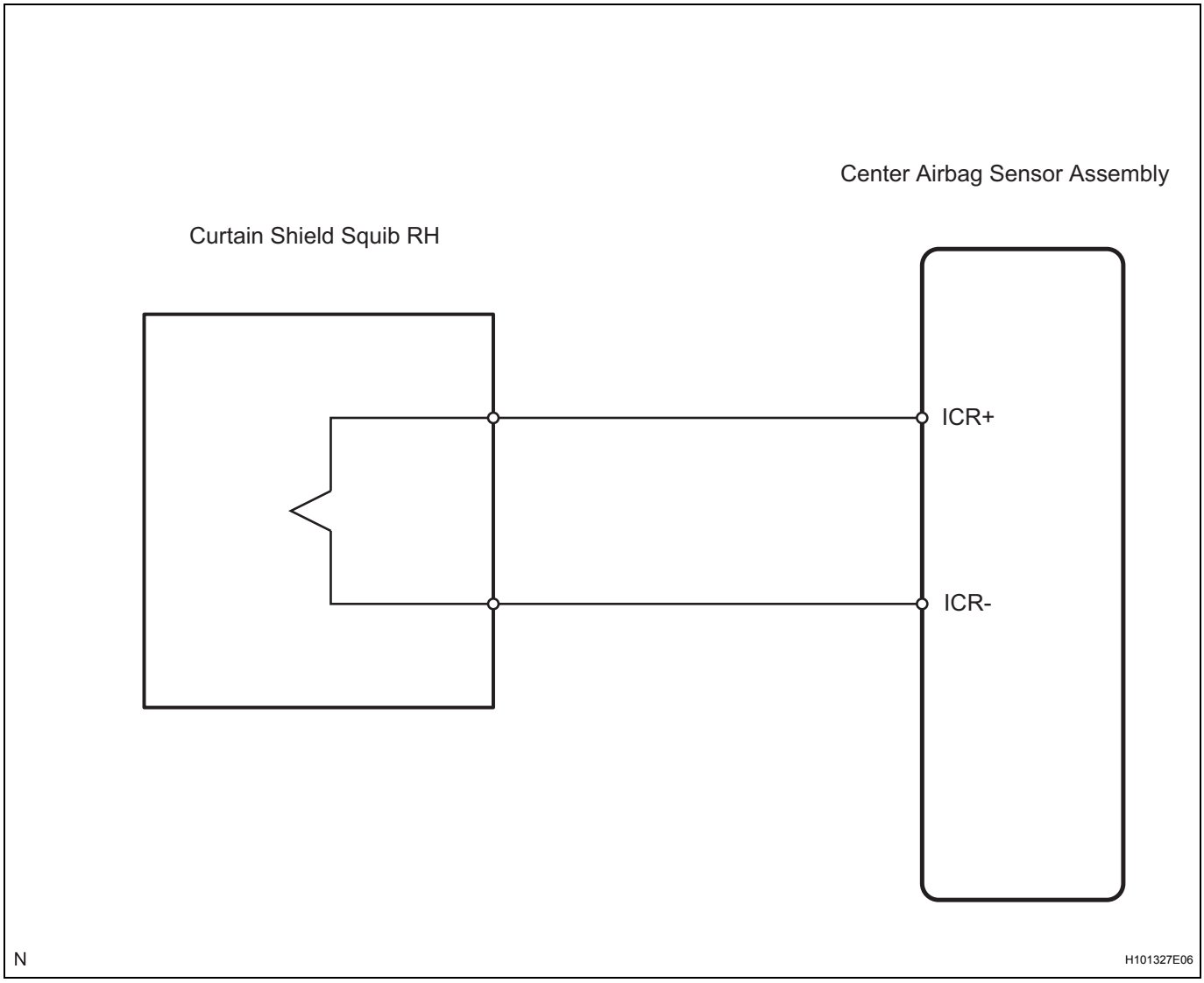
RS

The curtain shield squib RH circuit consists of the center airbag sensor and the curtain shield airbag RH. The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B1162/81 is recorded when a ground short is detected in the curtain shield squib RH circuit.

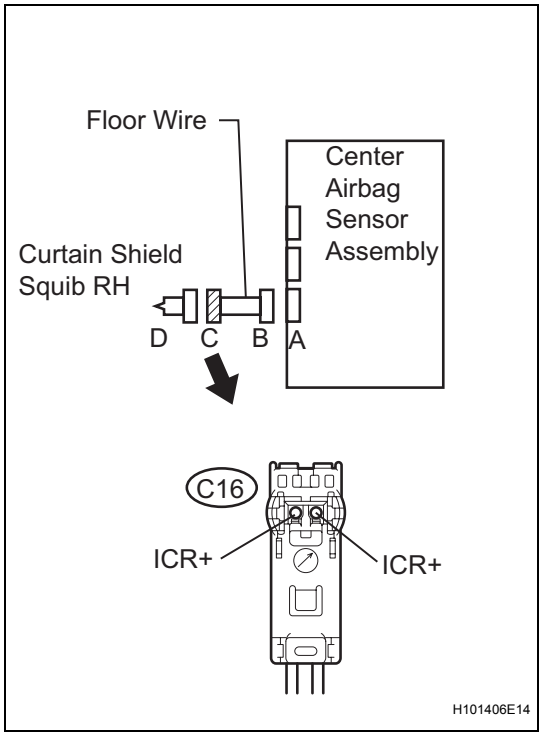
DTC No.	DTC Detection Condition	Trouble Area
B1162/81	• Short in curtain shield squib RH circuit (to ground) • Curtain shield squib RH malfunction • Center airbag sensor malfunction	• Curtain shield airbag assembly RH (curtain shield squib RH) • Center airbag sensor assembly • Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB RH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the curtain shield airbag RH.
(d) Measure the resistance according to the value(s) in the table below.

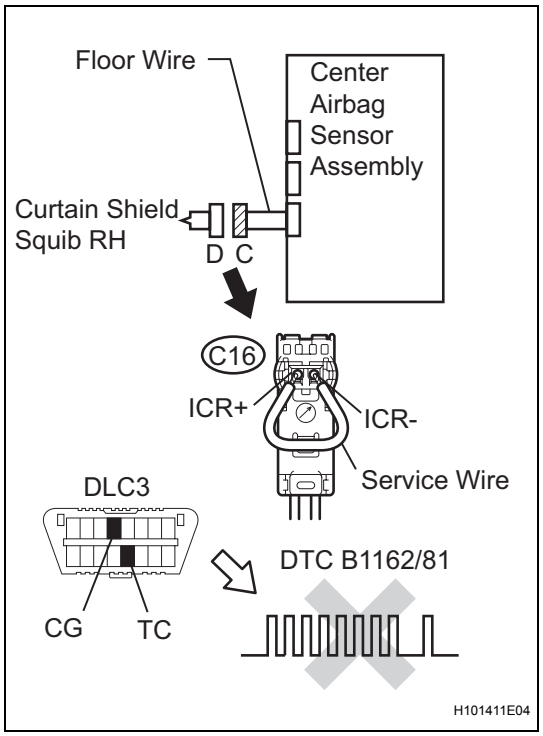
Standard resistance

Tester Connection (Connector "C")	Specified Condition
C16-1 (ICR+) - Body ground	1 MΩ or higher
C16-2 (ICR-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals ICR+ and ICR- of connector "C".

NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

OK:

DTC B1162/81 is not output.

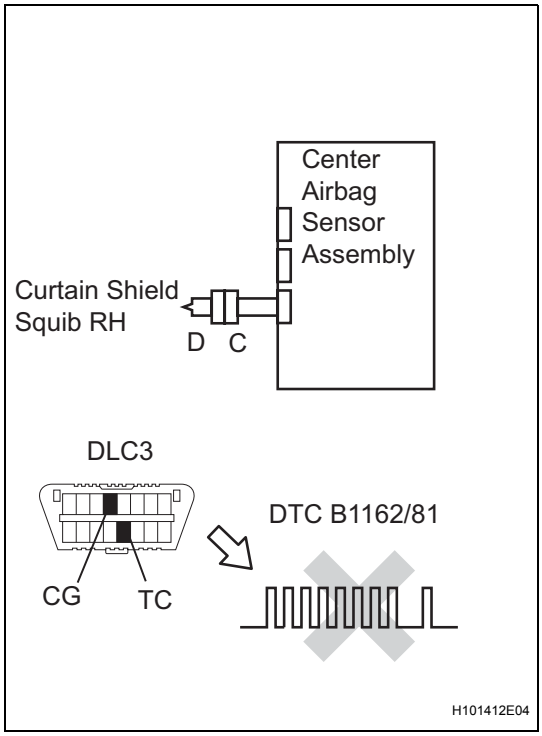
HINT:
Codes other than code B1162/81 may be output at this time, but they are not relevant to this check.

NG → REPLACE CENTER AIRBAG SENSOR ASSEMBLY

OK

RS

3	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY RH (CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the curtain shield airbag RH (curtain shield squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1162/81 is not output.

HINT:

Codes other than code B1162/81 may be output at this time, but they are not relevant to this check.

NG → REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY RH

OK

4	USE SIMULATION METHOD TO CHECK

NG → Go to step 1

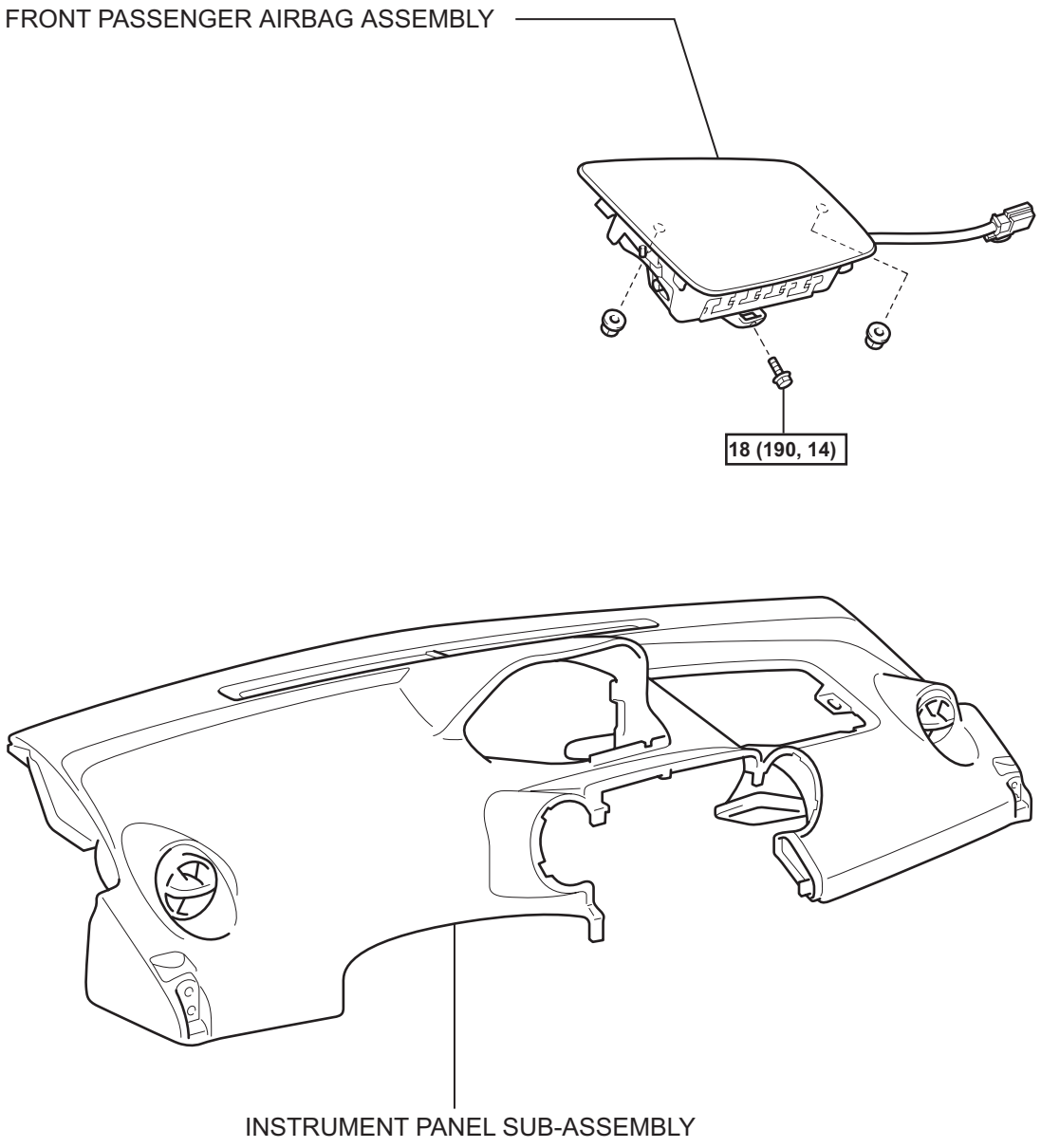
OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

FRONT PASSENGER AIRBAG ASSEMBLY

COMPONENTS

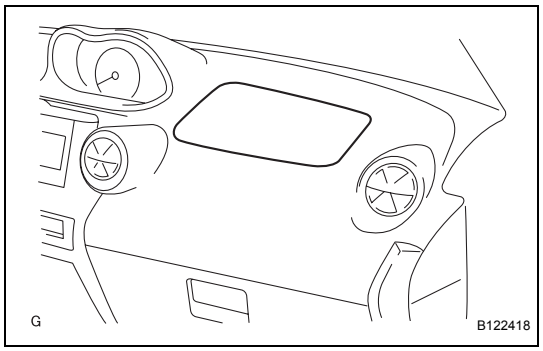
RS



N*m (kgf*cm, ft.*lbf) : Specified torque

T

C119029E03

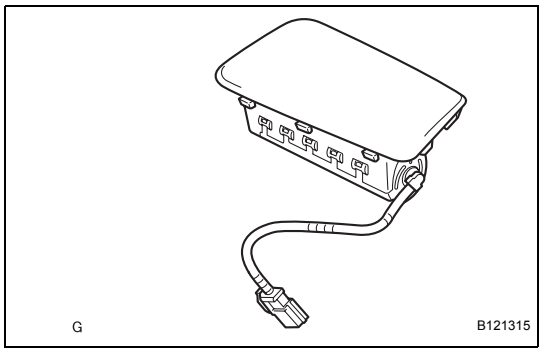


ON-VEHICLE INSPECTION

1. CHECK FRONT PASSENGER AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)

(a) Perform a diagnostic system check (see page RS-33).

(b) With the front passenger airbag installed on the vehicle, perform a visual check:
Check for cuts, cracks or discoloration on the front passenger airbag surface and in the grooved portion.
If any of the defects mentioned above are present, replace the front passenger airbag with a new one.
CAUTION:
For removal and installation of the front passenger airbag, be sure to follow the correct procedures.

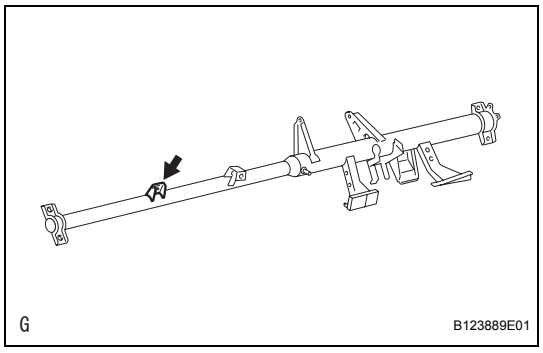


2. CHECK FRONT PASSENGER AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)

(a) Perform a diagnostic system check (see page RS-33).

(b) With the front passenger airbag removed from the vehicle, perform a visual check:
- Check for cuts, cracks or discoloration on the front passenger airbag.
- Check for cracks or other damage on the connectors.
- Check for deformation or cracks on the instrument panel and instrument panel reinforcement.

If any of the defects mentioned above are present, replace the front passenger airbag with a new one.
CAUTION:
For removal and installation of the front passenger airbag, be sure to follow the correct procedures.



DTC	B1163/82	Short to B+ in Curtain Shield Squib RH Circuit

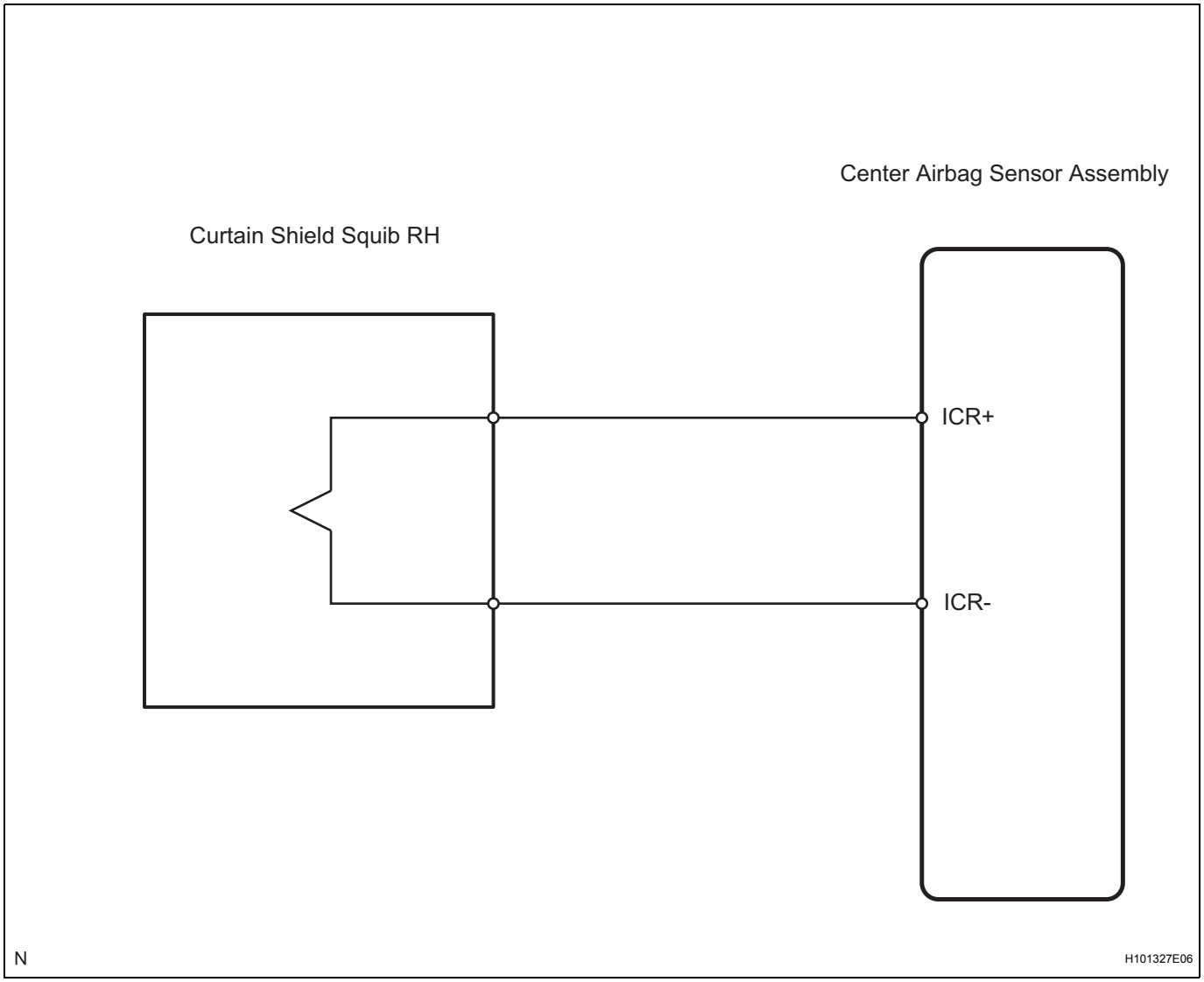
DESCRIPTION

The curtain shield squib RH circuit consists of the center airbag sensor and the curtain shield airbag RH. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1163/82 is recorded when a B+ short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1163/82	• Short in curtain shield squib RH circuit (to B+) • Curtain shield squib RH malfunction • Center airbag sensor malfunction	• Curtain shield airbag assembly RH (curtain shield squib RH) • Center airbag sensor assembly • Floor wire

HINT:
DTC B1163/82 is indicated only for the vehicle equipped with the side airbag.

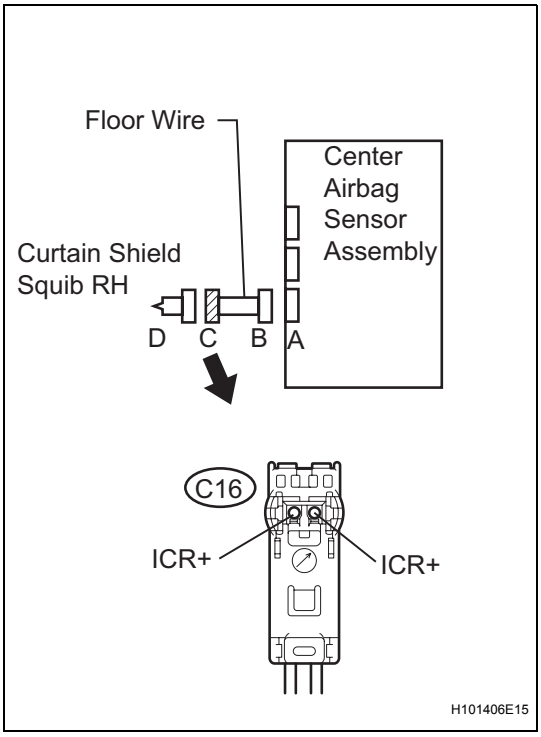
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB RH CIRCUIT)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the curtain shield airbag RH.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

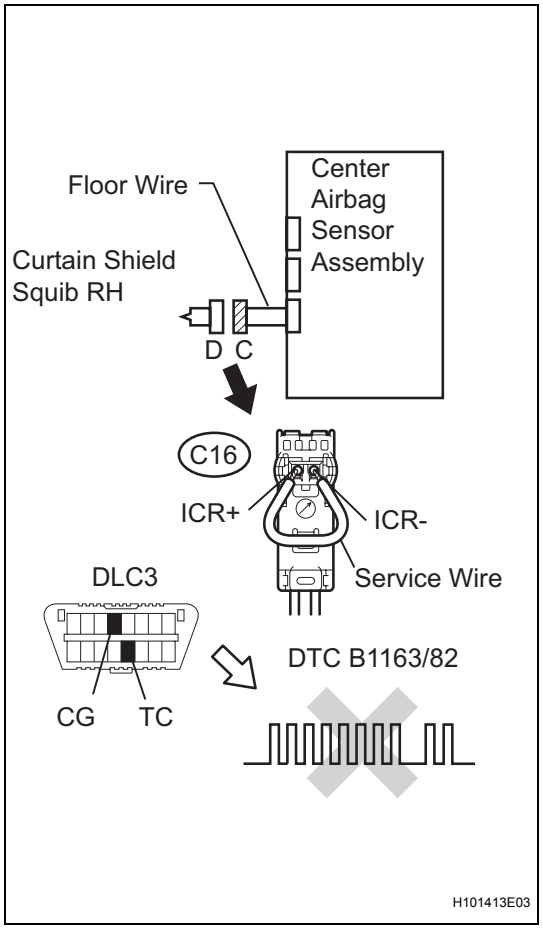
Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
C16-1 (ICR+) - Body ground	Ignition switch ON	Below 1 V
C16-2 (ICR-) - Body ground	Ignition switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect terminals ICR+ and ICR- of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1163/82 is not output.

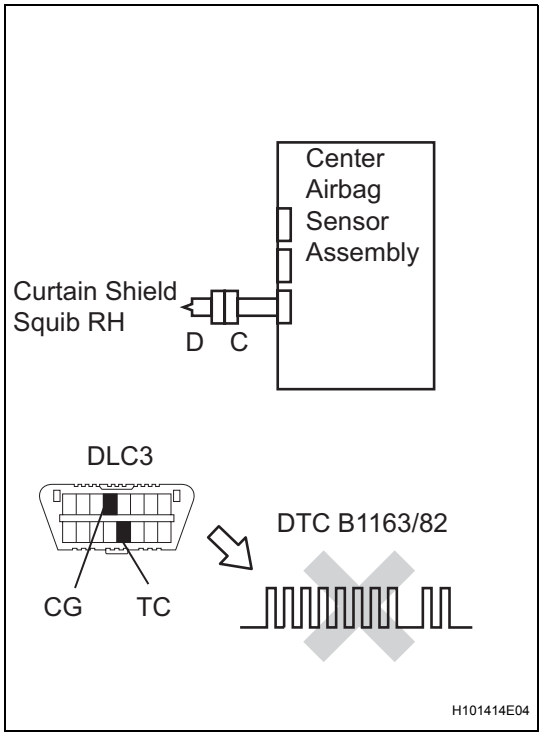
HINT:
Codes other than code B1163/82 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

RS

3	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY RH (CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the curtain shield airbag RH (curtain shield squib RH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1163/82 is not output.

HINT:

Codes other than code B1163/82 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY RH**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B1165/87	Short in Curtain Shield Squib LH Circuit

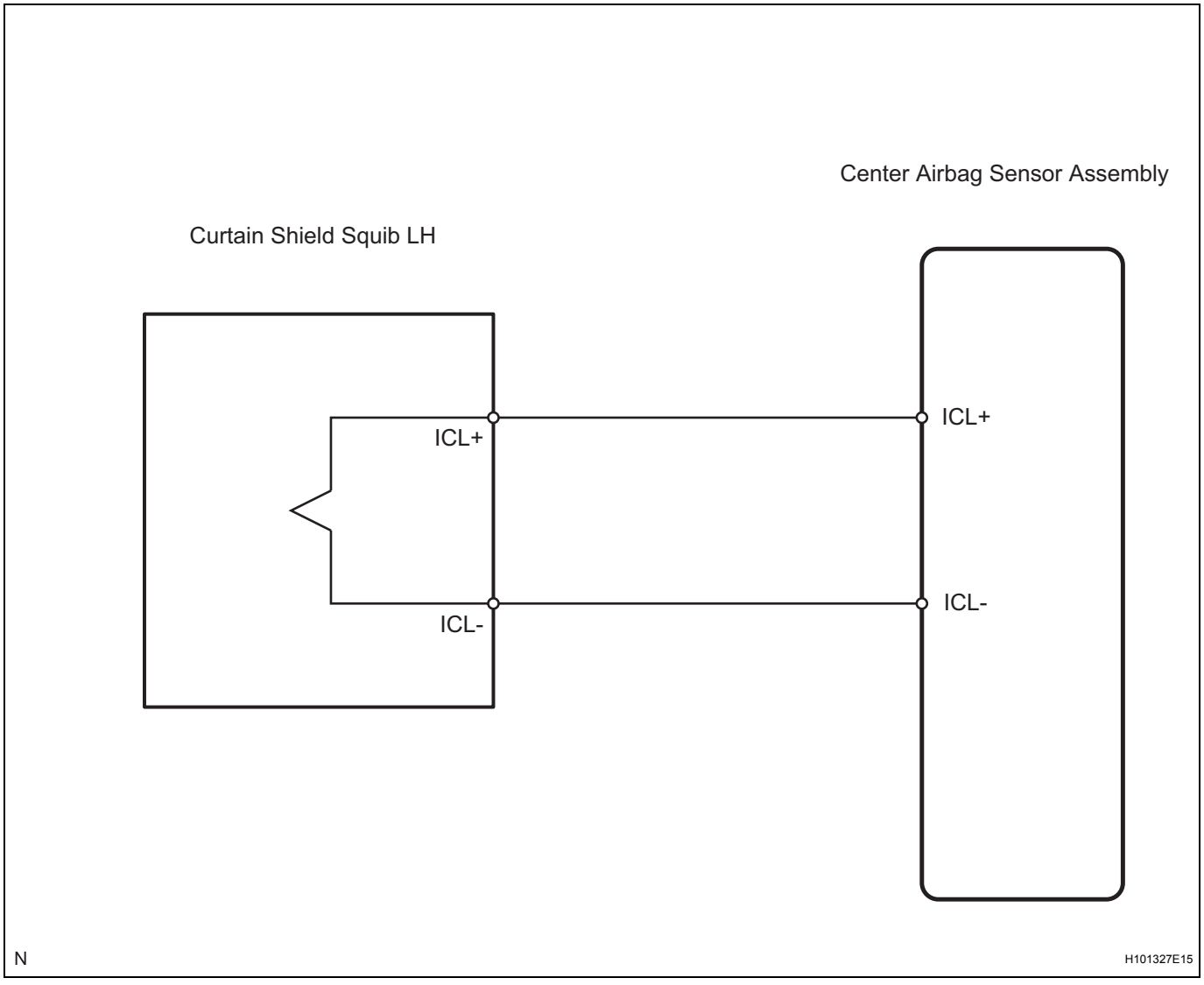
DESCRIPTION

The curtain shield squib LH circuit consists of the center airbag sensor and the curtain shield airbag LH. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1165/87 is recorded when a short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1165/87	• Short circuit between ICL+ wire harness and ICL- wire harness of curtain shield squib LH • Curtain shield squib LH malfunction • Center airbag sensor malfunction	• Curtain shield airbag assembly LH (curtain shield squib LH) • Center airbag sensor assembly • Floor wire

HINT:
DTC B1165/87 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONNECTOR

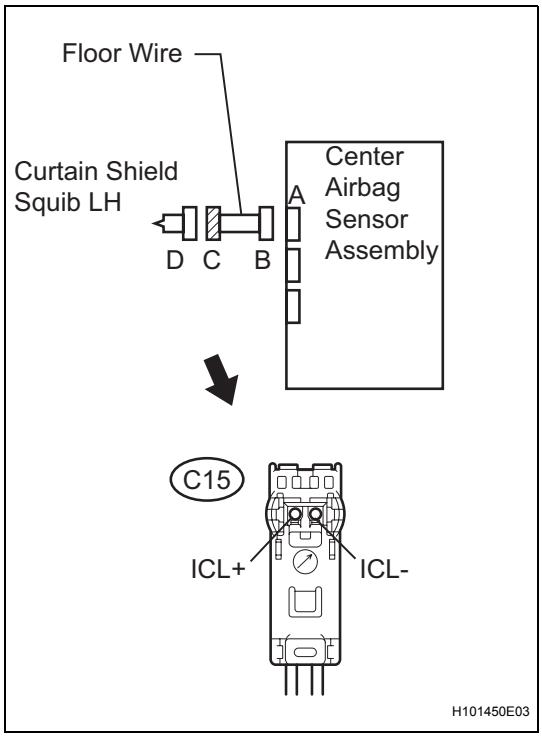
RS

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the curtain shield airbag LH.
(d) Check that the floor wire connector (on the curtain shield airbag LH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB LH CIRCUIT)



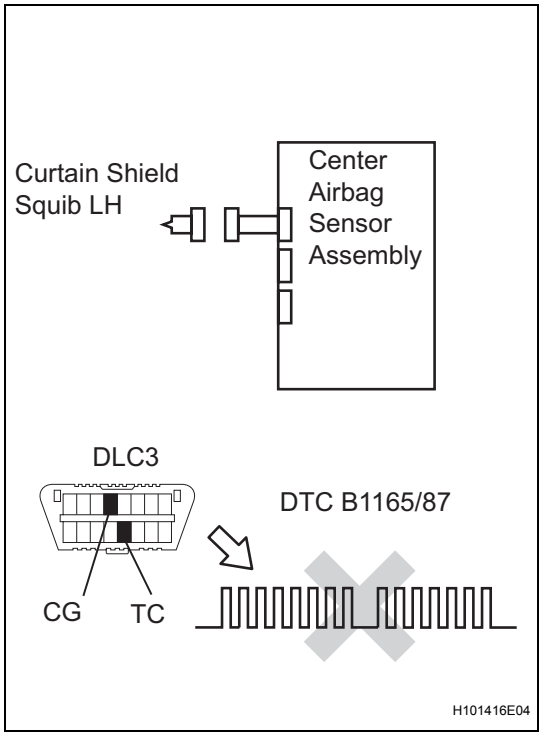
(a) Disconnect the connector from the center airbag sensor.
(b) Release the activation prevention mechanism built into connector "B" (see page RS-18).
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Connector "C")	Specified Condition
C15-1 (ICL+) - C15-2 (ICL-)	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

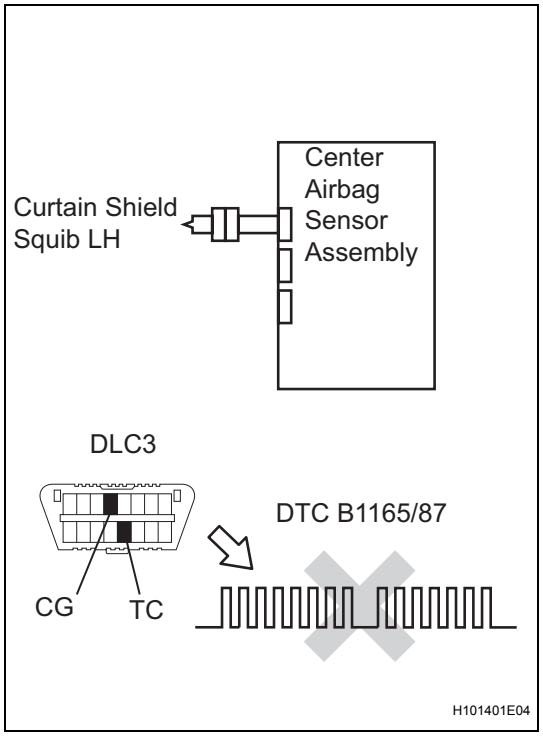
DTC B1165/87 is not output.

HINT:
Codes other than code B1165/87 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

4 CHECK CURTAIN SHIELD AIRBAG ASSEMBLY LH (CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag LH (curtain shield squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B1165/87 is not output.

HINT:
Codes other than code B1165/87 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY LH**

OK

USE SIMULATION METHOD TO CHECK

DTC	B1166/88	Open in Curtain Shield Squib LH Circuit

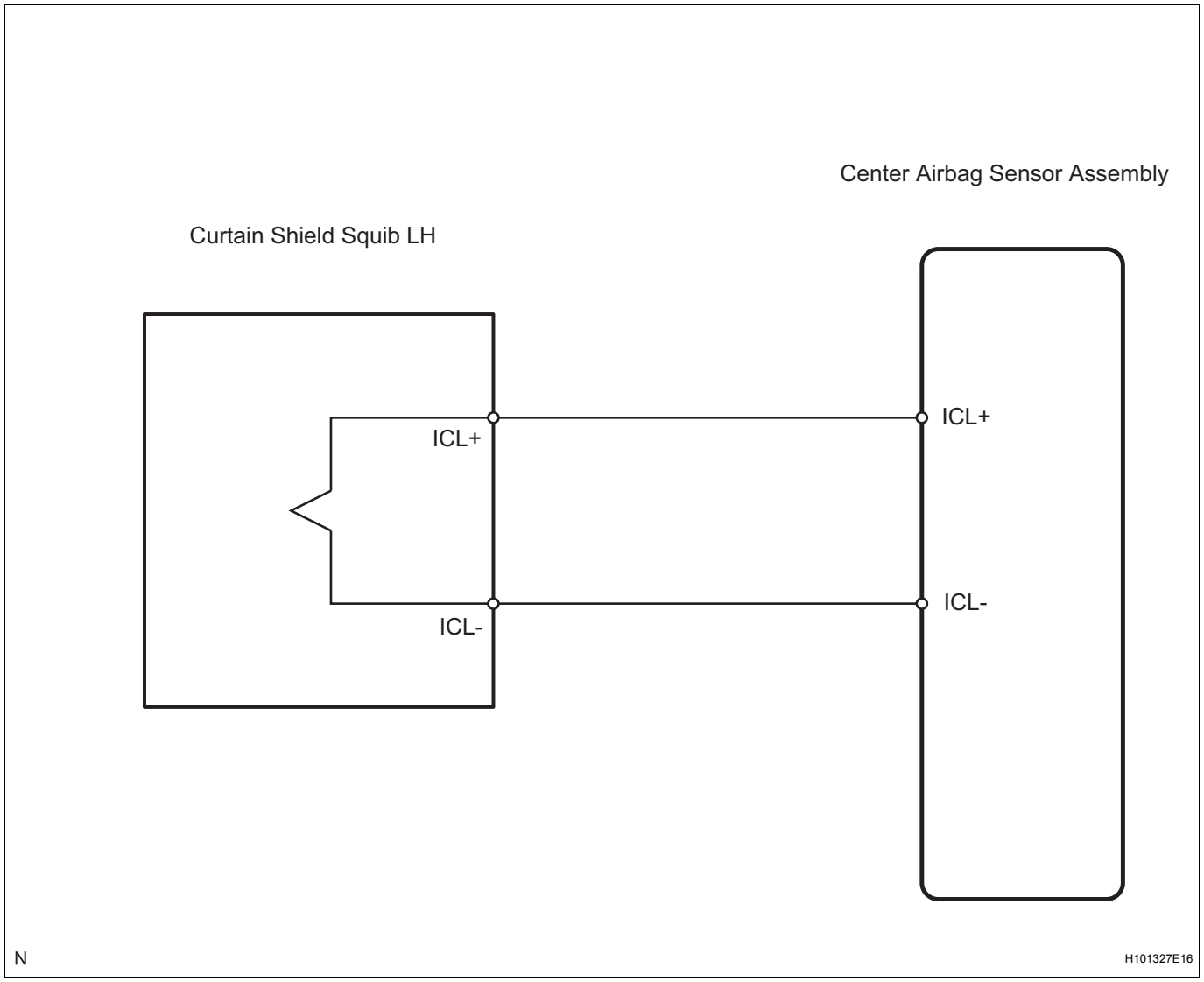
DESCRIPTION

The curtain shield squib LH circuit consists of the center airbag sensor and the curtain shield airbag LH. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1166/88 is recorded when an open is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1166/88	• Open circuit in ICL+ wire harness or ICL- wire harness of curtain shield squib LH • Curtain shield squib LH malfunction • Center airbag sensor malfunction	• Curtain shield airbag assembly LH (curtain shield squib LH) • Center airbag sensor assembly • Floor wire

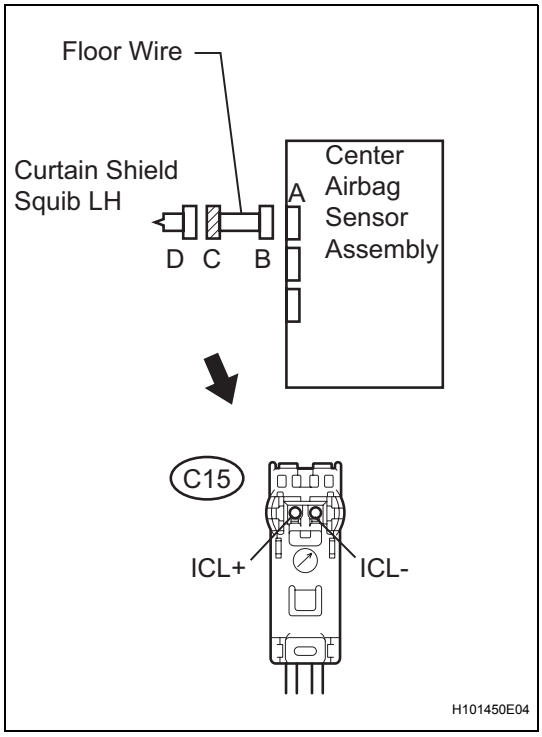
HINT:
DTC B1166/88 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the curtain shield airbag LH.
(d) Measure the resistance according to the value(s) in the table below.

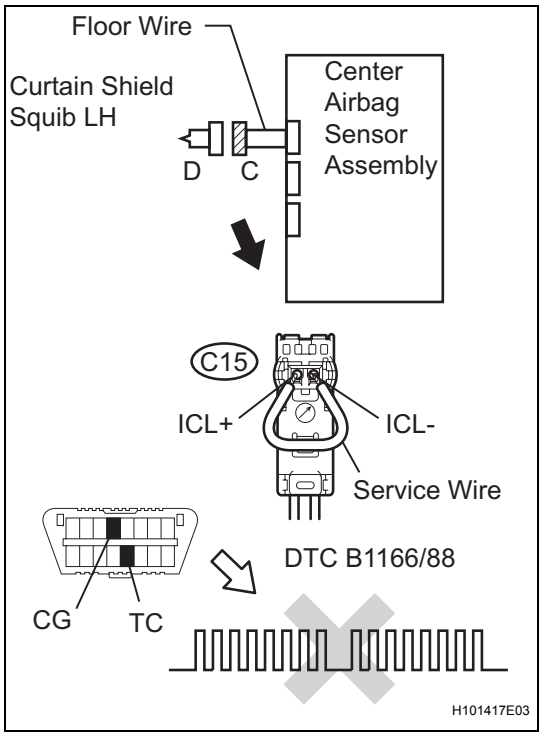
Standard resistance

Tester Connection (Connector "C")	Specified Condition
C15-1 (ICL+) - C15-2 (ICL-)	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals ICL+ and ICL- of connector "C".

NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

OK:

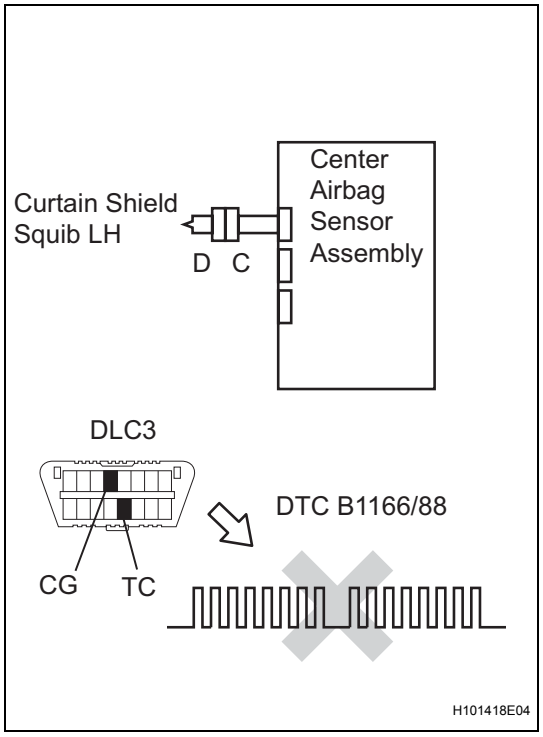
DTC B1166/88 is not output.

HINT:
Codes other than code B1166/88 may be output at this time, but they are not relevant to this check.

NG → REPLACE CENTER AIRBAG SENSOR ASSEMBLY

OK

3	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY LH (CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the curtain shield airbag LH (curtain shield squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1166/88 is not output.

HINT:

Codes other than code B1166/88 may be output at this time, but they are not relevant to this check.

NG → REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY LH

OK

USE SIMULATION METHOD TO CHECK

DTC	B1167/85	Short to GND in Curtain Shield Squib LH Circuit

DESCRIPTION

The curtain shield squib LH circuit consists of the center airbag sensor and the curtain shield airbag LH. The circuit instructs the SRS to deploy when deployment conditions are met.

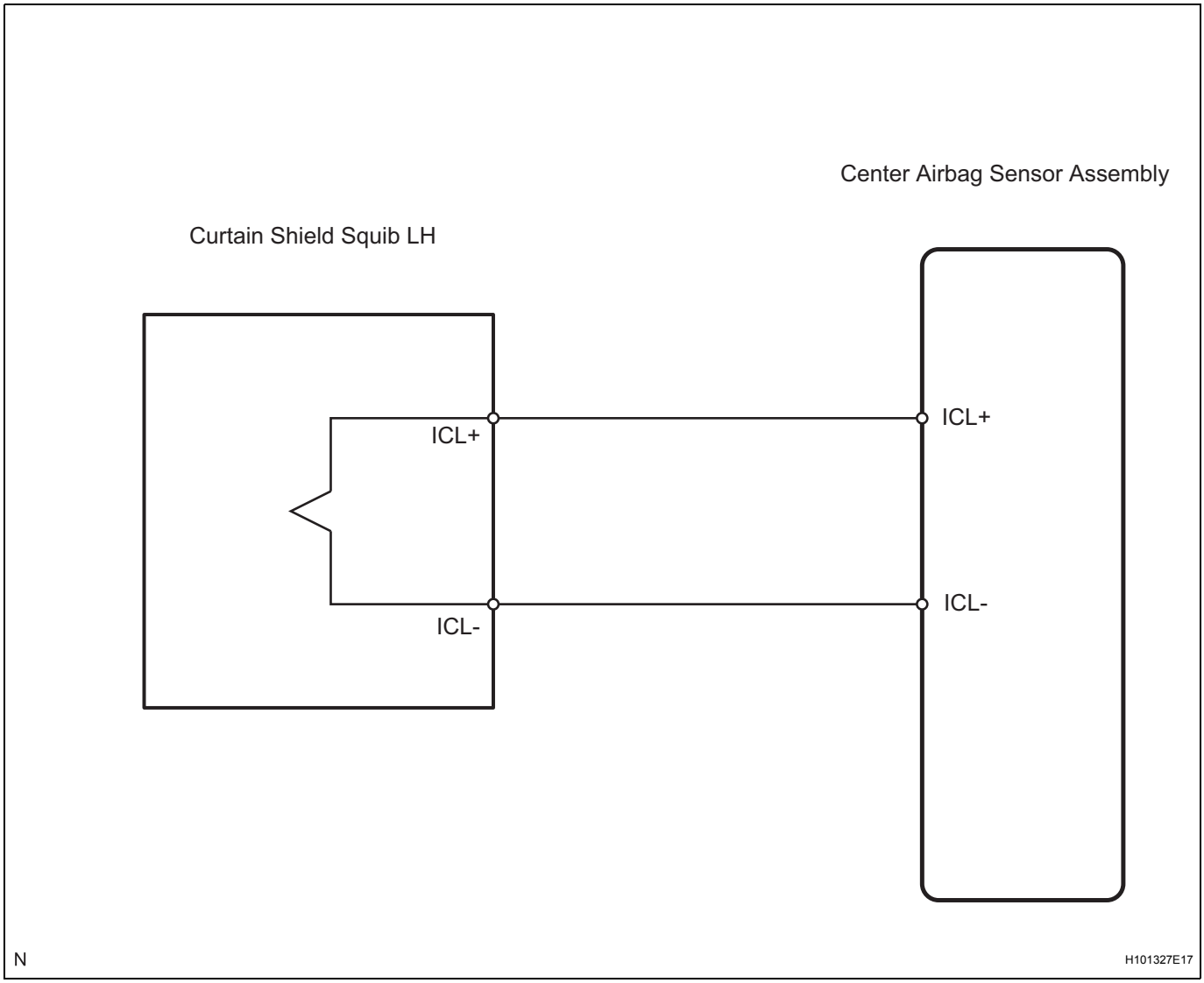
RS

DTC B1167/85 is recorded when a ground short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1167/85	• Short in curtain shield squib LH circuit (to ground) • Curtain shield squib LH malfunction • Center airbag sensor malfunction	• Curtain shield airbag assembly LH (curtain shield squib LH) • Center airbag sensor assembly • Floor wire

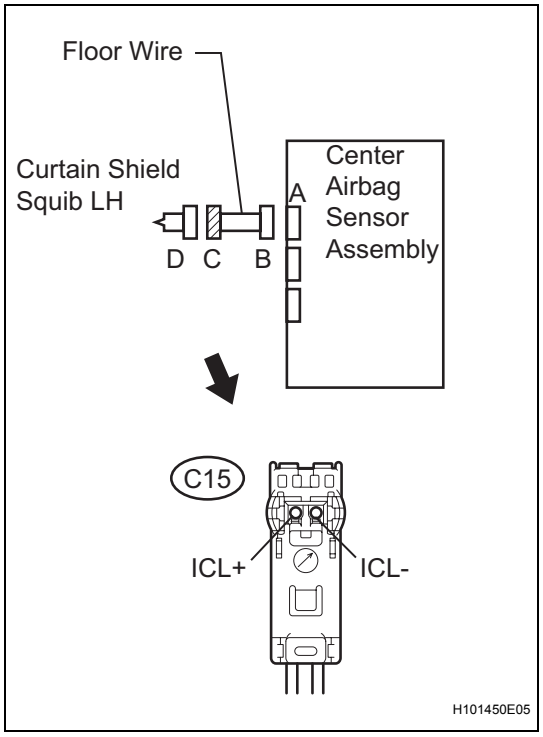
HINT:
DTC B1167/85 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the curtain shield airbag LH.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

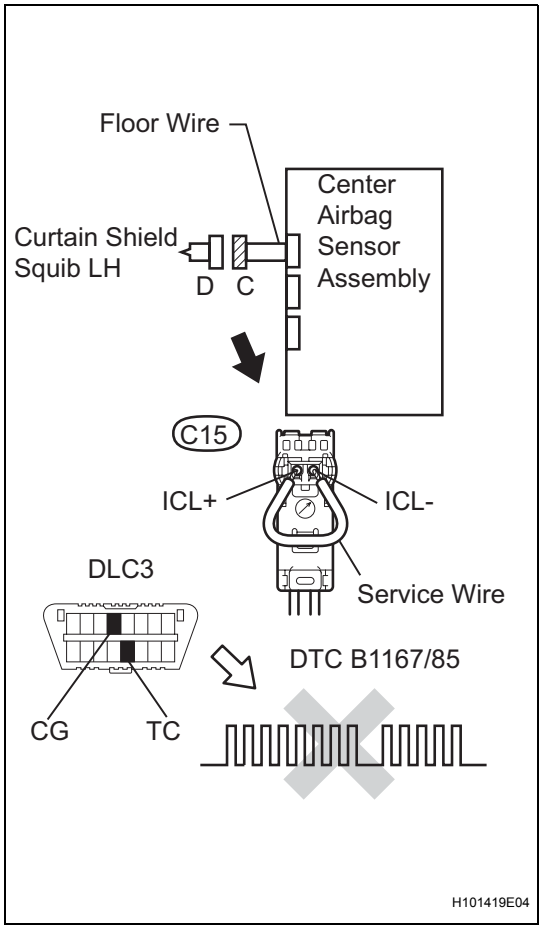
Tester Connection (Connector "C")	Specified Condition
C15-1 (ICL+) - Body ground	1 MΩ or higher
C15-2 (ICL-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



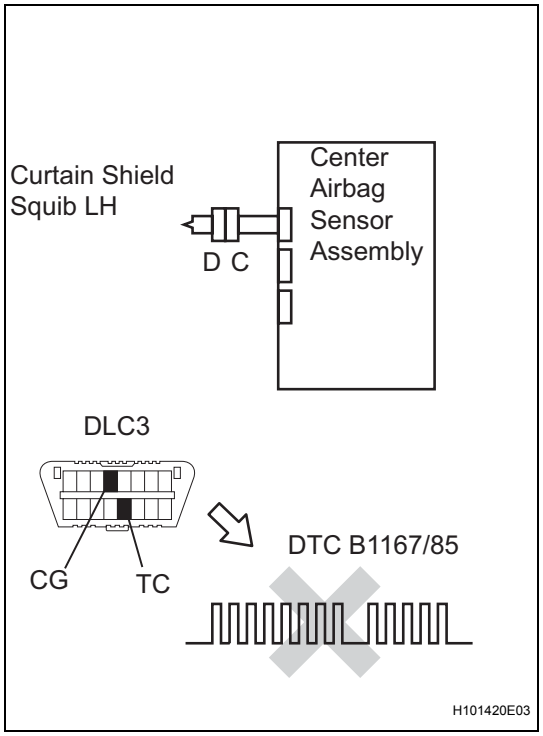
(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals ICL+ and ICL- of connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B1167/85 is not output.
HINT:
Codes other than code B1167/85 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK CURTAIN SHIELD SQUIB LH (CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the curtain shield airbag LH (curtain shield squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1167/85 is not output.

HINT:

Codes other than code B1167/85 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY LH**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B1168/86	Short to B+ in Curtain Shield Squib LH Circuit

DESCRIPTION

The curtain shield squib LH circuit consists of the center airbag sensor and the curtain shield airbag LH. The circuit instructs the SRS to deploy when deployment conditions are met.

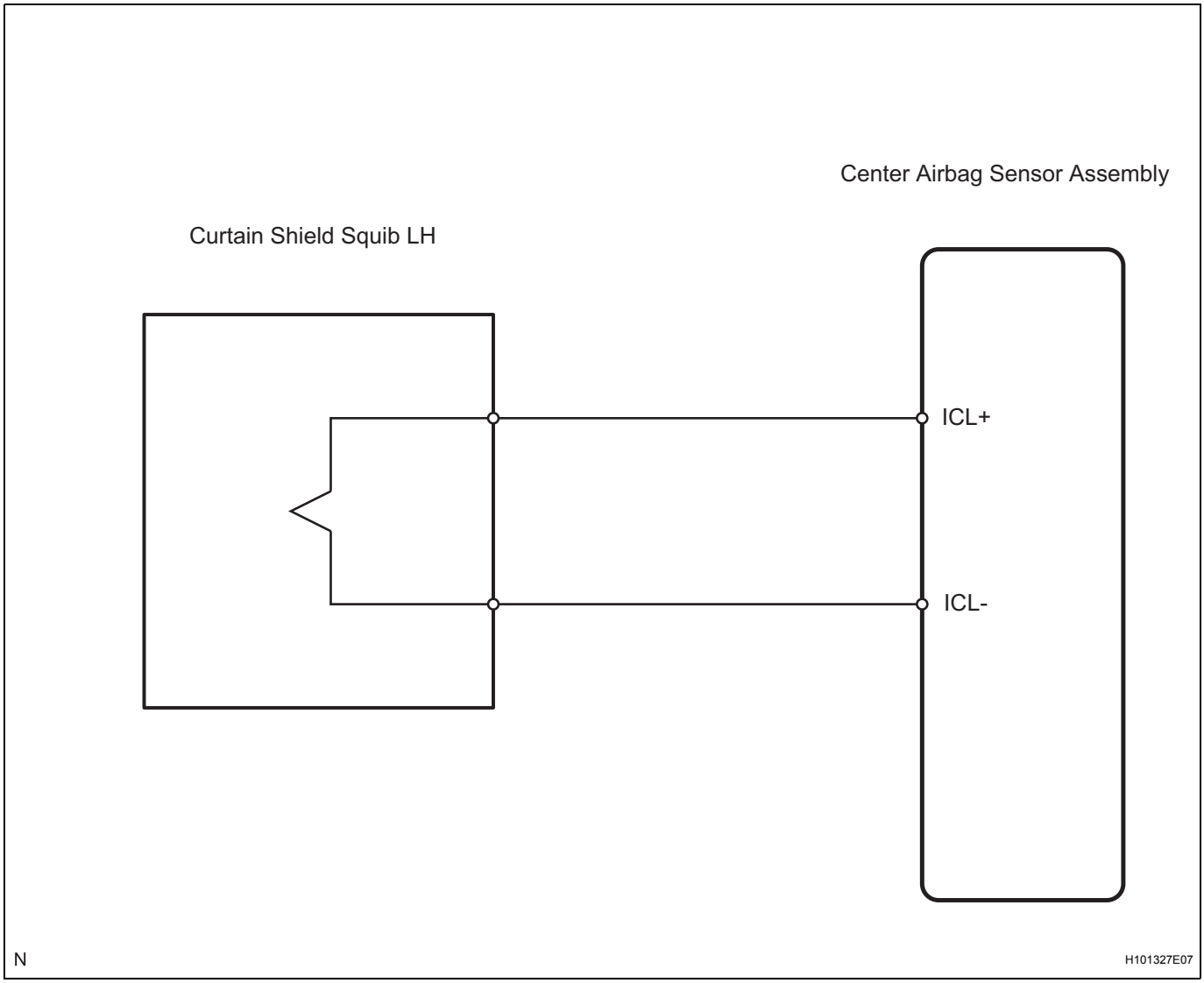
RS

DTC B1168/86 is recorded when a B+ short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1168/86	• Short in curtain shield squib LH circuit (to B+) • Curtain shield squib LH malfunction • Center airbag sensor malfunction	• Curtain shield airbag assembly LH (curtain shield squib LH) • Center airbag sensor assembly • Floor wire

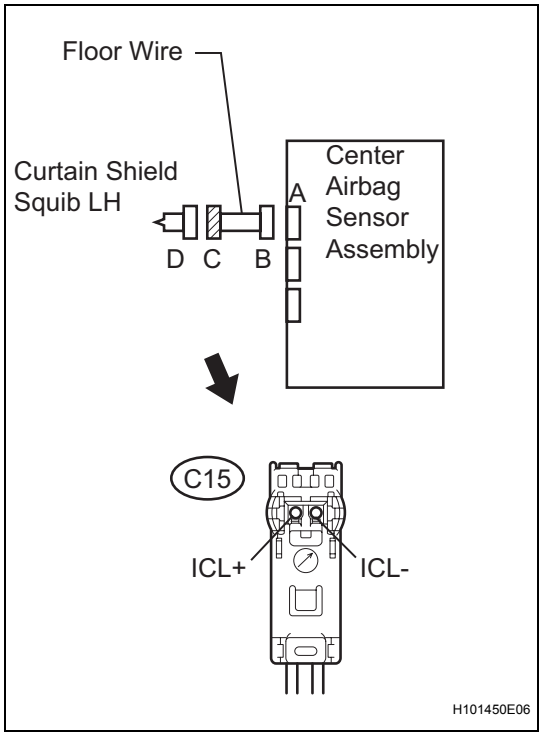
HINT:
DTC B1168/86 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FLOOR WIRE (CURTAIN SHIELD SQUIB LH CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the curtain shield airbag LH.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

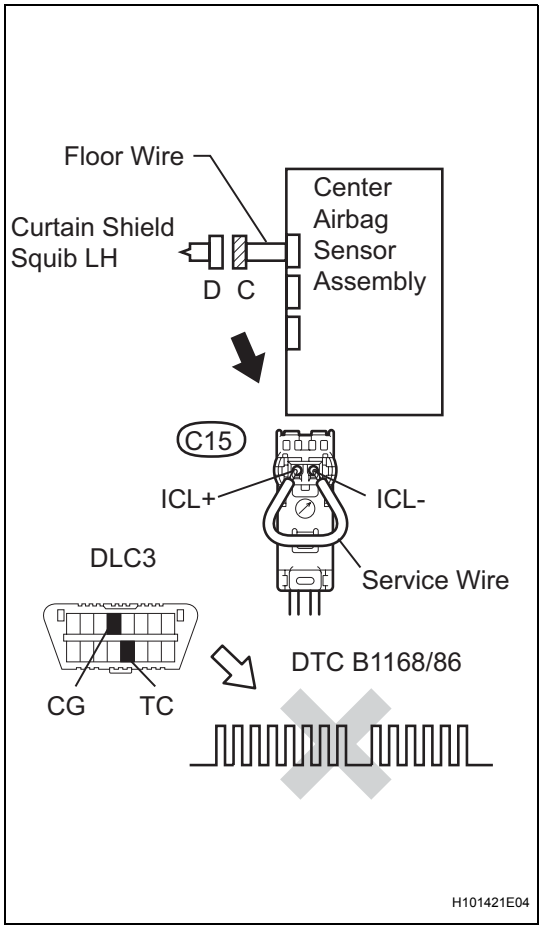
Tester Connection (Connector "C")	Condition	Specified Condition
C15-1 (ICL+) - Body ground	Ignition switch ON	Below 1 V
C15-2 (ICL-) - Body ground	Ignition switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

RS



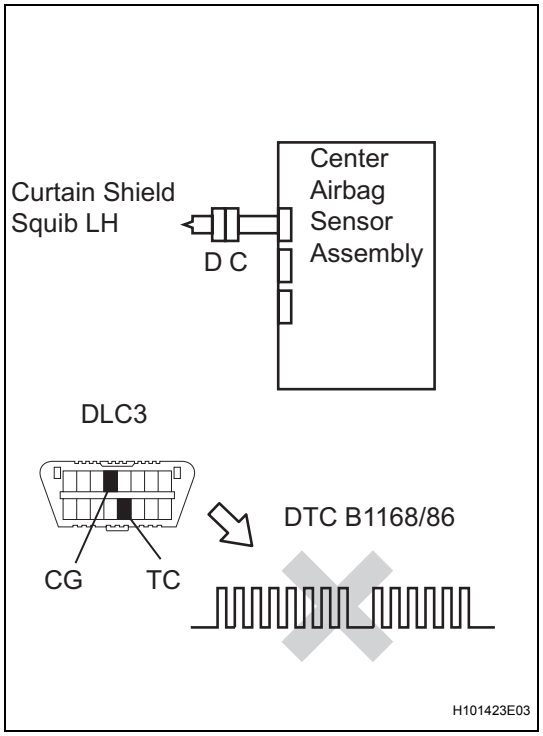
(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect terminals ICL+ and ICL- of connector "C".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B1168/86 is not output.
HINT:
Codes other than code B1168/86 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY LH (CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "C".
(d) Connect the curtain shield airbag LH (curtain shield squib LH) connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1168/86 is not output.

HINT:

Codes other than code B1168/86 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY LH**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B1180/17	Short in Driver Side Squib 2nd Step Circuit

DESCRIPTION

The driver side squib (2nd step) circuit consists of the center airbag senor, the spiral cable and the steering pad.

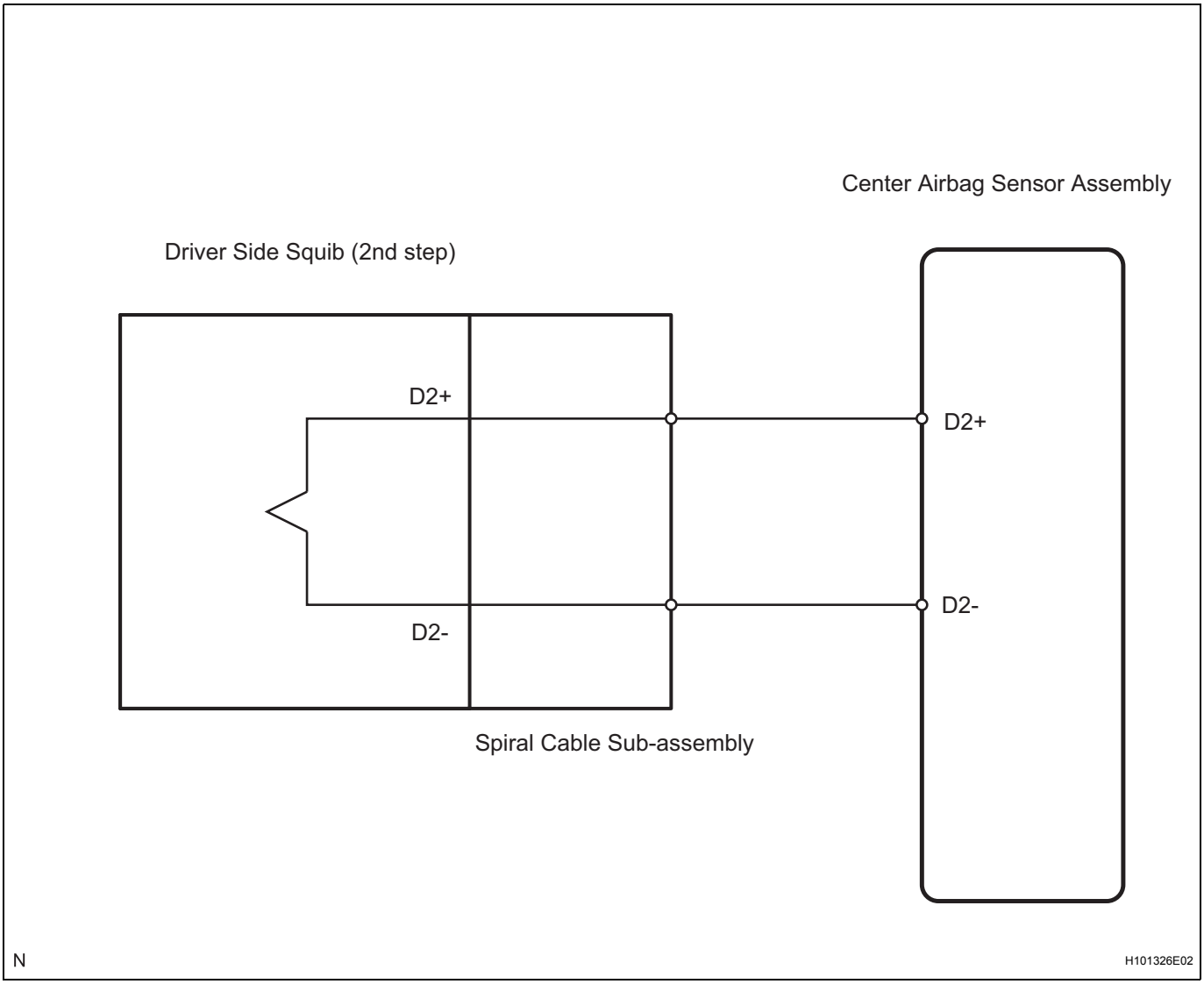
RS

The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B1180/17 is recorded when a short is detected in the driver side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1180/17	• Short in driver side squib (2nd step) circuit • Driver side squib (2nd step) malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad assembly (driver side squib (2nd step)) • Spiral cable sub-assembly • Center airbag sensor assembly • Instrument panel wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONNECTOR

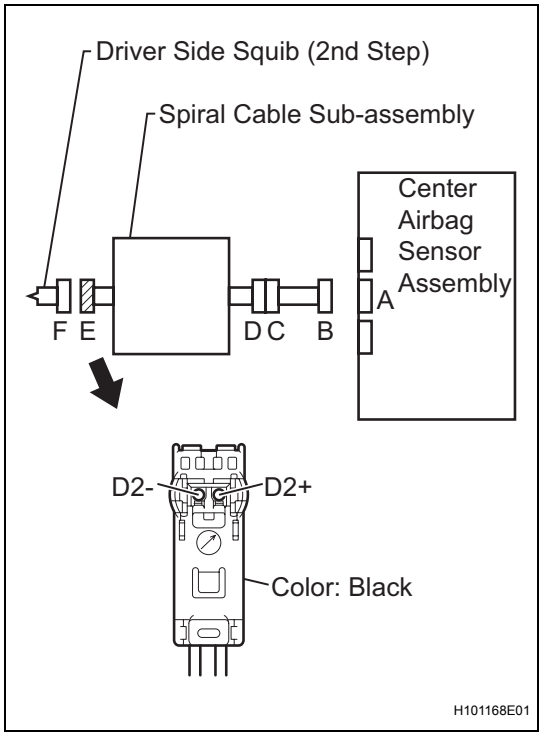
(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the steering pad.
(d) Check that the spiral cable connector (on the horn side) is not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

2	CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR - STEERING PAD)



(a) Disconnect the connector from the center airbag sensor.
(b) Release the activation prevention mechanism built into connector "B" (see page RS-18).
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

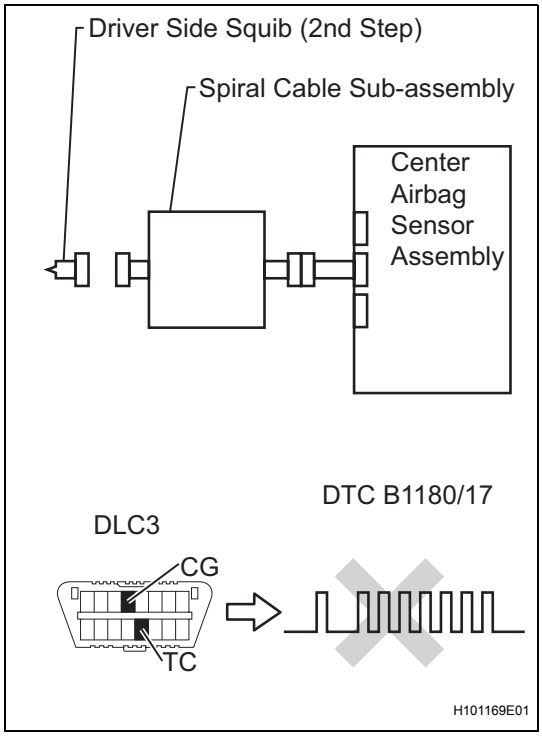
Tester connection (Connector "E")	Specified Condition
D2+ - D2-	1 MΩ or higher

NG → **Go to step 5**

OK

RS

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag senor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

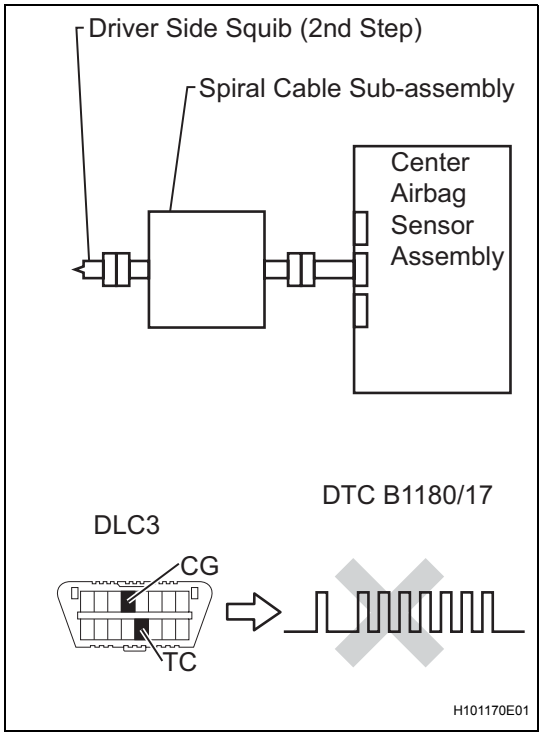
DTC B1180/17 is not output.

HINT:
Codes other than code B1180/17 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

4	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB, 2ND STEP)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connectors to the steering pad.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B1180/17 is not output.

HINT:
Codes other than code B1180/17 may be output at this time, but they are not relevant to this check.

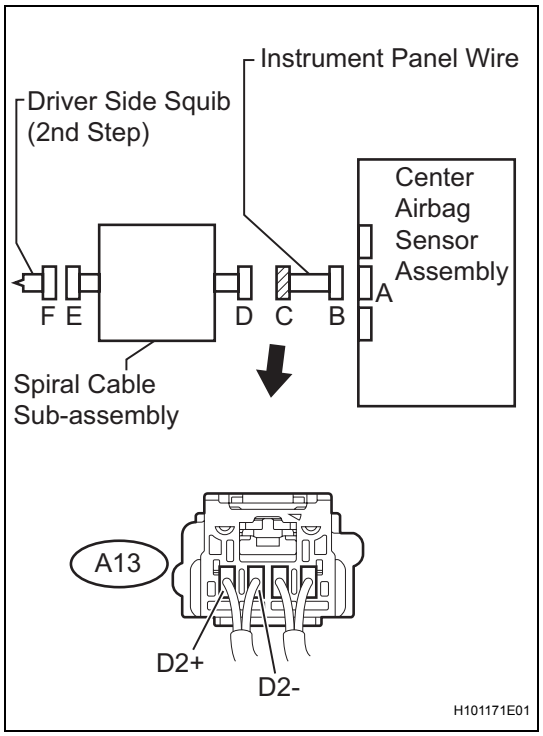
NG → **REPLACE STEERING PAD ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

RS

5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable.
HINT:
The activation prevention mechanism of connector "B" has already been released.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

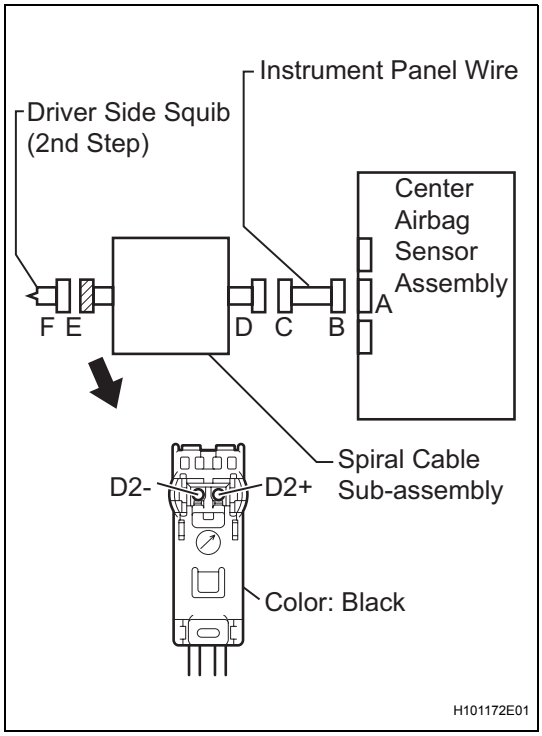
Tester Connection (Connector "C")	Specified Condition
A13-4 (D2+) - A13-3 (D2-)	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

6	CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Release the activation prevention mechanism built into connector "D" (see page RS-18).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "E")	Specified Condition
D2+ - D2-	1 MΩ or higher

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

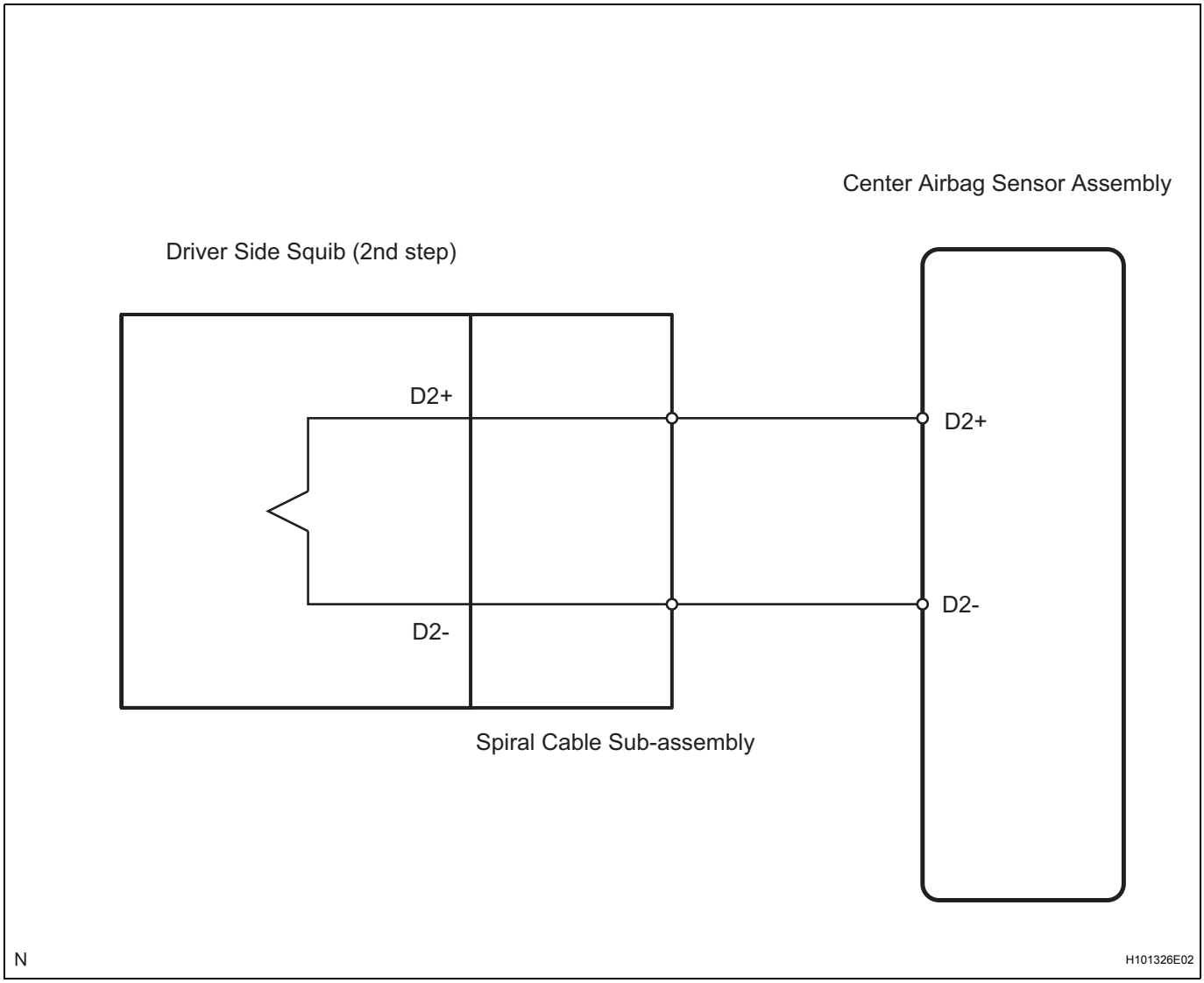
DTC	B1181/18	Open in Driver Side Squib 2nd Step Circuit

DESCRIPTION

The driver side squib (2nd step) circuit consists of the center airbag sensor, the spiral cable and the steering pad.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1181/18 is recorded when an open is detected in the driver side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1181/18	• Open in driver side squib (2nd step) circuit • Driver side squib (2nd step) malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad assembly (driver side squib (2nd step)) • Spiral cable sub-assembly • Center airbag sensor assembly • Instrument wire

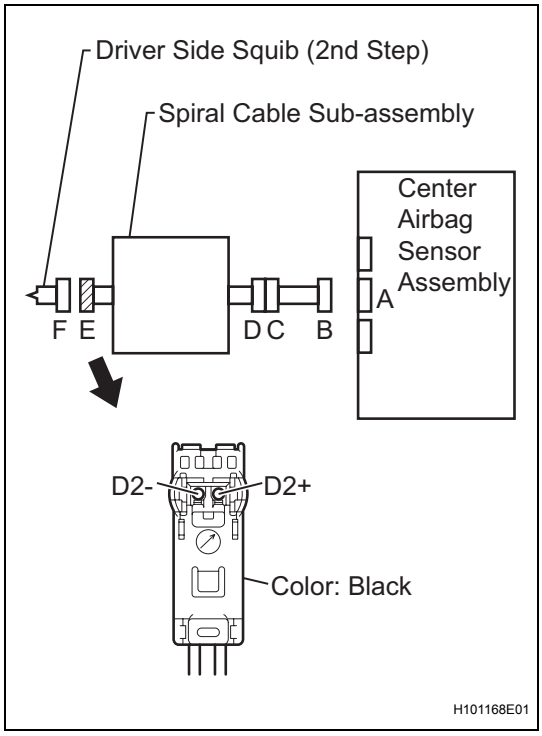
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR ASSEMBLY - STEERING PAD ASSEMBLY)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the steering pad.
(d) Measure the resistance according to the value(s) in the table below.

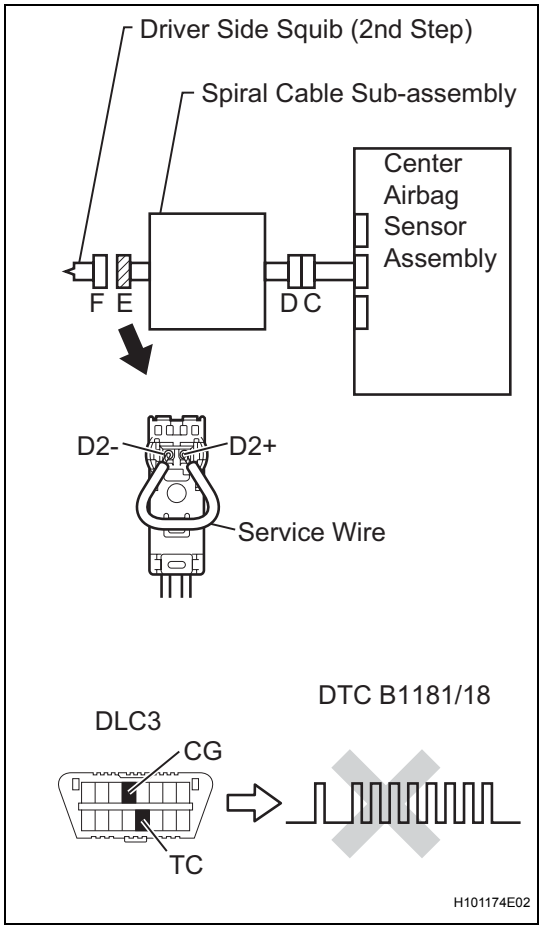
Standard resistance

Tester Connection (Connector "E")	Specified Condition
D2+ - D2-	Below 1 Ω

NG → **Go to step 4**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals D2+ and D2- of connector "E".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting,**

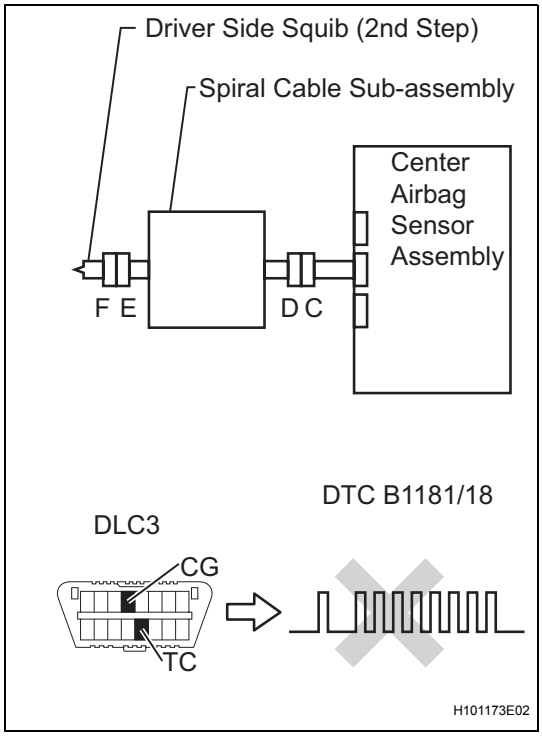
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B1181/18 is not output.
HINT:
Codes other than code B1181/18 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

RS

3	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB, 2ND STEP)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "E".
(d) Connect the connectors to the steering pad.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1181/18 is not output.

HINT:

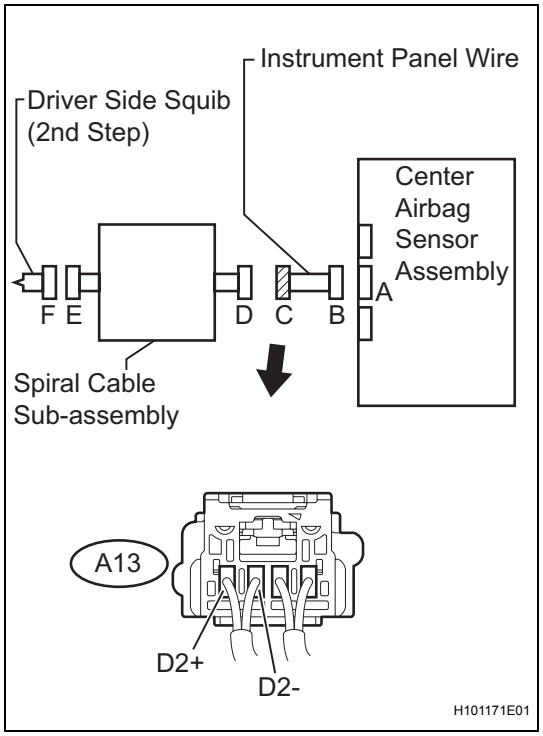
Codes other than code B1181/18 may be output at this time, but they are not relevant to this check.

NG → **REPLACE STEERING PAD ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable.
(b) Measure the resistance according to the value(s) in the table below.

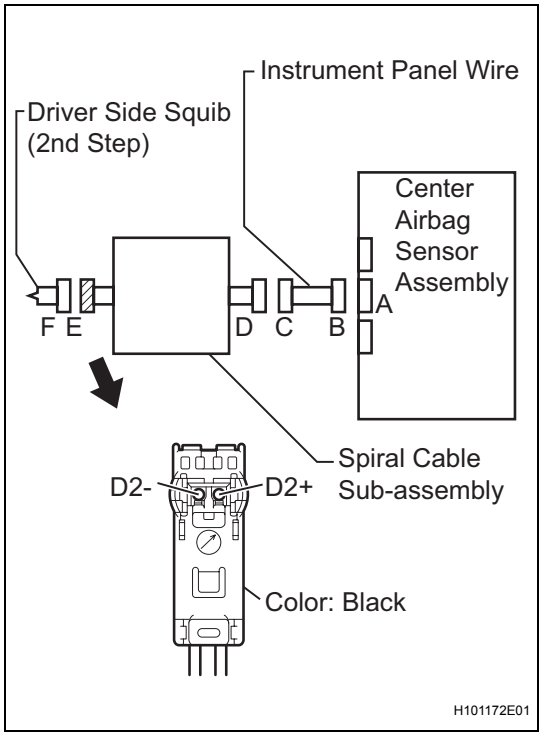
Standard resistance

Tester Connection (Connector "C")	Specified Condition
A13-4 (D2+) - A13-3 (D2-)	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "C")	Specified Condition
A13-4 (D2+) - A13-3 (D2-)	Below 1 Ω

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

DTC	B1182/19	Short to GND in Driver Side Squib 2nd Step Circuit

DESCRIPTION

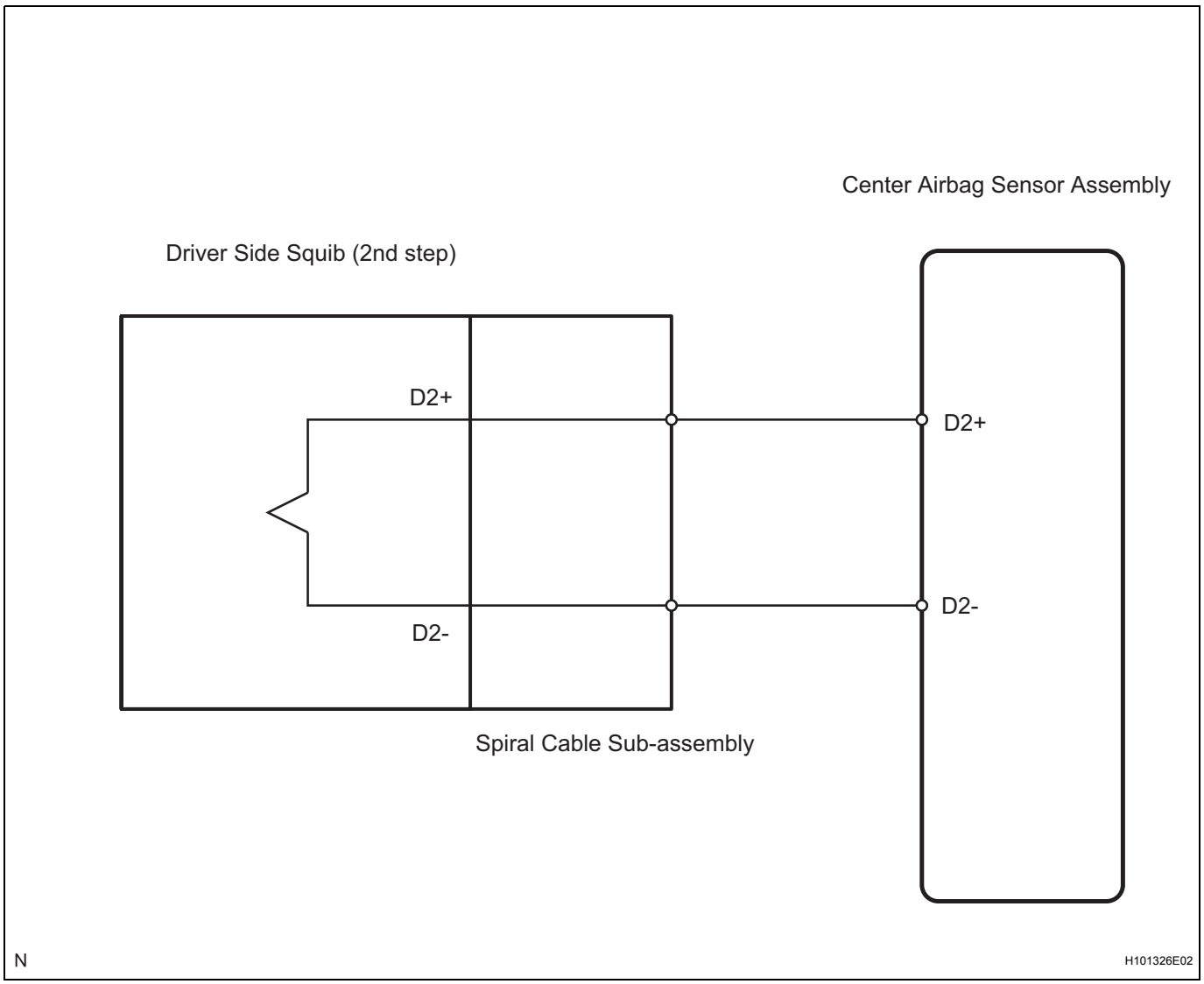
The driver side squib (2nd step) circuit consists of the center airbag sensor, the spiral cable and the steering pad.

The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B1182/19 is recorded when a ground short is detected in the driver side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1182/19	• Short in driver side squib (2nd step) circuit (to ground) • Driver side squib (2nd step) malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad assembly (driver side squib (2nd step)) • Spiral cable sub-assembly • Center airbag sensor assembly • Instrument panel wire

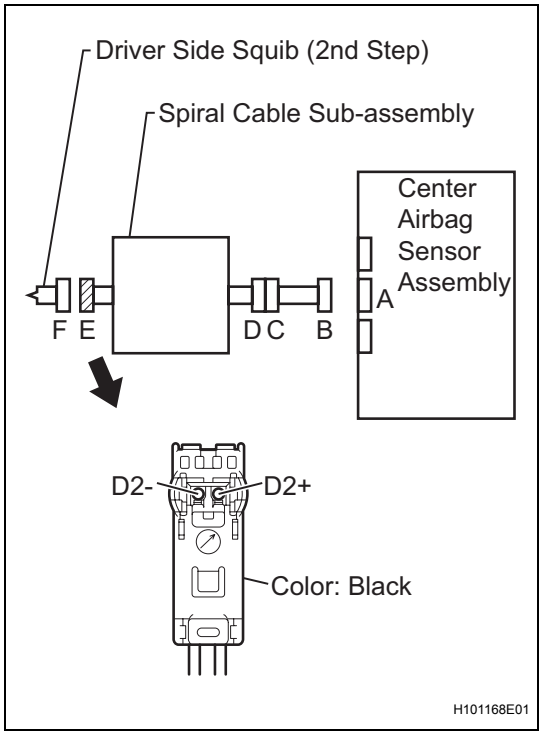
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR - STEERING PAD ASSEMBLY)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the steering pad.
(d) Measure the resistance according to the value(s) in the table below.

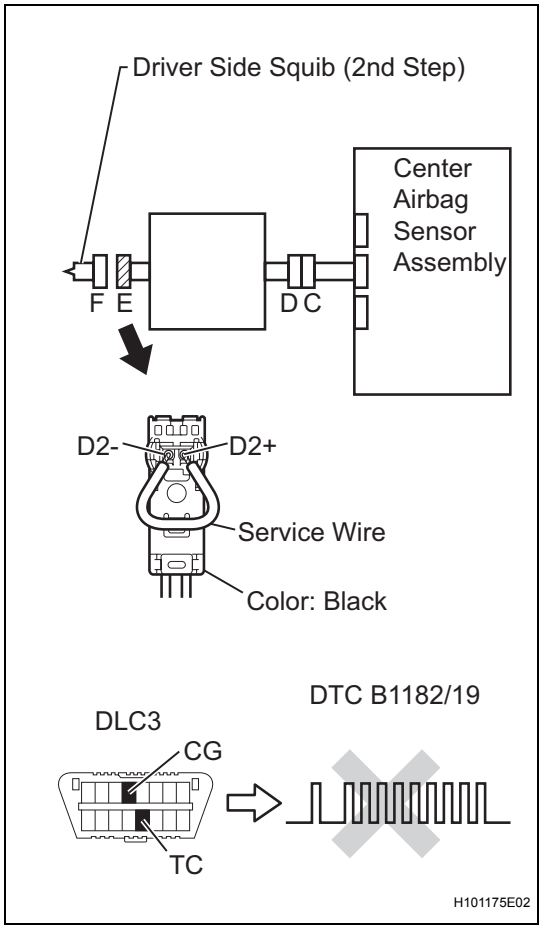
Standard resistance

Tester Connection (Connector "E")	Specified Condition
D2+ - Body ground	1 MΩ or higher
D2- - Body ground	1 MΩ or higher

NG → **Go to step 5**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect terminals D2+ and D2- of connector "E".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

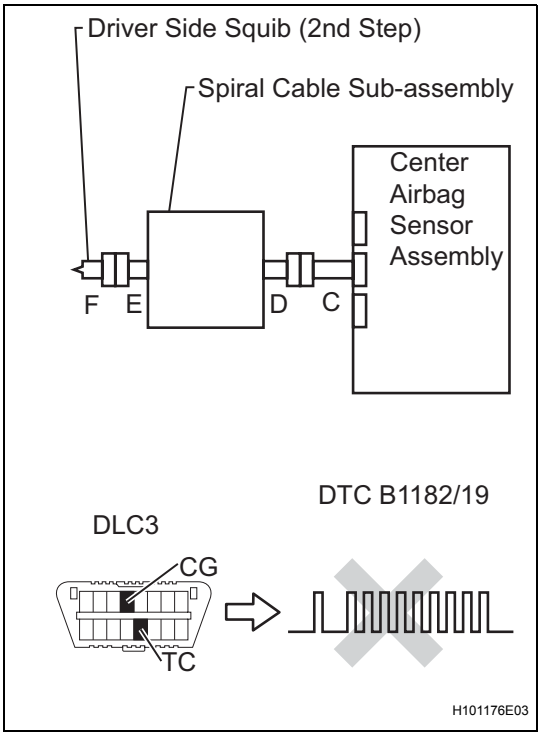
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B1182/19 is not output.
HINT:
Codes other than code B1182/19 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

RS

3	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB, 2ND STEP)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "E".
(d) Connect the connector to the steering pad.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1182/19 is not output.

HINT:

Codes other than code B1182/19 may be output at this time, but they are not relevant to this check.

NG → **REPLACE STEERING PAD ASSEMBLY**

OK

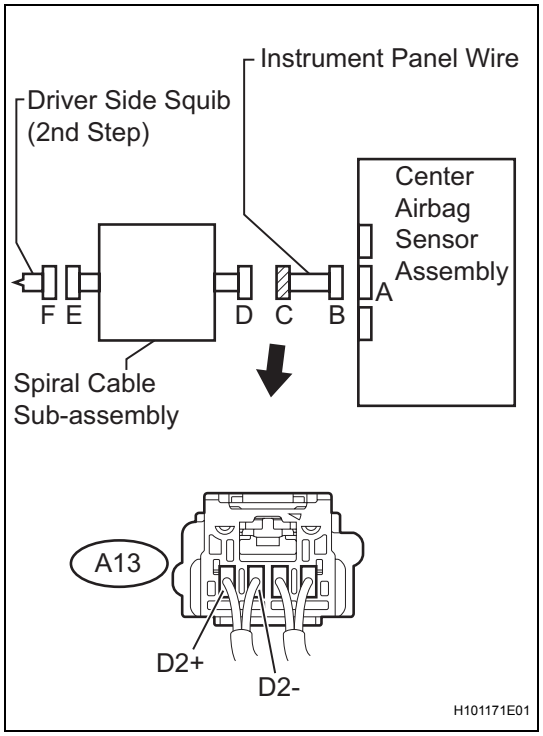
4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable.
(b) Measure the resistance according to the value(s) in the table below.

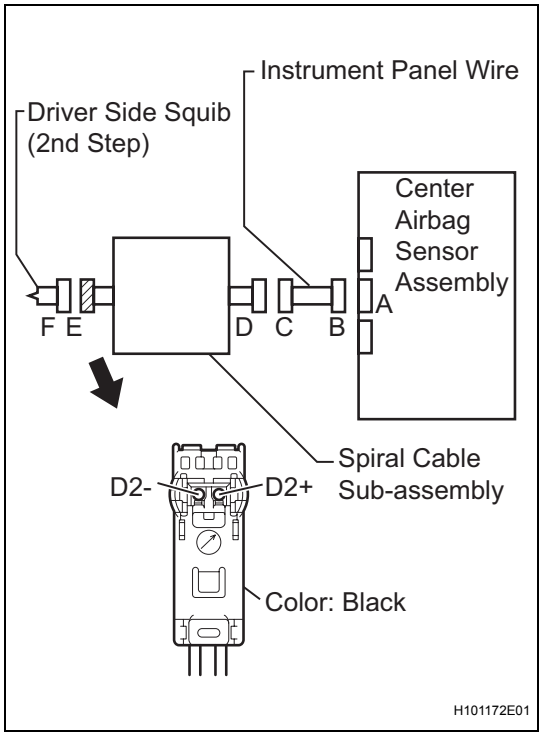
Standard resistance

Tester Connection (Connector "C")	Specified Condition
A13-4 (D2+) - Body ground	1 MΩ or higher
A13-3 (D-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "E")	Specified Condition
D2+ - Body ground	1 MΩ or higher
D- - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

7	USE SIMULATION METHOD TO CHECK

NG → Go to step 1

RS

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

DTC	B0100/13	Short in Driver Side Squib Circuit

DESCRIPTION

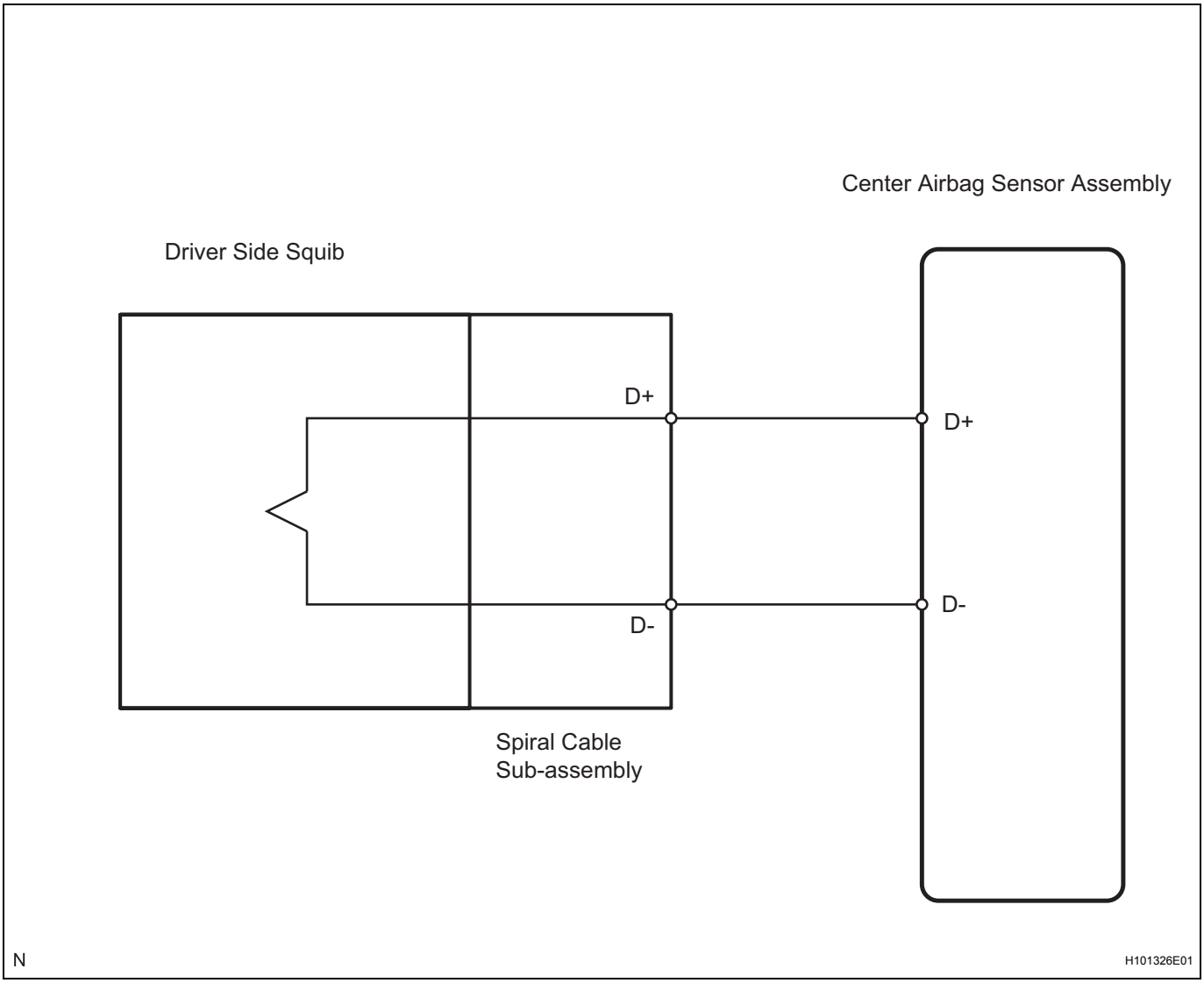
The driver side squib circuit consists of the center airbag sensor, the spiral cable and the steering pad. The circuit instructs the SRS to deploy when deployment conditions are met.

RS

DTC B0100/13 is recorded when a short circuit is detected in the driver side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0100/13	• Short in driver side squib circuit • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad (driver side squib) • Spiral cable assembly • Center airbag sensor sub-assembly • Instrument panel wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONNECTOR

(a) Turn the ignition switch to LOCK.

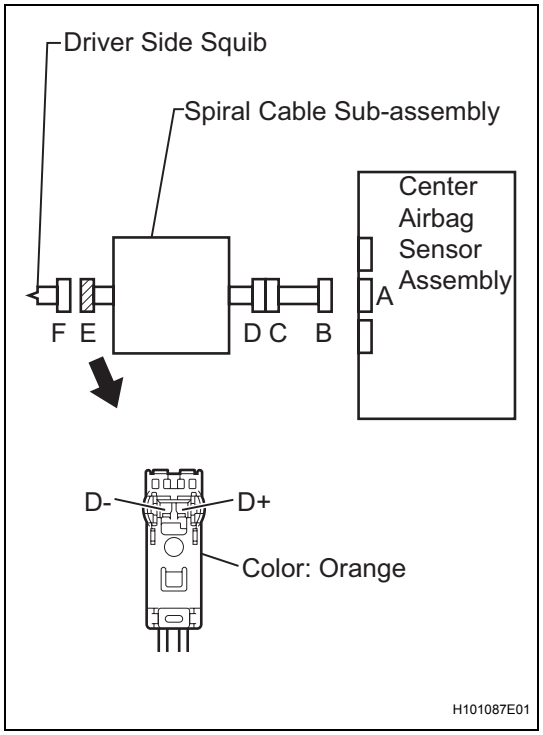
(b) Disconnect the negative (-) battery terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the steering pad.
(d) Check that the spiral cable connectors (on the steering pad side) are not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

RS

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

2 CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR - STEERING PAD)



(a) Disconnect the connector from the center airbag sensor.
(b) Release the activation prevention mechanism built into the connector "B" (see page RS-18).
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

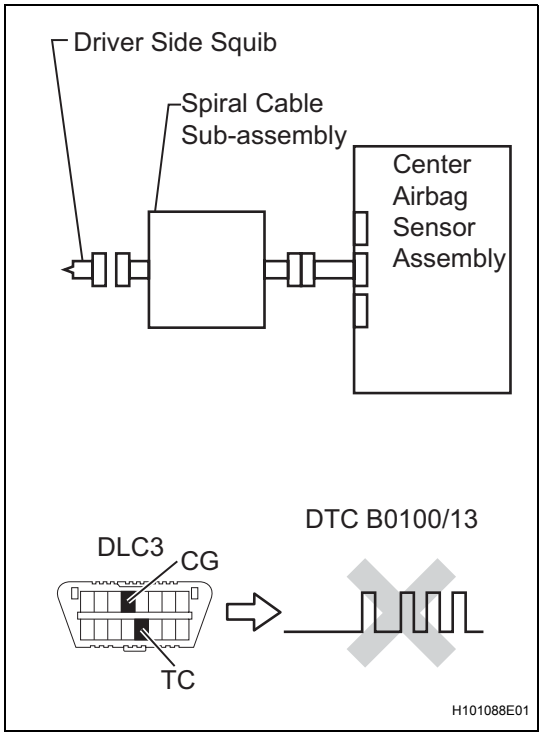
Tester Connection (Connector "E")	Specified Condition
D+ - D-	1 MΩ or higher

NG → **Go to step 5**

OK

RS

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

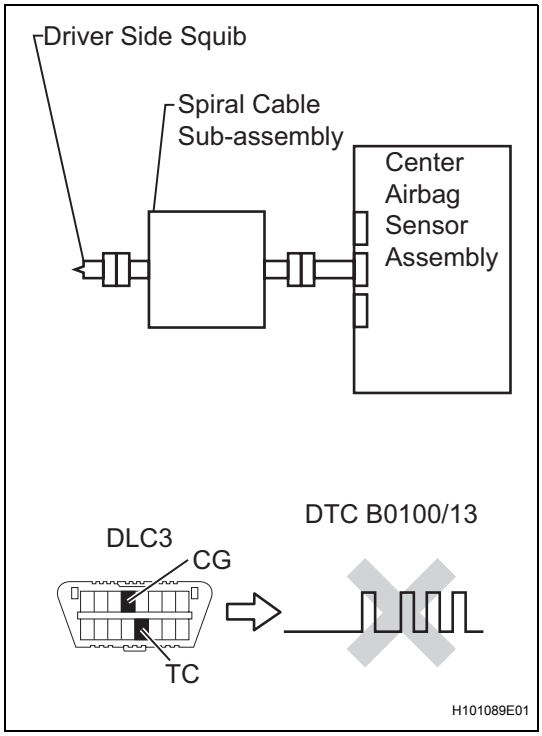
DTC B0100/13 is not output.

HINT:
Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

4	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connectors to the steering pad assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B0100/13 is not output.

HINT:
Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

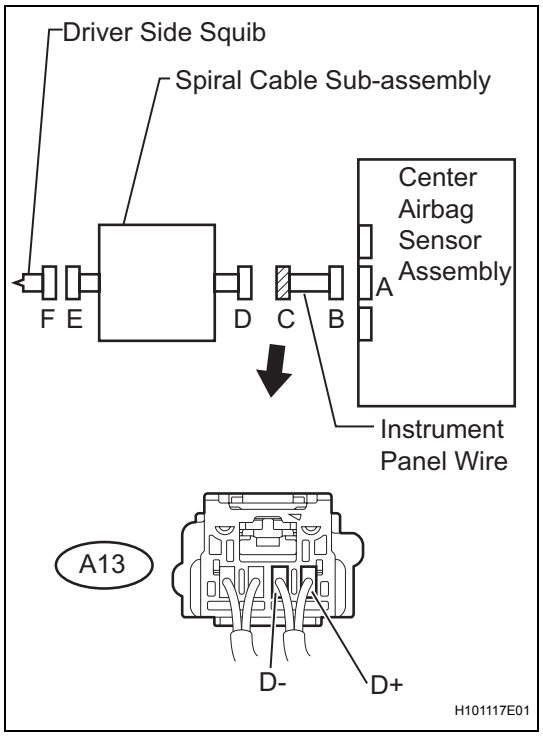
NG → **REPLACE STEERING PAD ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

RS

5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable.
HINT:
The activation prevention mechanism of connector "B" has already been released.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

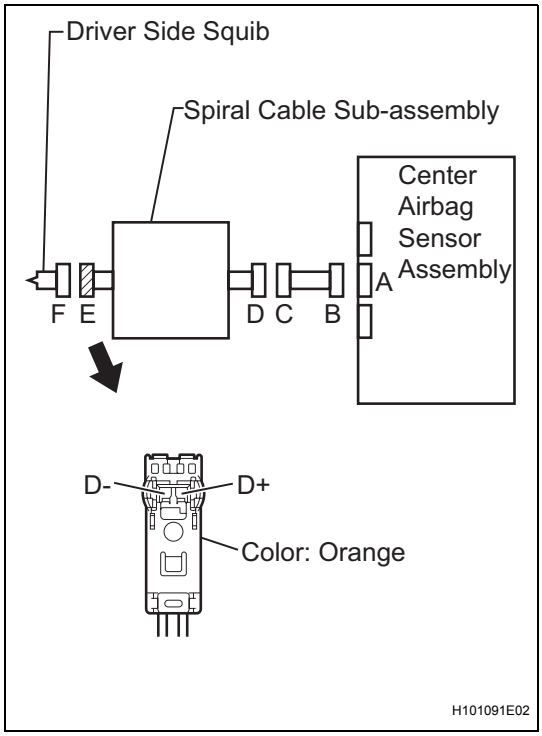
Tester Connection (Connector "C")	Specified Condition
A13-1 (D+) - A13-2 (D-)	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

6	CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Release the activation prevention mechanism built into connector "D" (see page RS-18).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "E")	Specified Condition
D+ - D-	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

DTC	B1183/22	Short to B+ in Driver Side Squib 2nd Step Circuit

DESCRIPTION

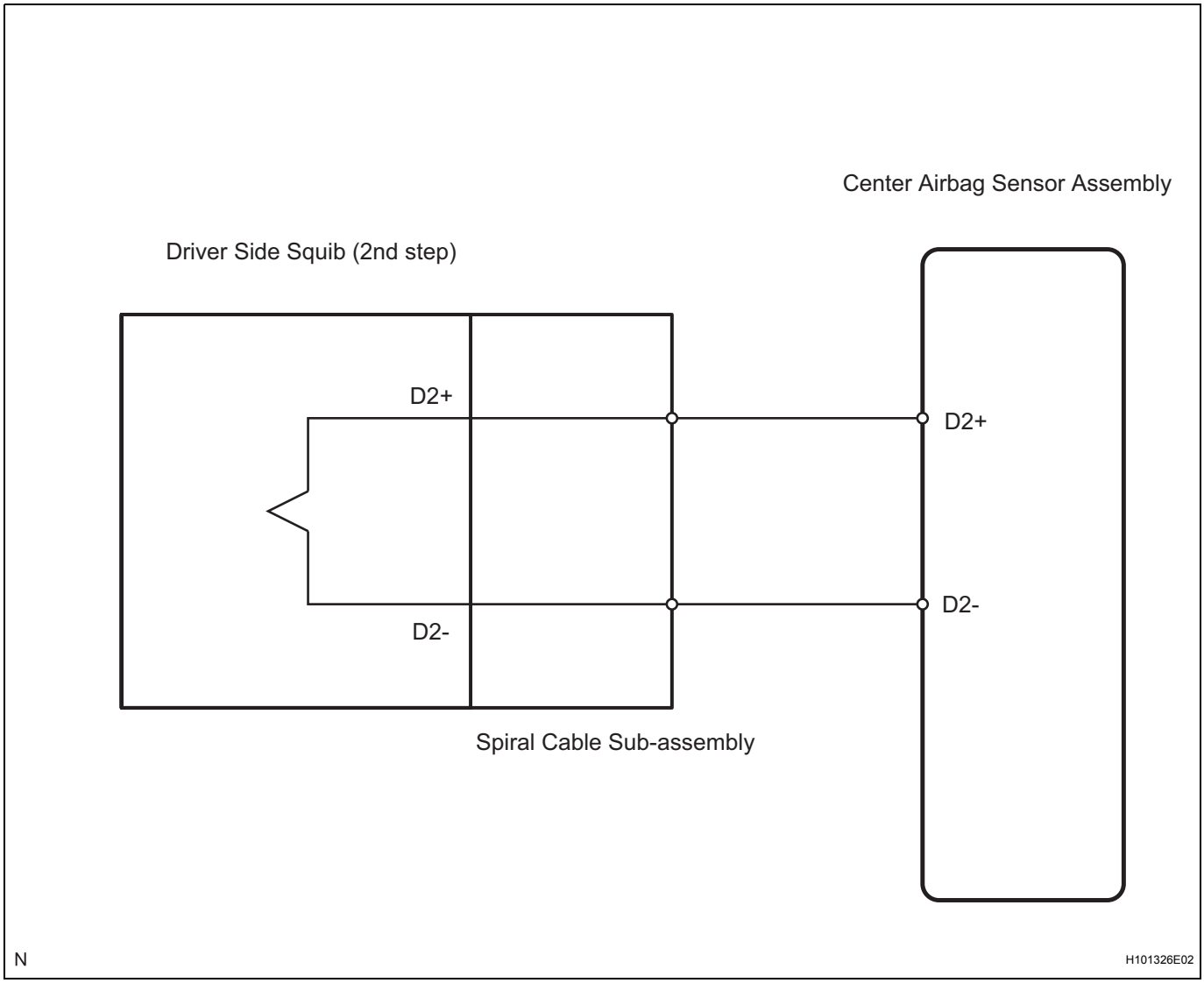
The driver side squib (2nd step) circuit consists of the center airbag sensor, the spiral cable and the steering pad.

The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B1183/22 is recorded when a B+ short is detected in the driver side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1183/22	• Short in driver side squib (2nd step) circuit (to B+) • Driver side squib (2nd step) malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad assembly (driver side squib (2nd step)) • Spiral cable assembly • Center airbag sensor assembly • Instrument panel wire

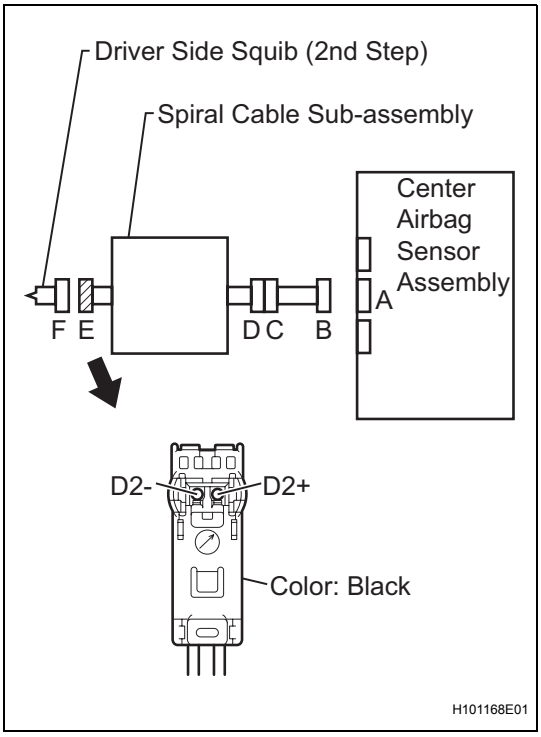
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR - STEERING PAD)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the steering pad.
(d) Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

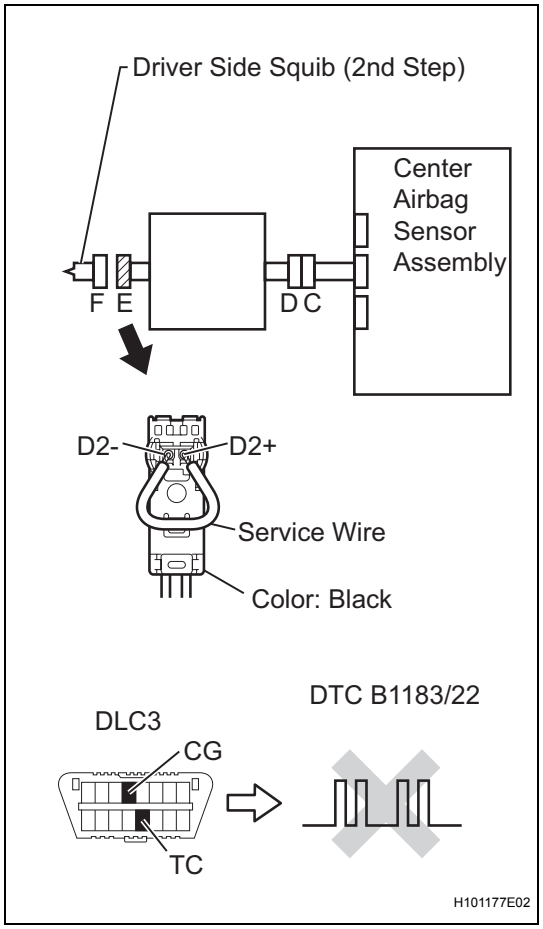
Standard voltage

Tester Connection (Connector "E")	Condition	Specified Condition
D2+ - Body ground	Ignition switch ON	Below 1 V
D2- - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 5**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect terminals D2+ and D2- of connector "E".
NOTICE:
- **Twist the end of the service wire in order to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting,**

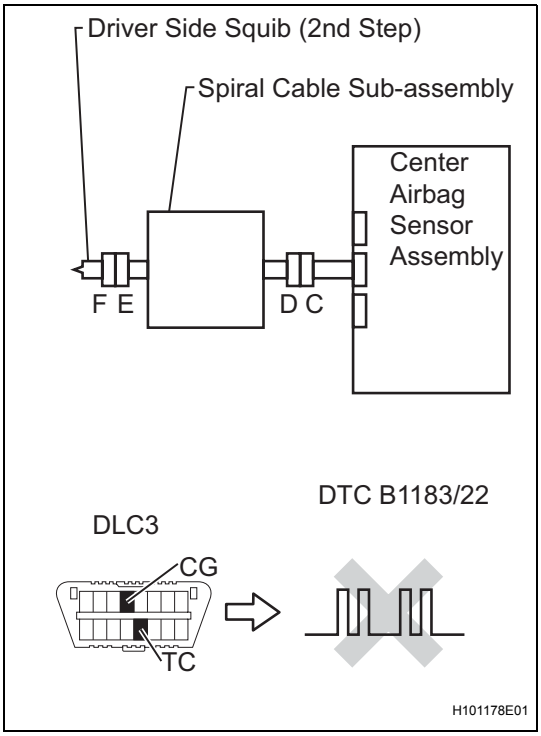
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B1183/22 is not output.
HINT:
Codes other than code B1183/22 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

RS

3	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB, 2ND STEP)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "E".
(d) Connect the connectors to the steering pad.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1183/22 is not output.

HINT:

Codes other than code B1183/22 may be output at this time, but they are not relevant to this check.

NG → **REPLACE STEERING PAD ASSEMBLY**

OK

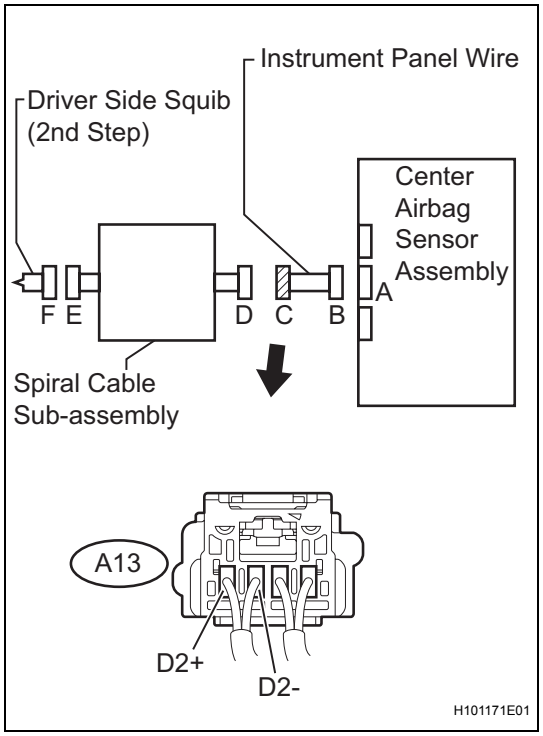
4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

5 CHECK INSTRUMENT PANEL WIRE



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the instrument panel wire connector from the spiral cable sub-assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

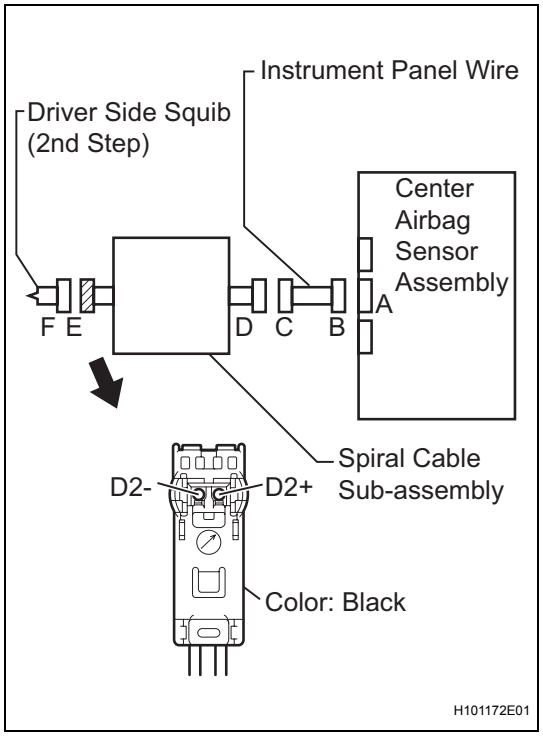
Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
A13-4 (D2+) - Body ground	Ignition switch ON	Below 1 V
A13-3 (D2-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Connector "E")	Condition	Specified Condition
D2+ - Body ground	Ignition switch ON	Below 1 V
D2- - Body ground	Ignition switch ON	Below 1 V

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

7	USE SIMULATION METHOD TO CHECK

NG → Go to step 1

RS

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

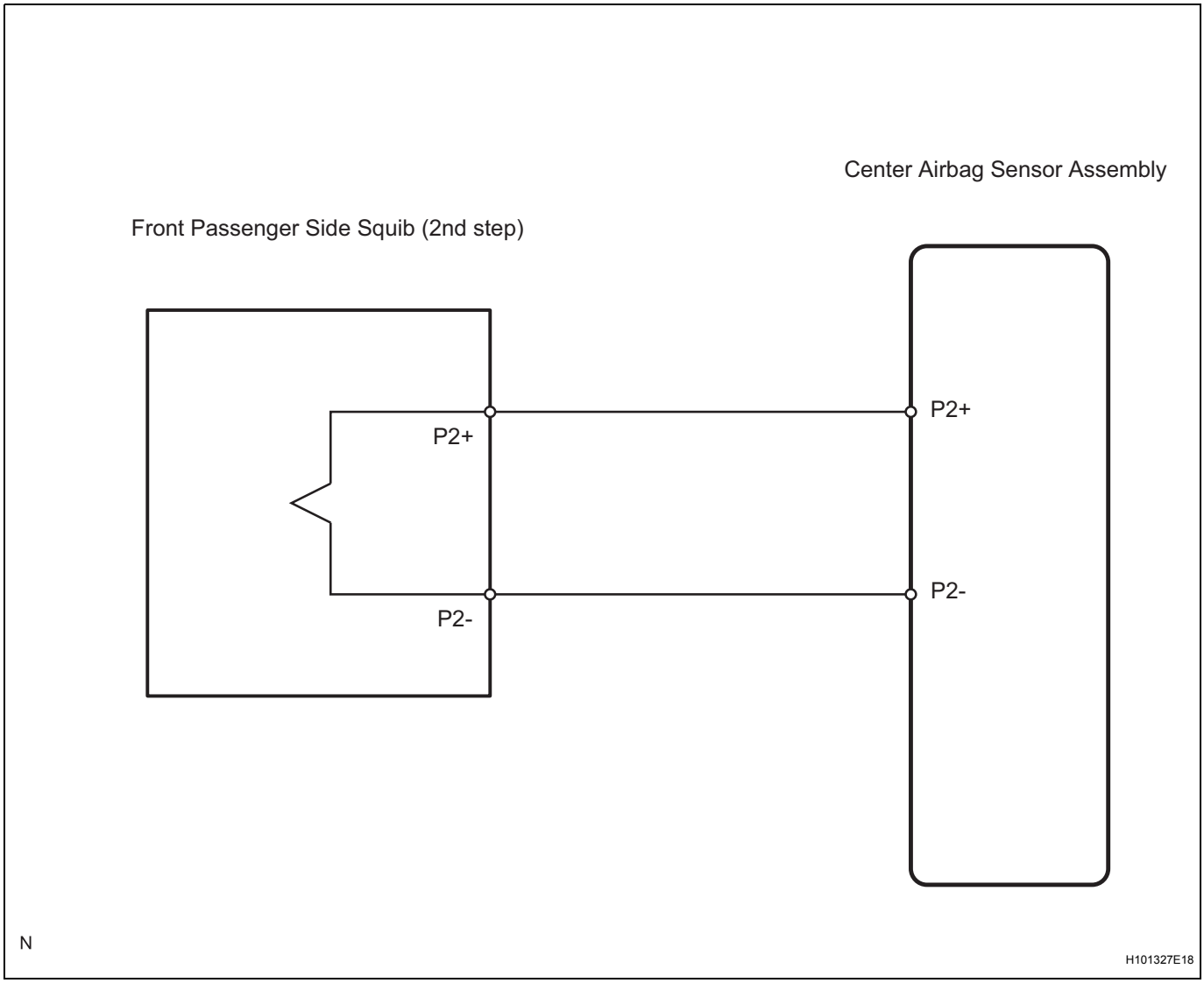
DTC	B1185/57	Short in Front Passenger Side Squib 2nd Step Circuit

DESCRIPTION

The front passenger side squib (2nd step) circuit consists of the center airbag sensor and the front passenger airbag.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1185/57 is recorded when a short is detected in the front passenger side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1185/57	• Short in front passenger side squib (2nd step) circuit • Front passenger side squib (2nd step) malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib (2nd step)) • Center airbag sensor assembly • Instrument panel wire

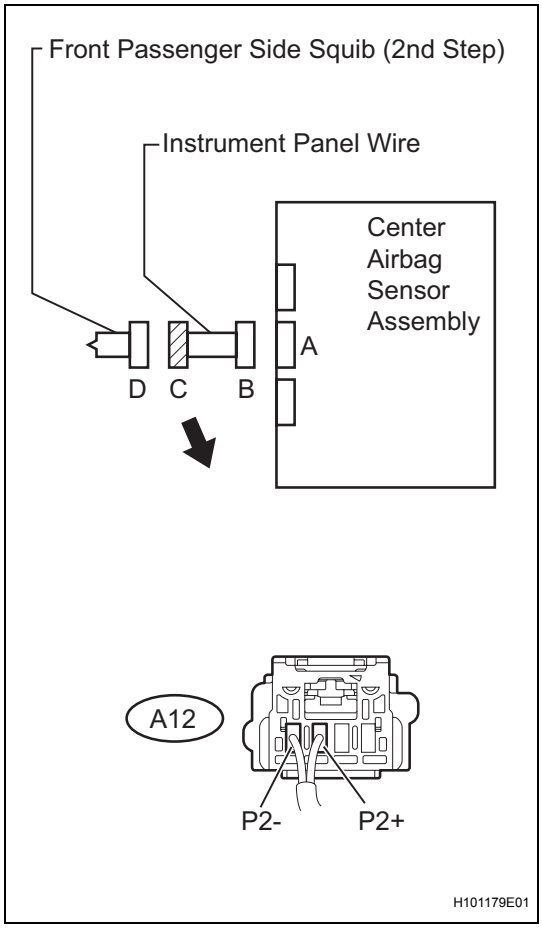
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL WIRE

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable form the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front passenger airbag.
(d) Release the activation prevention mechanism built into connector "B" (see page RS-18).
(e) Measure the resistance according to the value(s) in the table below.

Standard resistance

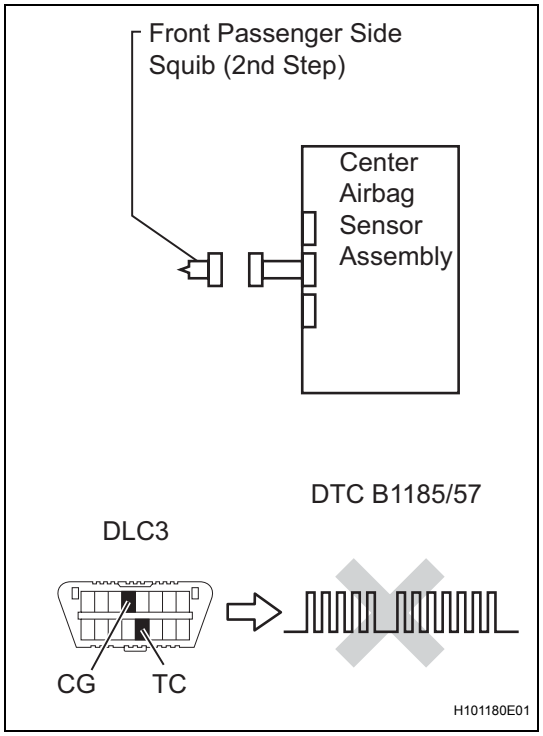
Tester Connection (Connector "C")	Specified Condition
A12-3 (P2+) - A12-4 (P2-)	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

2 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

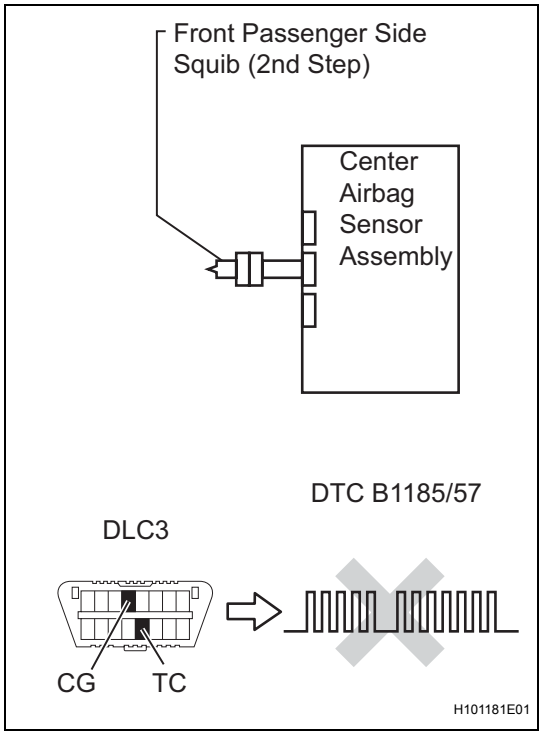
DTC B1185/57 is not output.

HINT:
Codes other than code B1185/57 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3 CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB, (2ND STEP))



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the front passenger airbag.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B1185/57 is not output.

HINT:
Codes other than code B1185/57 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

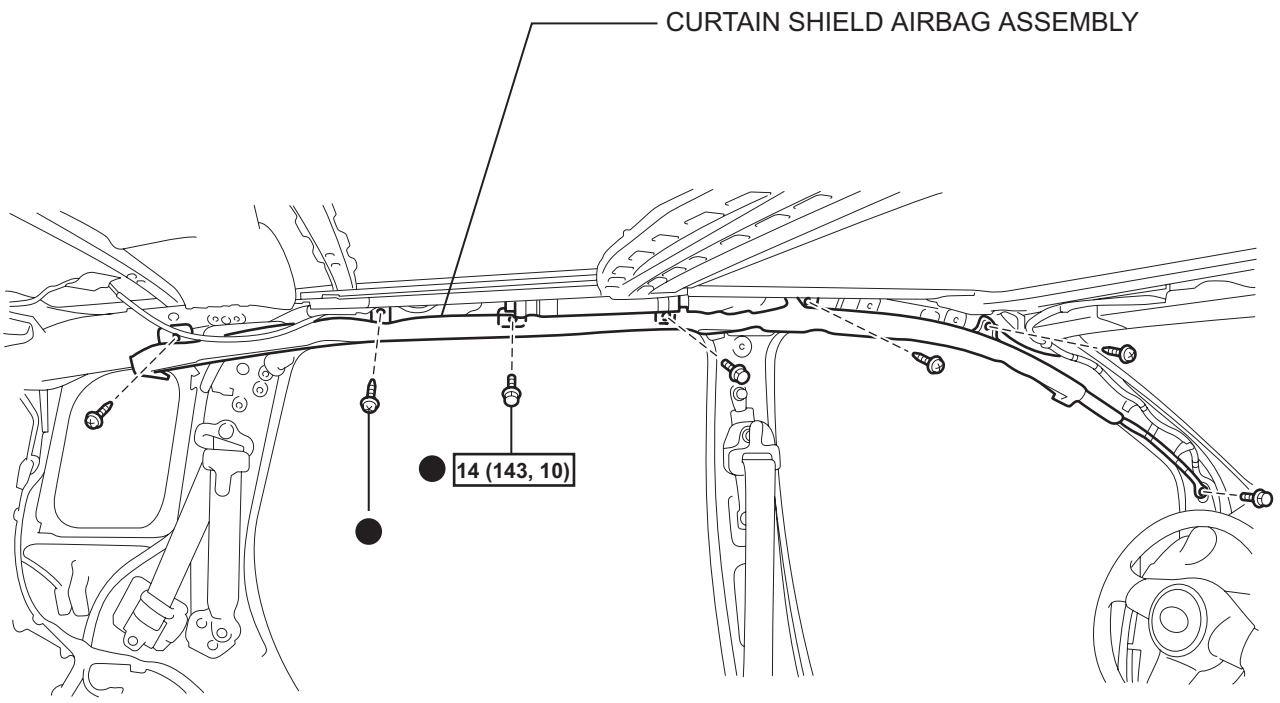
OK

USE SIMULATION METHOD TO CHECK

CURTAIN SHIELD AIRBAG ASSEMBLY

COMPONENTS

RS



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

T

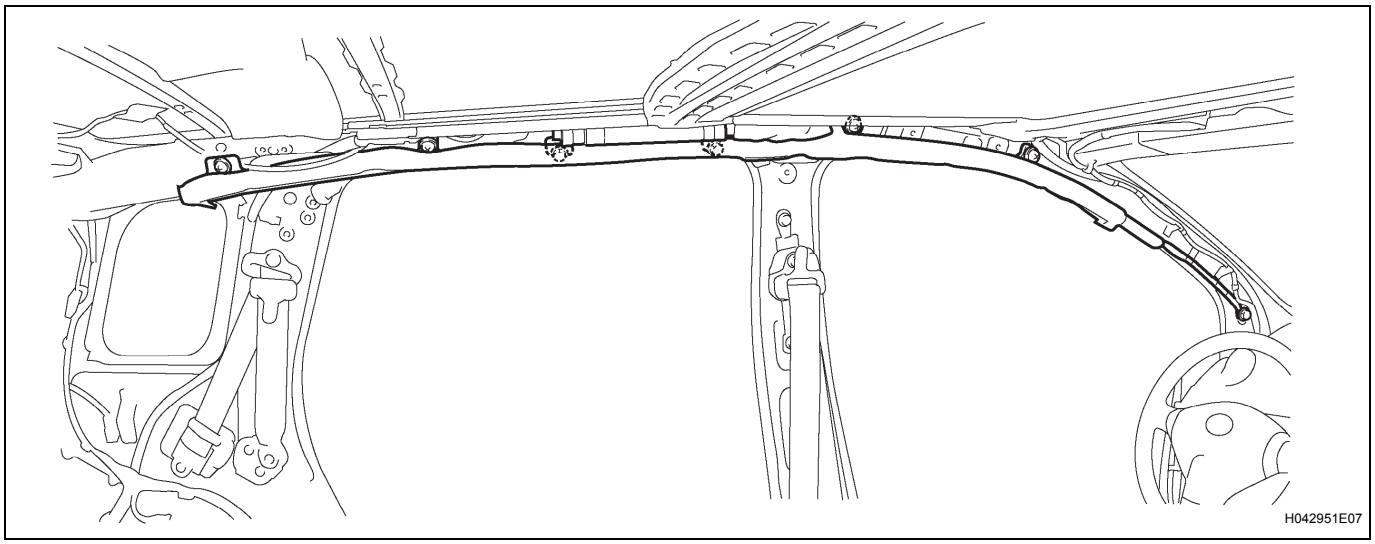
C119030E02

ON-VEHICLE INSPECTION

1. CHECK CURTAIN SHIELD AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (see page RS-33).

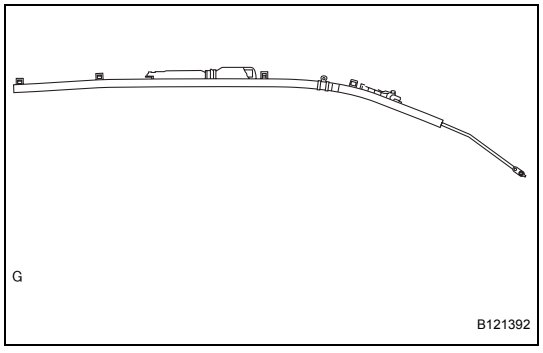
(b) With the curtain shield airbag installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front pillar garnish or roof headlining with a new one:



Cuts, minute cracks or marked discoloration on the front pillar garnish or roof headlining around the curtain shield airbag.

CAUTION:

For removal and installation procedures of the curtain shield airbag assembly, be sure to follow the correct procedures.



2. CHECK CURTAIN SHIELD AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)

(a) Perform a diagnostic system check (see page RS-33).

(b) With the curtain shield airbag removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the curtain shield airbag with a new one:

- Cuts, minute cracks or marked discoloration on the curtain shield airbag.
- Cracks or other damage to the connectors.

CAUTION:

For removal and installation procedures of the curtain shield airbag assembly, be sure to follow the correct procedures.

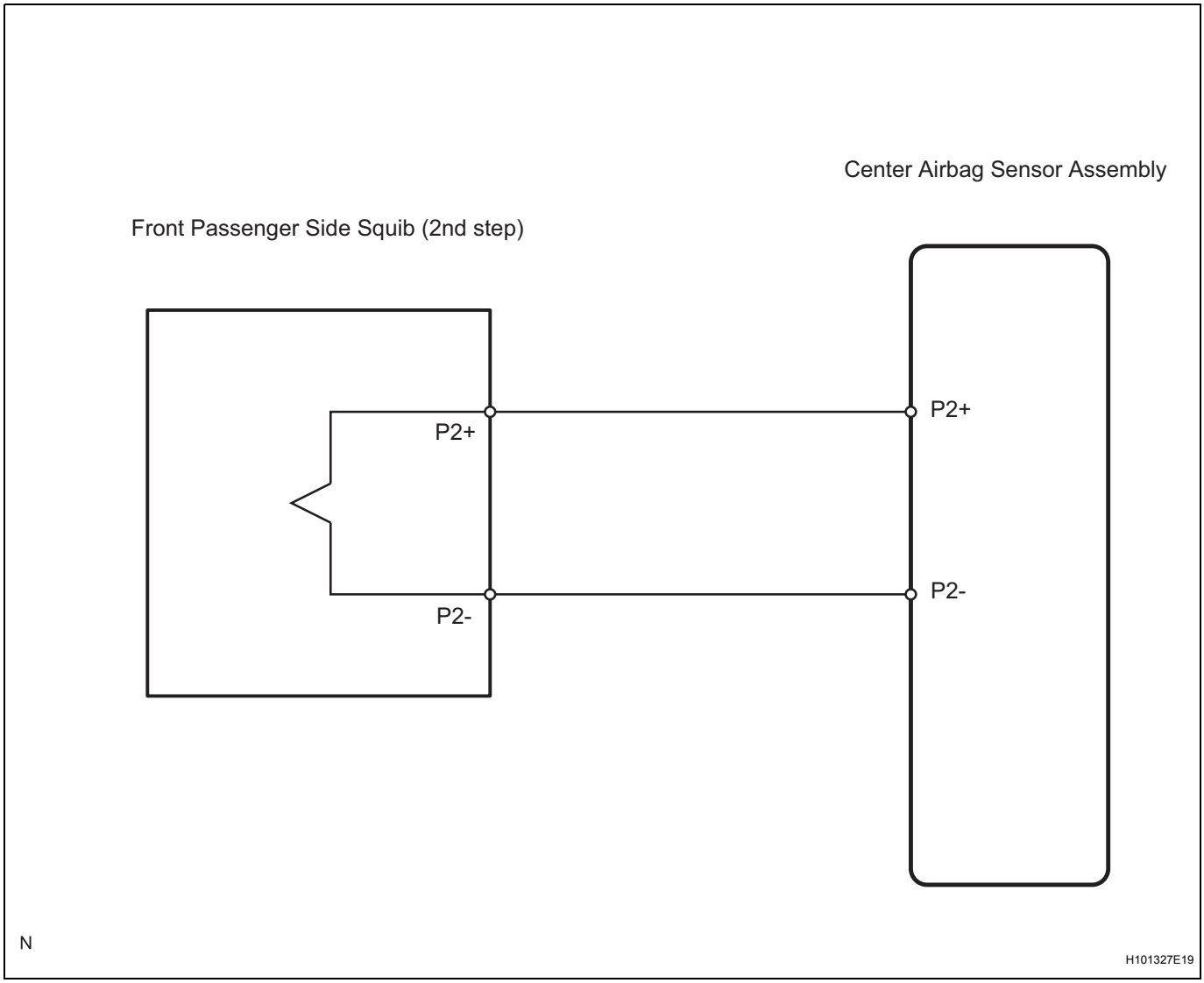
DTC	B1186/58	Open in Front Passenger Side Squib 2nd Step Circuit

DESCRIPTION

The front passenger side squib (2nd step) circuit consists of the center airbag sensor and the front passenger airbag.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1186/58 is recorded when an open is detected in the front passenger side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1186/58	• Open circuit in P2+ wire harness or P2- wire harness of P squib (2nd step) • Front passenger side squib (2nd step) malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib (2nd step)) • Center airbag sensor assembly • Instrument panel wire

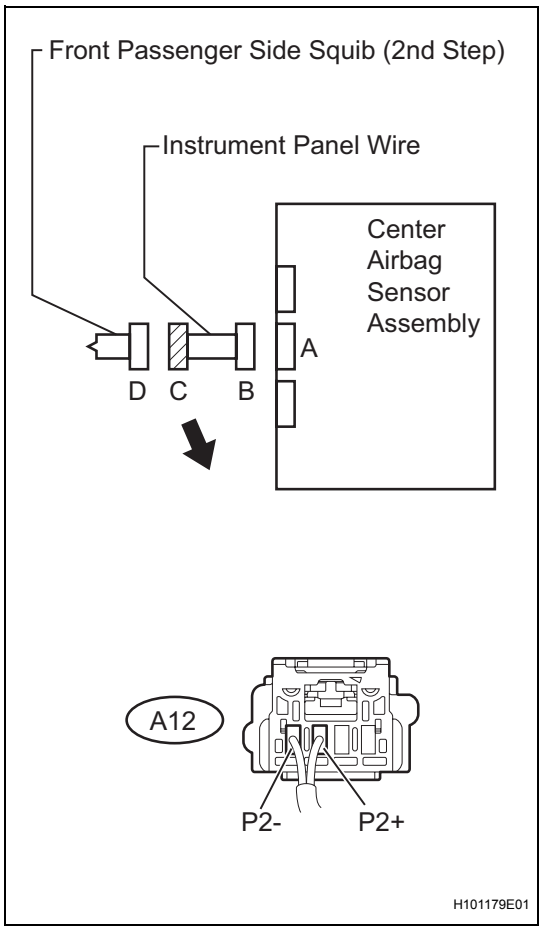
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL WIRE (FRONT PASSENGER SIDE SQUIB CIRCUIT (2ND STEP))

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the instrument panel passenger airbag.
(d) Measure the resistance according to the value(s) in the table below.

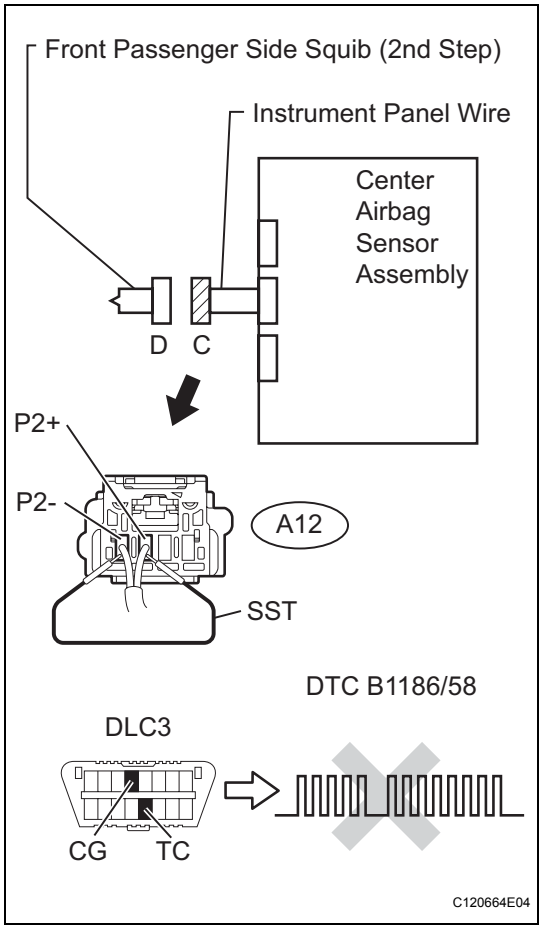
Standard resistance

Tester Connection (Connector "C")	Specified Condition
A12-3 (P2+) - A12-4 (P2-)	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the airbag sensor.
(b) Using SST, connect terminals P2+ and P2- of connector "C".

SST 09843-18040

NOTICE:
Do not forcibly insert SST into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

OK:
DTC B1186/58 is not output.

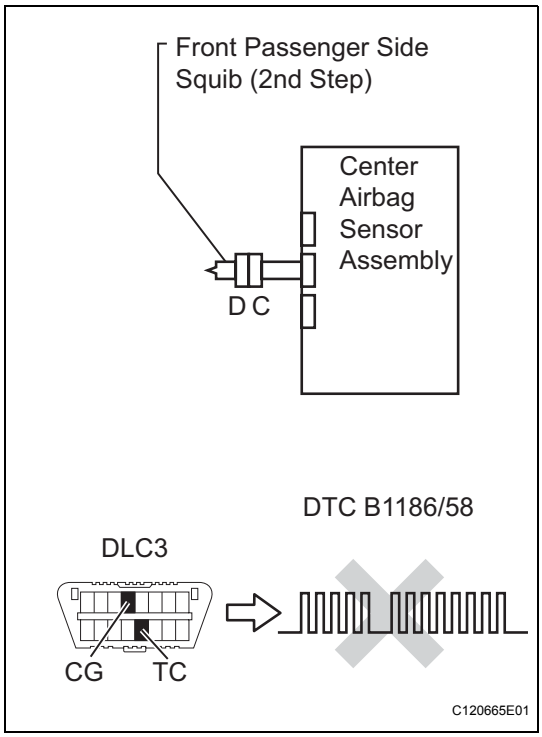
HINT:
Codes other than code B1186/58 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB, 2ND STEP)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the SST from the connector "C".
(d) Connect the connector to the front passenger airbag.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1186/58 is not output.

HINT:

Codes other than code B1186/58 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

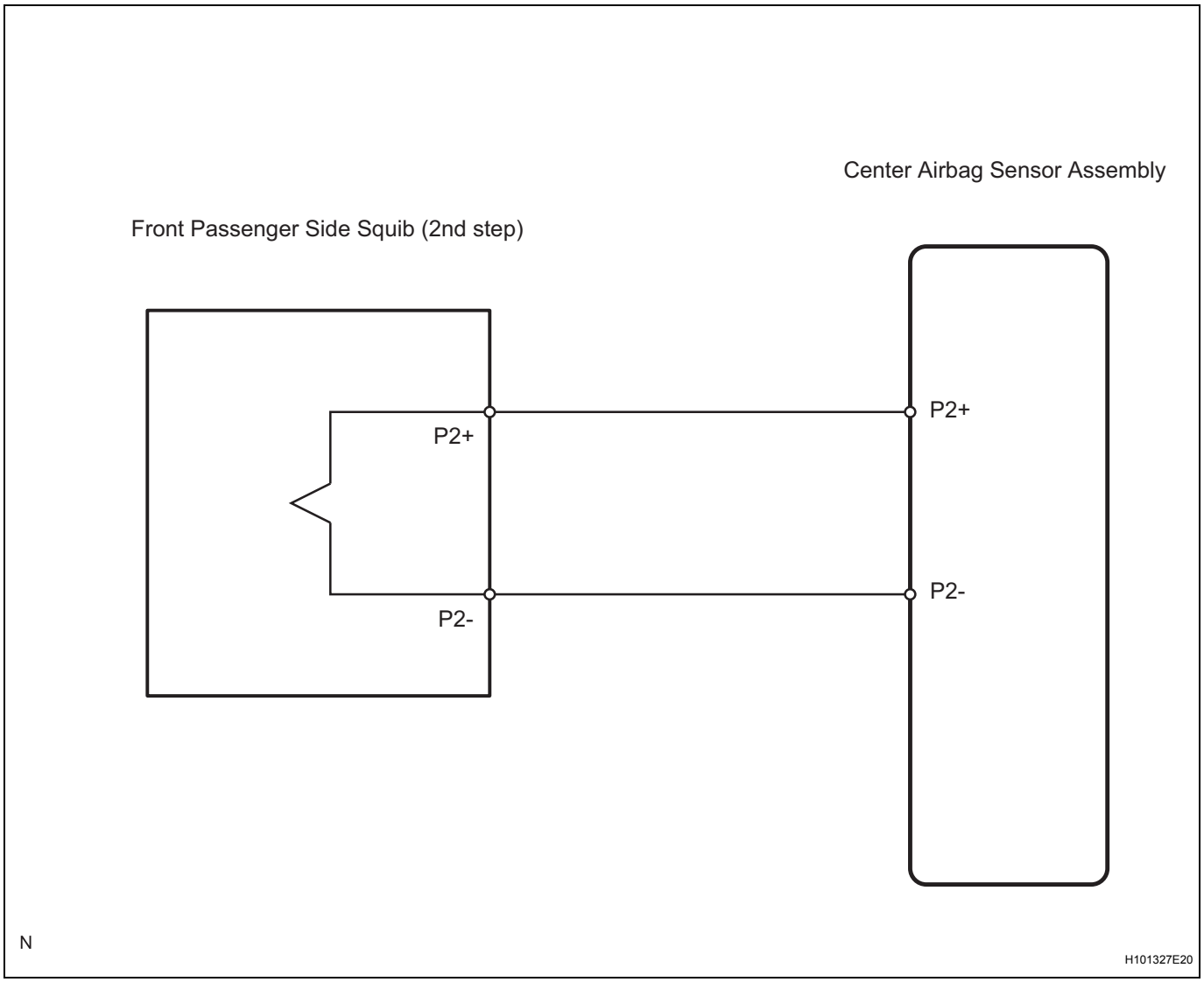
DTC	B1187/55	Short to GND in Front Passenger Side Squib 2nd Step Circuit

DESCRIPTION

The front passenger side squib (2nd step) circuit consists of the center airbag sensor and the front passenger airbag.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1187/55 is recorded when a ground short is detected in the front passenger side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1187/55	• Short in front passenger side squib (2nd step) circuit (to ground) • Front passenger side squib (2nd step) malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib (2nd step)) • Center airbag sensor assembly • Instrument panel wire

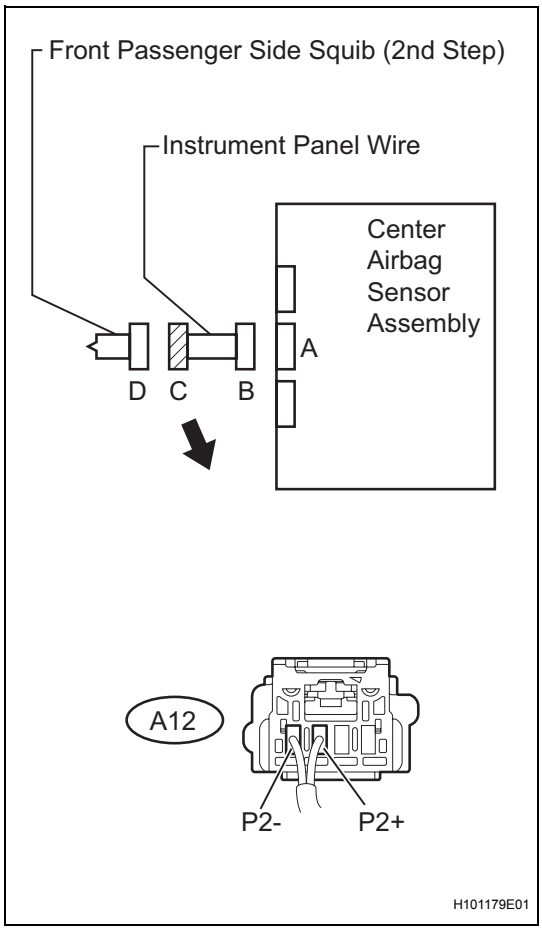
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL WIRE (FRONT PASSENGER SIDE SQUIB CIRCUIT (2ND STEP))

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front passenger airbag.
(d) Measure the resistance according to the value(s) in the table below.

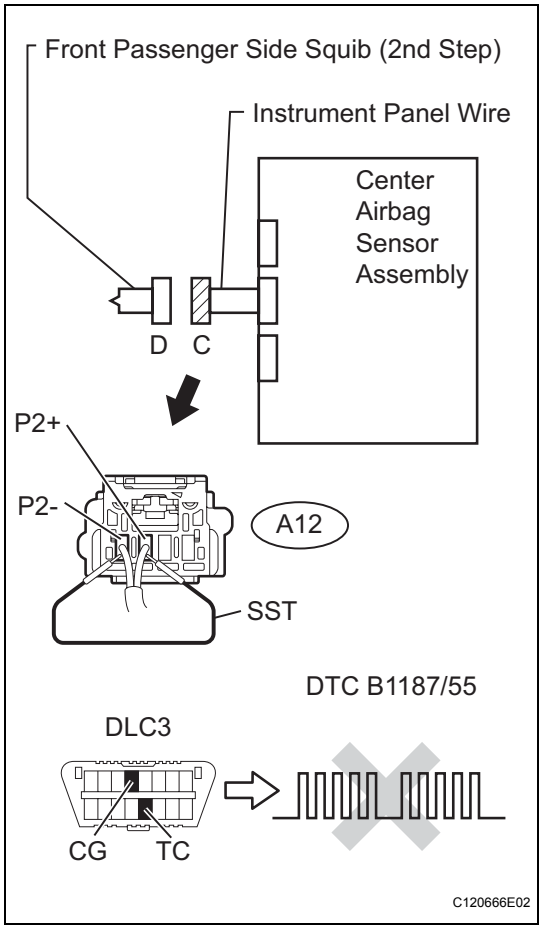
Standard resistance

Tester Connection (Connector "C")	Specified Condition
A12-3 (P2+) - Body ground	1 MΩ or higher
A12-4 (P2-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using SST, connect terminals P2+ and P2- of connector "C".

SST 09843-18040

NOTICE:
Do not forcibly insert SST into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).

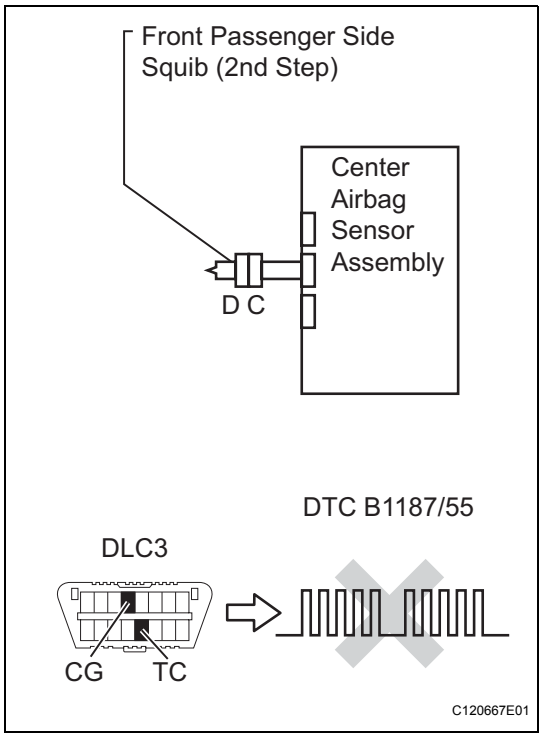
OK:
DTC B1187/55 is not output.

HINT:
Codes other than code B1187/55 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB, 2ND STEP)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the SST from the connector "C".
(d) Connect the connector to the front passenger airbag.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1187/55 is not output.

HINT:

Codes other than code B1187/55 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

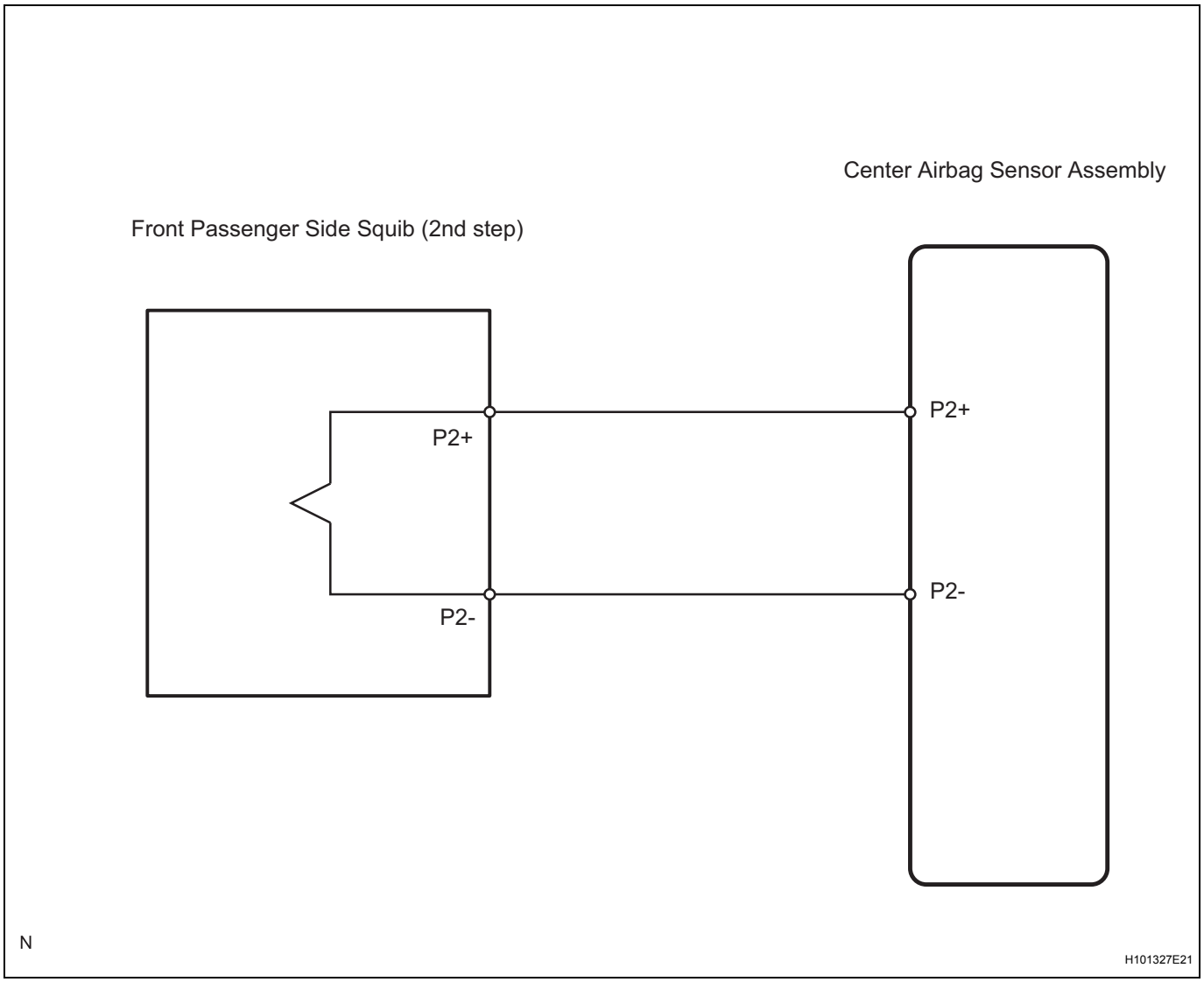
DTC	B1188/56	Short to B+ in Front Passenger Side Squib 2nd Step Circuit

DESCRIPTION

The front passenger side squib (2nd step) circuit consists of the center airbag sensor and the front passenger airbag.
The circuit instructs the SRS to deploy when the airbag deployment conditions are met.
DTC B1188/56 is recorded when a B+ short is detected in the front passenger side squib (2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1188/56	• Short in front passenger side squib (2nd step) circuit (to B+) • Front passenger side squib (2nd step) malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib (2nd step)) • Center airbag sensor assembly • Instrument panel wire

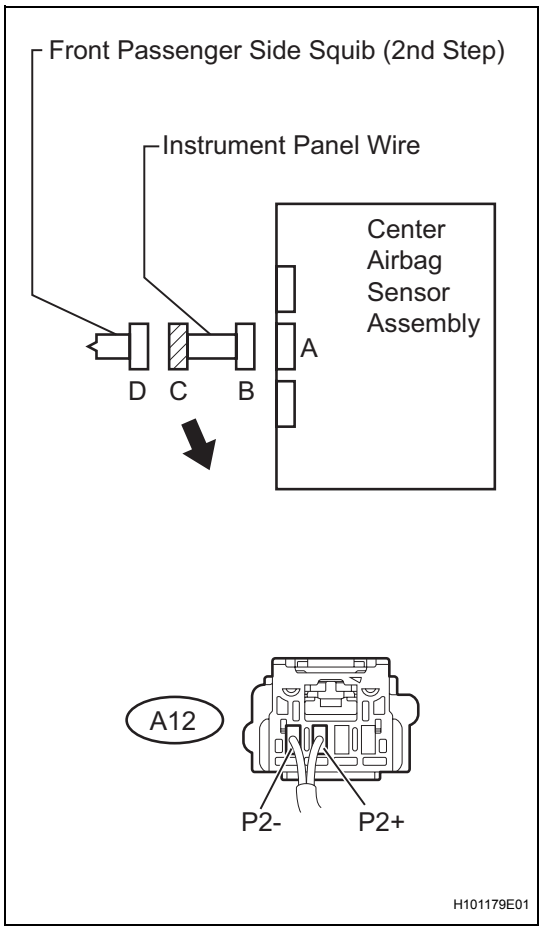
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL WIRE (FRONT PASSENGER SIDE SQUIB CIRCUIT (2ND STEP))

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and the front passenger airbag.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

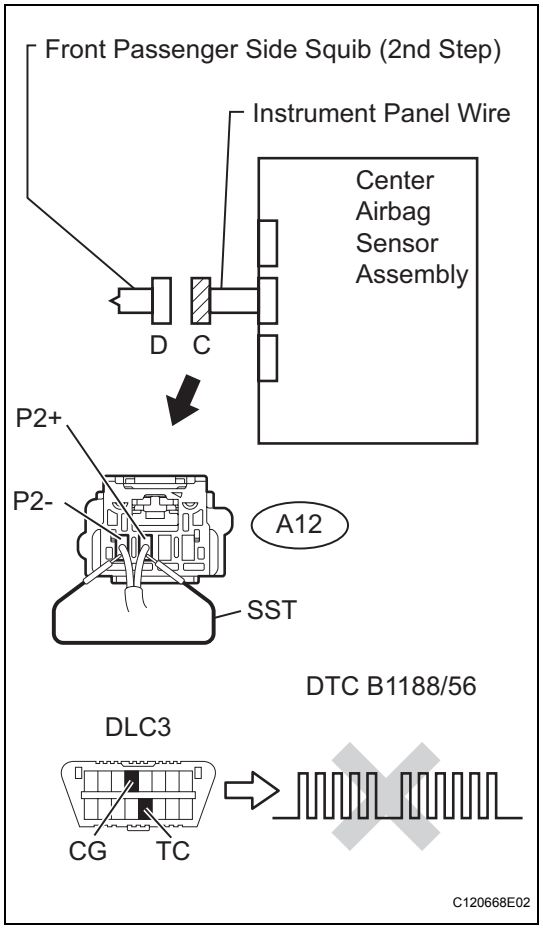
Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
A12-3 (P2+) - Body ground	Ignition switch ON	Below 1 V
A12-4 (P2-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using SST, connect terminals P2+ and P2- of connector "C".

SST 09843-18040

NOTICE:
Do not forcibly insert SST into the terminals of the connector when connecting.

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

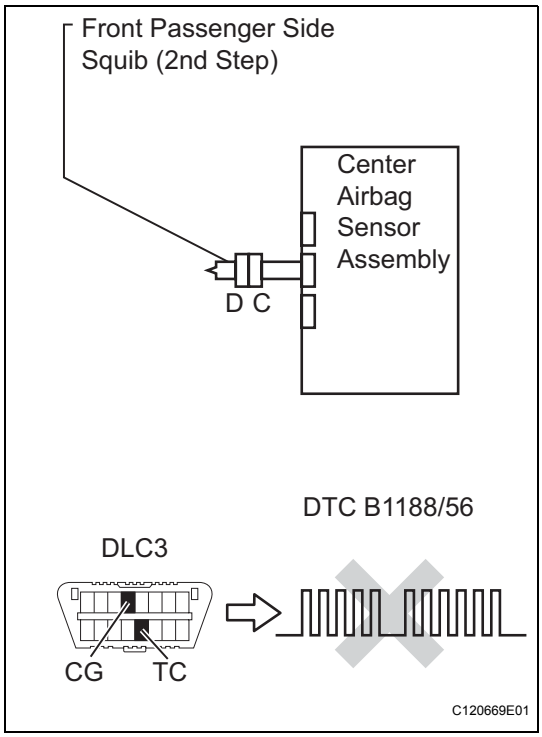
OK:
DTC B1188/56 is not output.

HINT:
Codes other than code B1188/56 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB, 2ND STEP)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the SST from the connector "C".
(d) Connect the connector to the front passenger airbag.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B1188/56 is not output.

HINT:

Codes other than code B1188/56 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

OK

4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

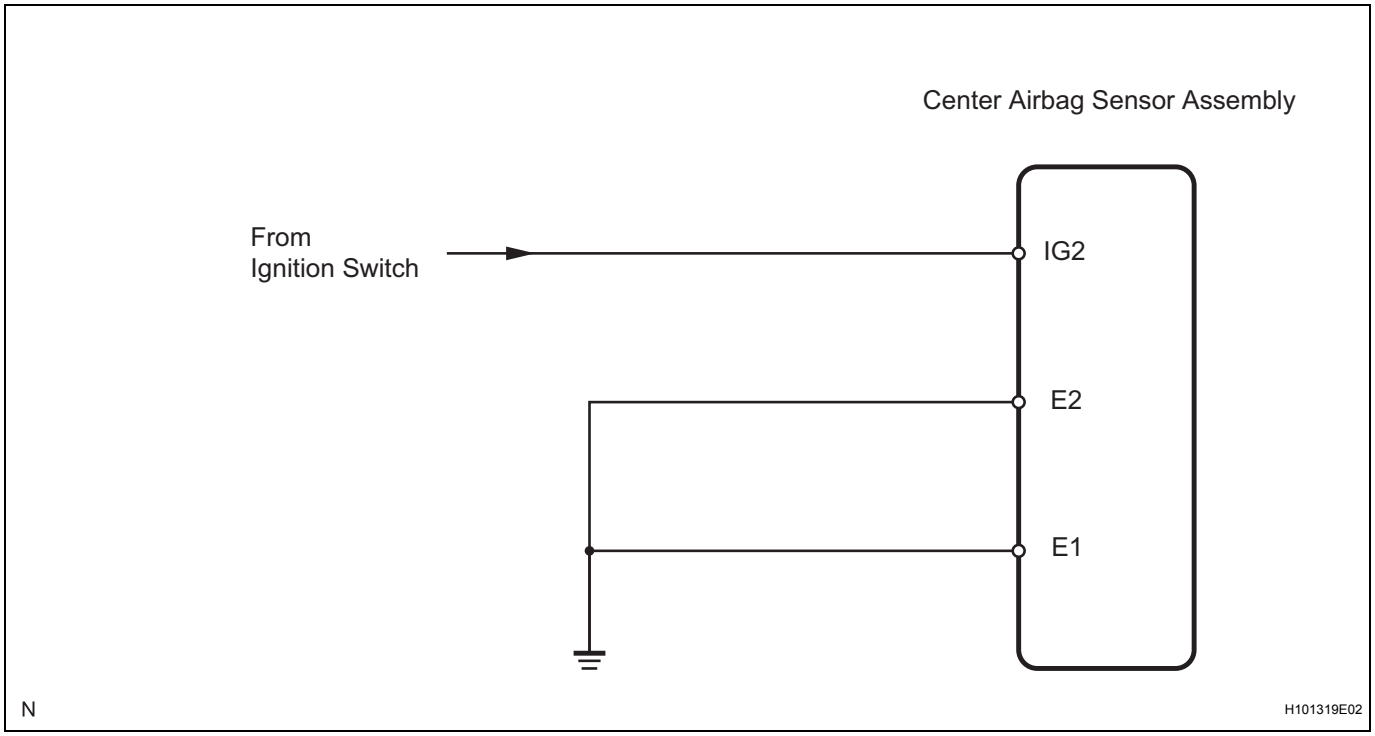
Source Voltage Drop

DESCRIPTION

The SRS is equipped with a voltage-increase circuit (DC-DC converter) in the center airbag sensor in case the source voltage drops.
When the battery voltage drops, the voltage-increase circuit (DC-DC converter) functions to increase the voltage of the SRS to normal voltage.
A malfunction in this circuit is displayed differently from other codes. In this circuit, no DTCs are recorded.
With a normal system code present, the source voltage drop is indicated when the SRS warning light comes on.
A malfunction in this circuit is not recorded in the center airbag sensor.
The SRS warning light automatically goes off when the source voltage returns to normal.

DTC No.	Diagnosis
(Normal)	Source voltage drop

WIRING DIAGRAM



INSPECTION PROCEDURE

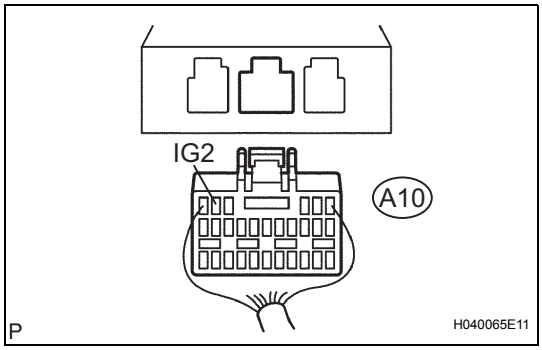
1	PREPARE FOR INSPECTION

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor (see page RS-325).

NEXT

RS

2	CHECK SOURCE VOLTAGE



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Measure the voltage according to the value(s) in the table below.

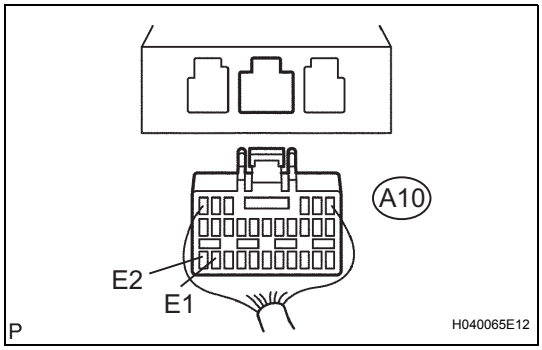
Standard voltage

Tester Connection	Condition	Specified Condition
A10-5 (IG2) - Body ground	Ignition switch ON	11 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS (BATTERY - CENTER AIRBAG SENSOR), CHARGING SYSTEM AND BATTERY)**

OK

3	CHECK WIRE HARNESS (E1 (E2) - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A10-27 (E1) - Body ground	Below 1 Ω
A10-28 (E2) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (CENTER AIRBAG SENSOR - BODY GROUND)**

OK

4	CHECK SRS WARNING LIGHT

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the center airbag sensor connectors.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 6 seconds.
(f) Operate all components of the electrical system (defogger, wiper, headlight, heater blower, etc.) and check that SRS warning light does not come on.

OK:

SRS warning light does not come on.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

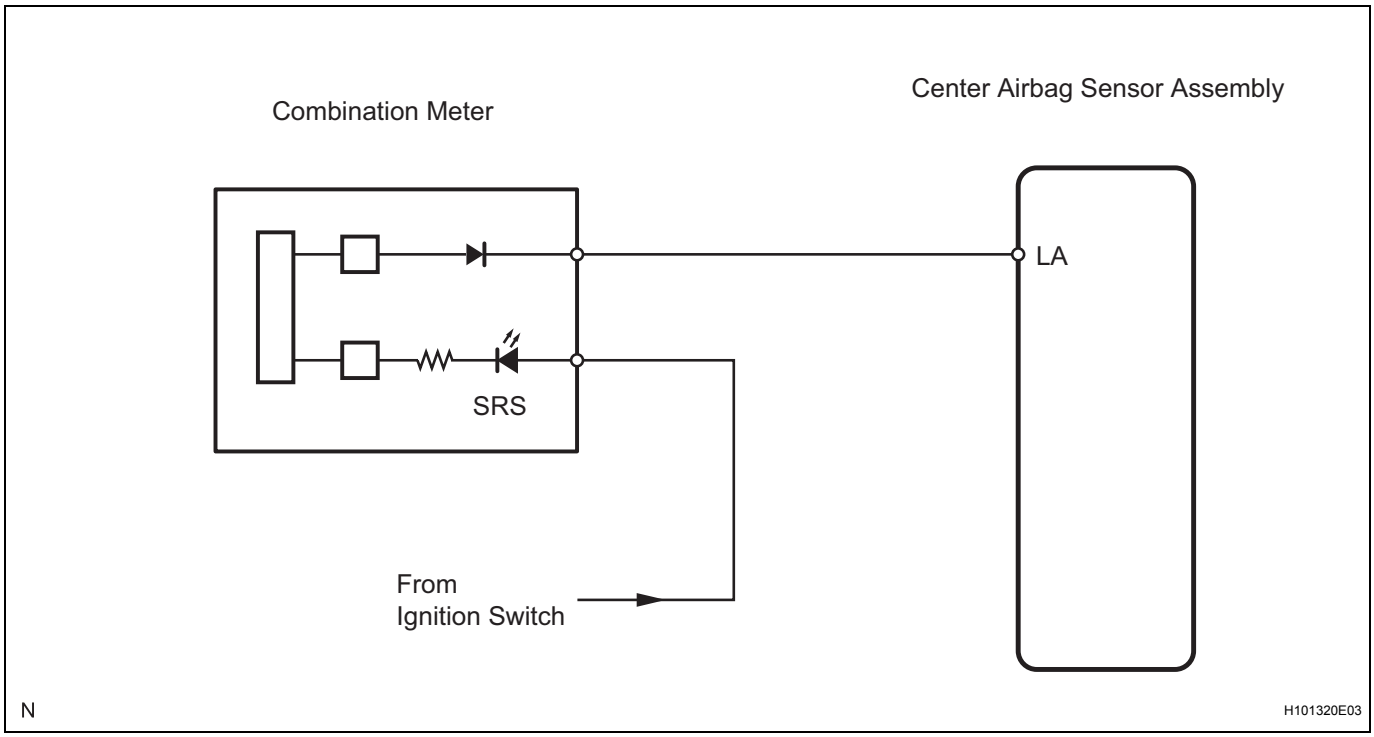
END

SRS Warning Light Remains ON

DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the ignition switch is turned from the LOCK position to ON position, and then turns off automatically.
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality.
When terminal TC and CG of the DLC3 are connected, the DTC is indicated by blinking the SRS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

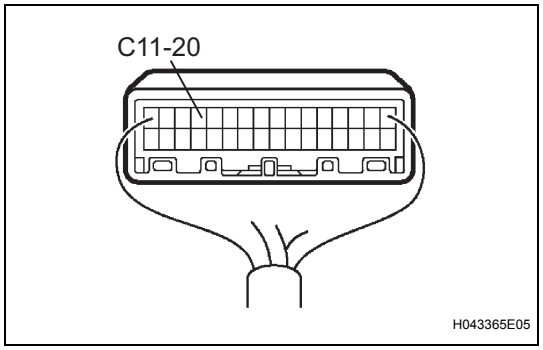
1	CONNECT CONNECTORS

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor.
OK:
Connectors are connected.

NG → **CONNECT CONNECTORS**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Disconnect the connector from the combination meter.
(b) Connect the negative (-) terminal cable to the battery.
(c) Measure the voltage according to the value(s) in the table below.

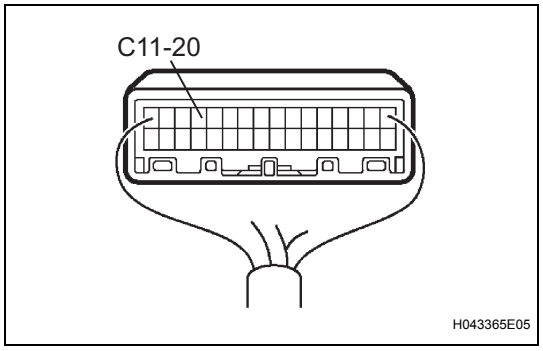
Standard voltage

Tester Connection	Condition	Specified Condition
C11-20 - Body ground	Ignition switch ON	Above 8 V

NG → **Go to step 4**

OK

3	CHECK INSTRUMENT PANEL WIRE (TO B+) (CENTER AIRBAG SENSOR - COMBINATION METER)



(a) Disconnect the connector from the center airbag sensor
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

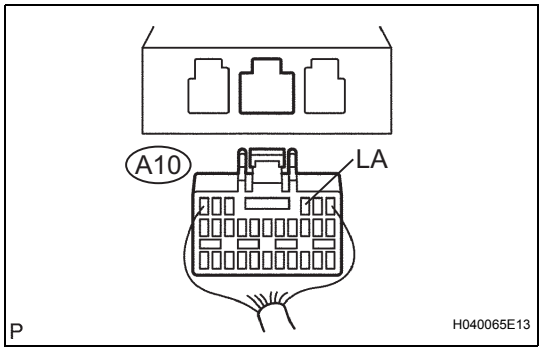
Tester Connection	Condition	Specified Condition
C11-20 - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE (CENTER AIRBAG SENSOR - COMBINATION METER)**

OK

REPLACE COMBINATION METER ASSEMBLY

4	CHECK INSTRUMENT PANEL WIRE (CENTER AIRBAG SENSOR - COMBINATION METER)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connector from the center airbag sensor
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

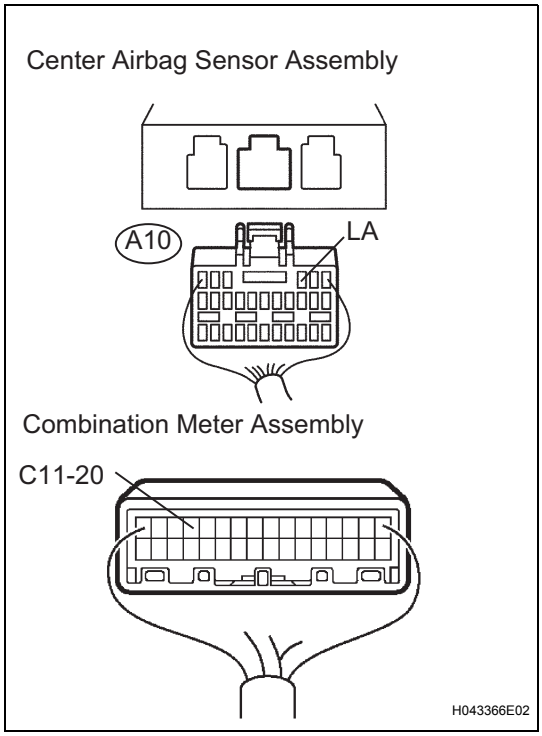
Tester Connection	Specified Condition
A10-3 (LA) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5	CHECK INSTRUMENT PANEL WIRE (CENTER AIRBAG SENSOR - COMBINATION METER)

RS



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A10-3 (LA) - C11-20	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE (CENTER AIRBAG SENSOR - COMBINATION METER)**

OK

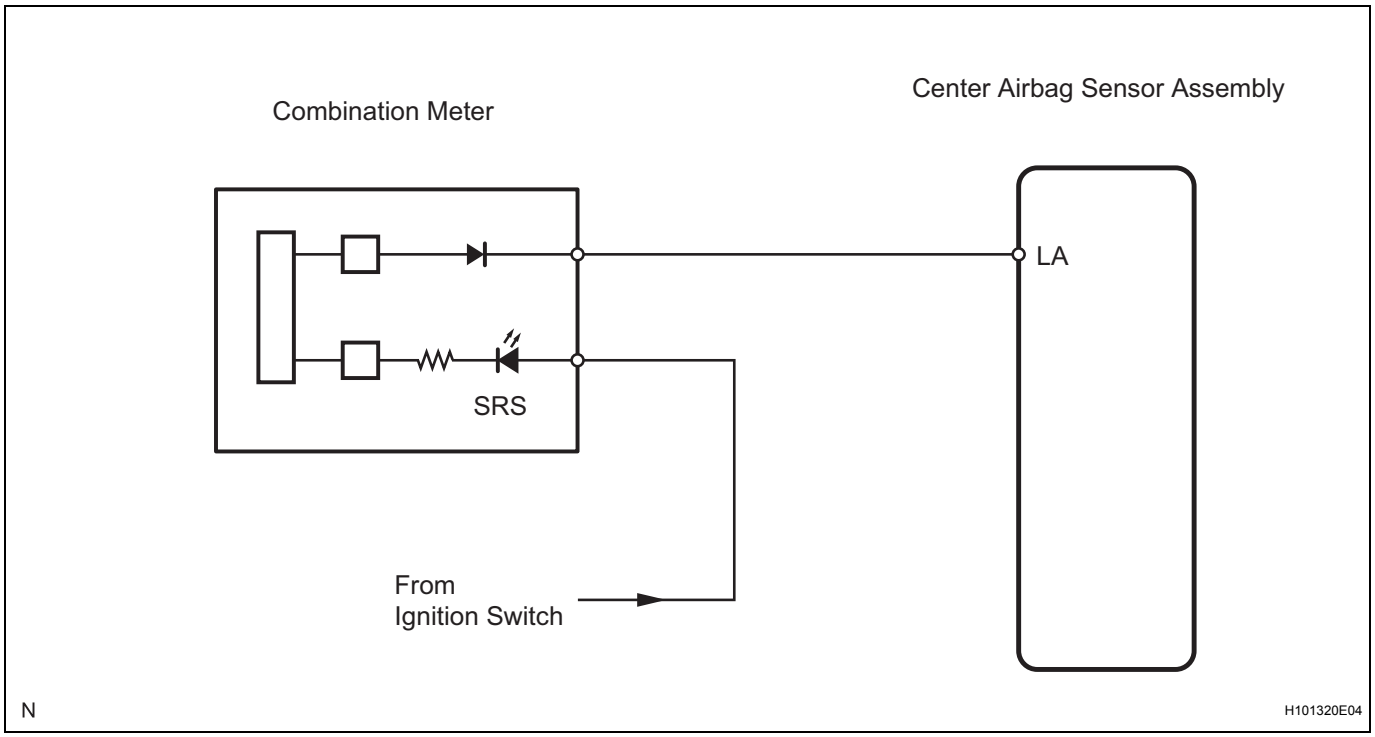
REPLACE CENTER AIRBAG SENSOR ASSEMBLY

SRS Warning Light does not Come ON

DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the ignition switch is turned from the LOCK position to the ON position, and then goes off automatically.
If there is a malfunction in the SRS, the SRS warning light comes on to inform the driver of a problem.
When terminals TC and CG of the DLC3 are connected, the DTC is displayed by blinking the SRS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK SOURCE VOLTAGE

(a) Measure the voltage of the battery.

Standard voltage

Tester Connection	Specified Condition
Positive terminal - Negative terminal	11 to 14 V

NG → **REPAIR OR REPLACE CHARGING SYSTEM AND BATTERY**

OK

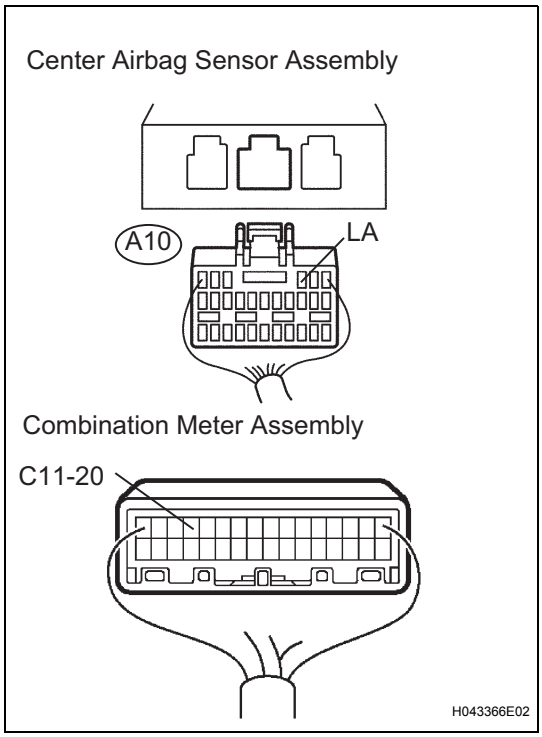
2	CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(b) Disconnect the connector from the center airbag sensor.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON.
(e) Check that the SRS warning light on the combination meter comes on.
OK:
SRS warning light comes on.

OK → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

NG

3	CHECK WIRE HARNESS (COMBINATION METER - CENTER AIRBAG SENSOR)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connector from the center airbag sensor.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON.
(f) Check that SRS warning light on the combination meter comes on.
OK:
SRS warning light comes on.

NG → **REPAIR OR REPLACE COMBINATION METER OR WIRE HARNESS (COMBINATION METER - BATTERY)**

OK

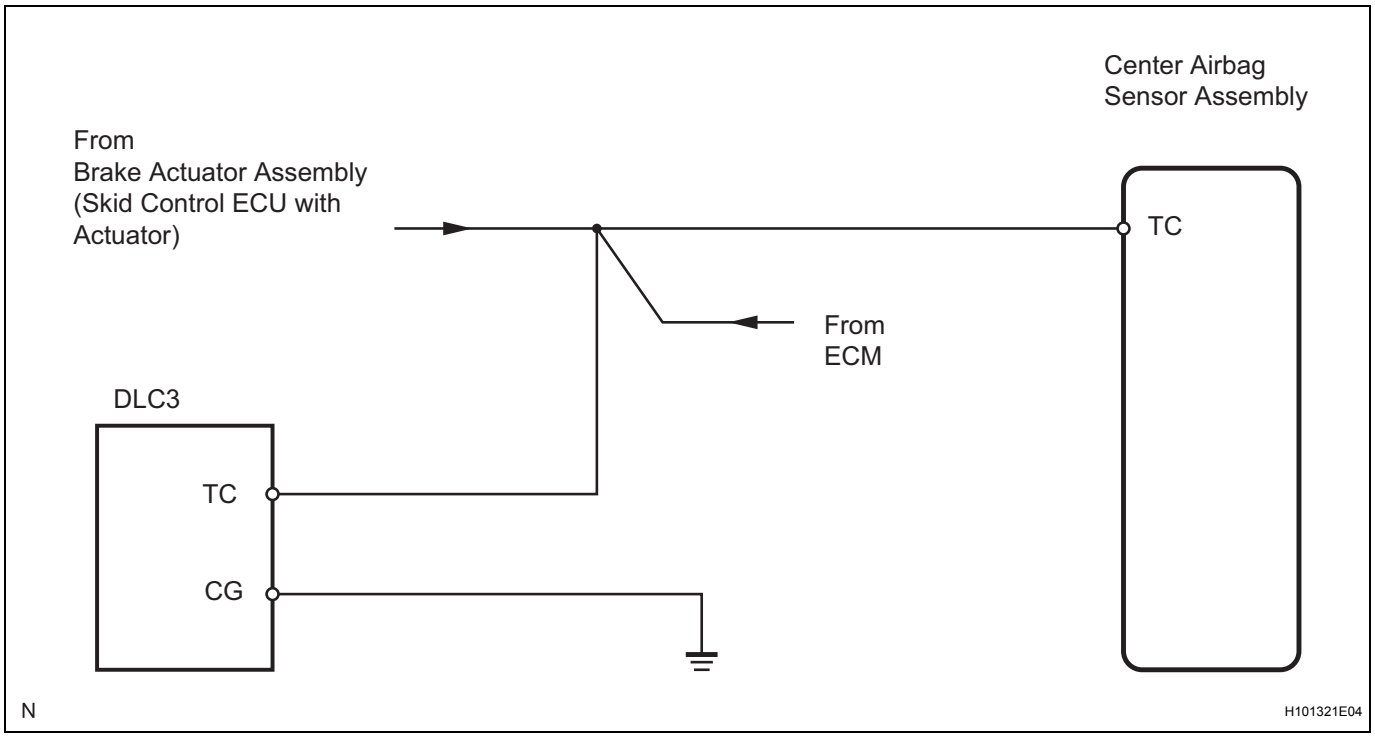
REPAIR OR REPLACE HARNESS (CENTER AIRBAG SENSOR - COMBINATION METER)

TC and CG Terminal Circuit

DESCRIPTION

DTC output mode is set by connecting terminal TC and CG of the DLC3. The DTCs are displayed by blinking the SRS warning light.

WIRING DIAGRAM

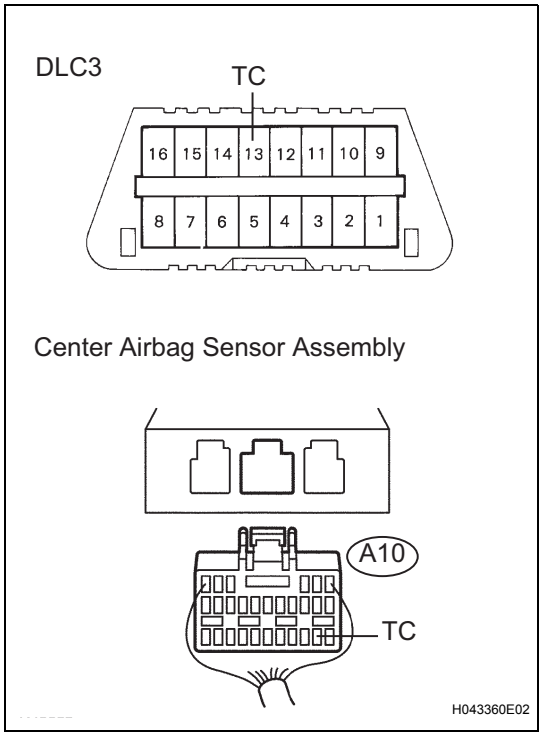


HINT:
When each warning light stays blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in each ECU is suspected.

INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (DLC3 - CENTER AIRBAG SENSOR)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the center airbag sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

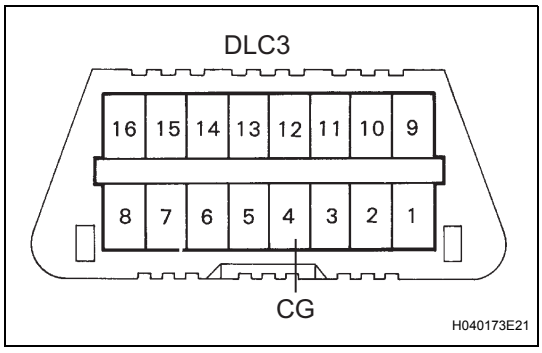
Standard resistance

Tester Connection	Specified Condition
DLC3 (TC) - A10-19 (TC)	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (TC OF DLC3 - TC OF CENTER AIRBAG SENSOR)**

OK

2	CHECK WIRE HARNESS (CG OF DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

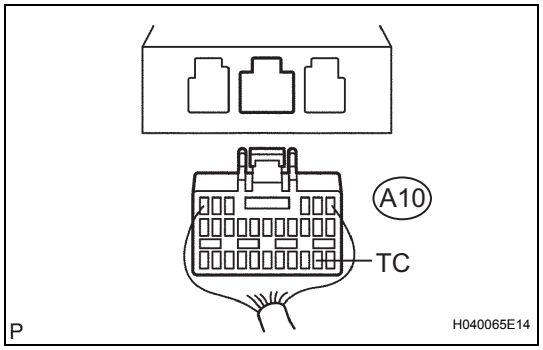
Standard resistance

Tester Connection	Specified Condition
DLC3 (TC) - Body ground	Below 1 Ω

OK → **REPAIR OR REPLACE WIRE HARNESS (CG OF DLC3 - BODY GROUND)**

NG

3	CHECK WIRE HARNESS (TC OF CENTER AIRBAG SENSOR - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A10-19 (TC) - Body ground	1 MΩ or higher

RS

NG → **REPAIR OR REPLACE WIRE HARNESS AND EACH ECU**

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY

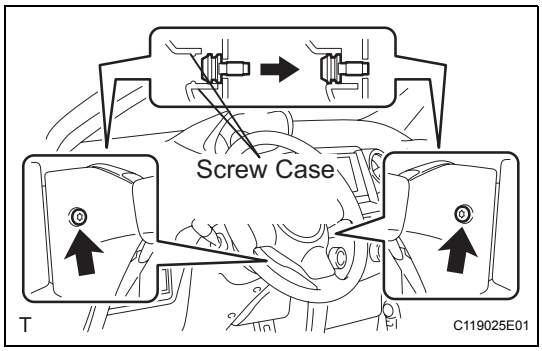
RS

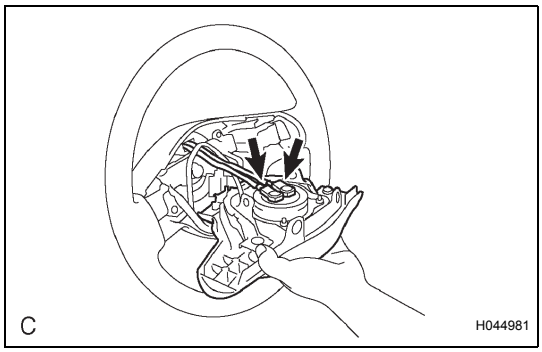
REMOVAL

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE STEERING PAD ASSEMBLY**
   (a) Straighten the front wheels.
   (b) Using a T30 "torx" socket, loosen the 2 screws until the groove along each screw circumference catches on the screw case.

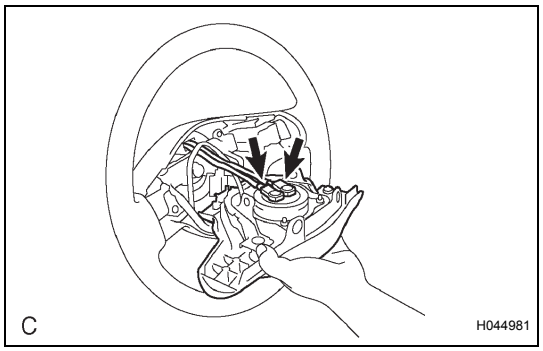




   (c) Pull out the steering pad from the steering wheel and support the steering pad with one hand as shown in the illustration.
   NOTICE:
   When removing the steering pad, do not pull the airbag wire harness.
   (d) Using a screwdriver, disconnect the 2 airbag connectors.
   CAUTION:
   When handling the airbag connector, do not damage the airbag wire harness.
   (e) Disconnect the horn connector and remove the steering pad.

INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).



1. INSTALL STEERING PAD ASSEMBLY

(a) Support the steering pad with one hand as shown in the illustration.

(b) Connect the 2 airbag connectors.
NOTICE:
When handling the airbag connector, do not damage the airbag wire harness.

(c) Connect the horn connector.

(d) Install the steering pad after confirming that the circumference grooves of the screws are caught on the screw case.

(e) Using a T30 "torx" socket, install the 2 screws.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

3. INSPECT STEERING PAD ASSEMBLY

(a) Check for cuts, cracks or discoloration on the steering pad outer surface and in the grooved portion.

(b) Check that the horn sounds.

4. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
CAUTION:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

5. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

RS

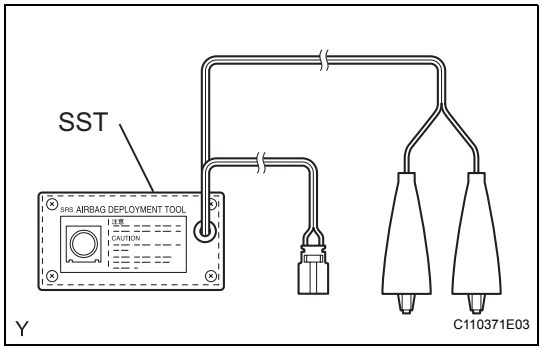
RS

DISPOSAL

HINT:
When scrapping a vehicle equipped with an SRS or disposing of the steering pad, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

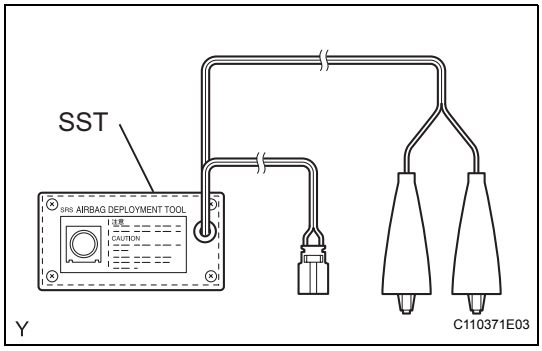
- **Never dispose of a steering pad with an unactivated airbag.**
- **The airbag produces a loud, exploding sound when it activates. Perform the operation where it will not be a nuisance to people nearby.**
- **When activating the airbag, always use the specified SST (SRS airbag deployment tool).**
- **Perform procedures in a place away from electrical interference.**
- **When activating the airbag, stand at least 10 m (33 ft.) away from the steering pad.**
- **The steering pad becomes very hot when the airbag is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

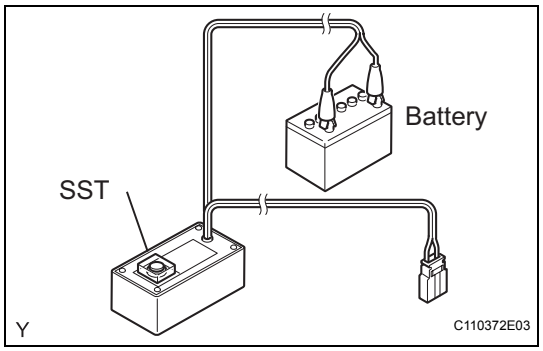


1. DISPOSE OF STEERING PAD ASSEMBLY TOGETHER WITH VEHICLE

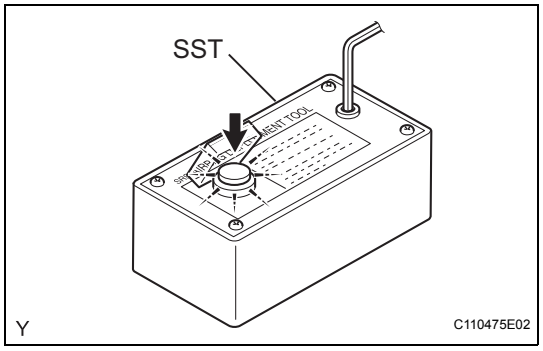
HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check if SST is functioning properly.
SST 09082-00700





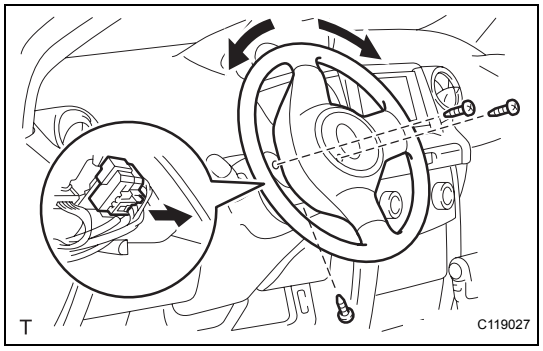
(1) Connect the SST's red clip to the positive (+) battery terminal and the black clip to the negative (-) battery terminal.
HINT:
The yellow connector will be used to connect to another SST in a later step.



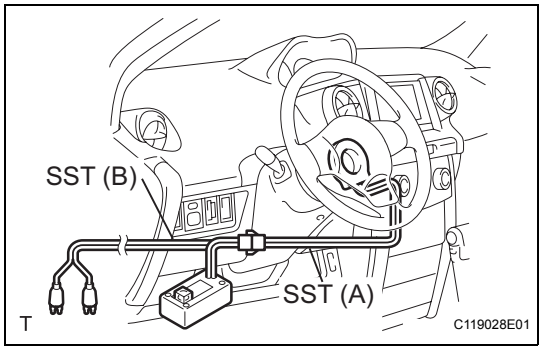
(2) Press the SST activation switch, and check that the LED of the SST activation switch illuminates.
CAUTION:
If the LED illuminates when the activation switch is not pressed, SST may have a malfunction, in which case that SST should not be used.
(3) Disconnect SST from the battery.

(b) Follow the "Precaution" (see page RS-1).

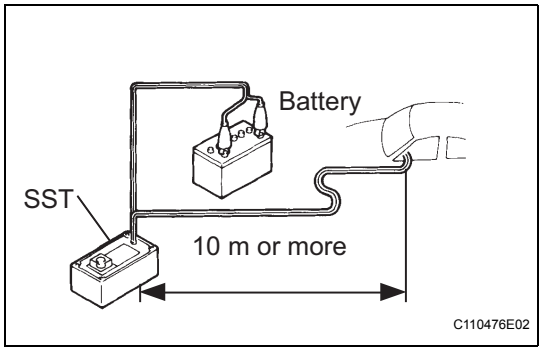
(c) Disconnect the cable from the negative (-) battery terminal.
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



(d) Remove the steering column cover lower.
(1) Turn the steering wheel to the right and left as necessary to remove the 2 screws.
(2) Remove the screw and cover lower.



(e) Install SST.
CAUTION:
Check that there is no free play in the steering wheel and steering pad.
(1) Disconnect the yellow airbag connector from the spiral cable.
NOTICE:
When handling the airbag connector, do not damage the airbag wire harness.
(2) Connect SST (A) to SST (B). Then connect SST (B)'s connector to the spiral cable.
SST 09082-00700, 09082-00780



NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

(3) Move SST at least 10 m (33 ft.) away from the front side window.

(4) Maintain a small opening in the front side window for the SST wire harness. Close the remaining windows of the vehicle. Close all doors.

NOTICE:
Take care not do damage the SST wire harness.

(5) Connect the SST red clip to the positive (+) battery terminal and the black clip to the negative (-) battery terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (33 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

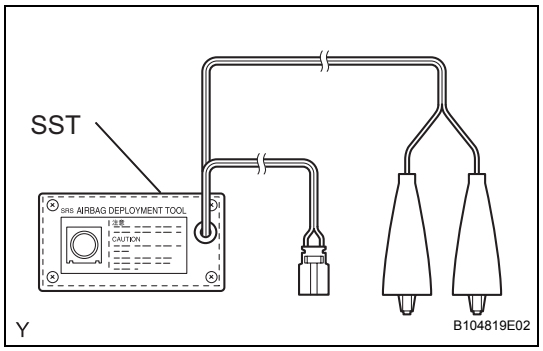
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The steering pad becomes extremely hot when the airbag is deployed. Do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:
The airbag is deployed as the SST activation switch LED illuminates.

2. DISPOSE OF ONLY STEERING PAD ASSEMBLY

NOTICE:
- **When disposing of the steering pad, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

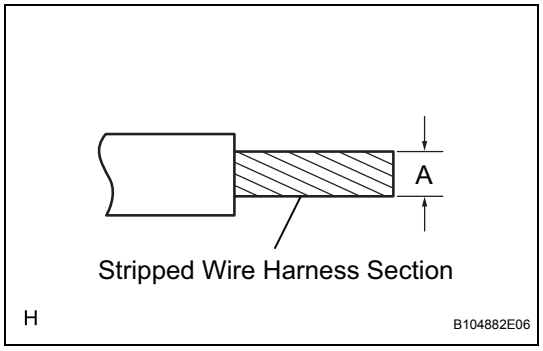


(a) Check if SST is functioning properly (see previous step).

(b) Remove the steering pad (see page RS-287).

CAUTION:

- **When removing the steering pad, work must be started at least 90 seconds after the ignition switch is turned OFF and after the cable is disconnected from the negative (-) battery terminal.**
- **When storing the steering pad, keep the airbag deployment side facing upward.**



(c) Using service wire harnesses for the vehicle, tie down the steering pad to a disc wheel (with tire).

Wire harness:

Stripped wire harness section

A:

1.25 mm^2 or more (0.0019 $in.^2$ or more)

NOTICE:

Use a disc wheel (with tire) that you are planning to throw away, as the airbag deployment will damage the disc wheel.

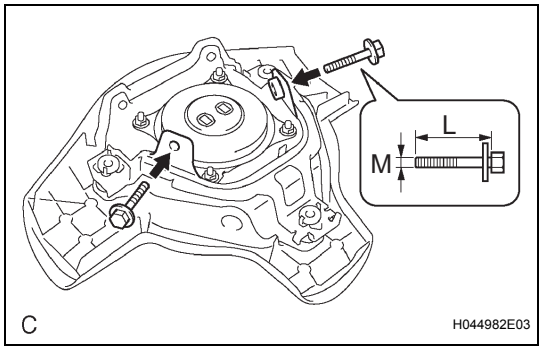
CAUTION:

Do not use wire harnesses that are too thin or any other substitute items to tie down the steering pad. They may snap when the airbag deploys. Always use vehicle wire harnesses that have an area of at least 1.25 mm^2 or more (0.0019 $in.^2$).

HINT:

To calculate the area of the stripped wire harness section:

Area = 3.14 x $Diameter^2/4$



(1) Install the 2 bolts with washers into the 2 bolt holes of the steering pad.

Bolt:

L:

35.0 mm (1.378 in.)

M:

6.0 mm (0.236 in.)

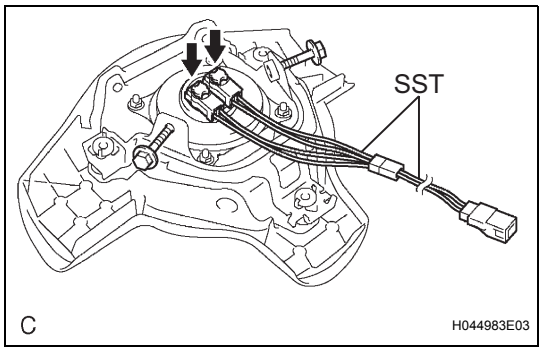
Pitch:

1.0 mm (0.039 in.)

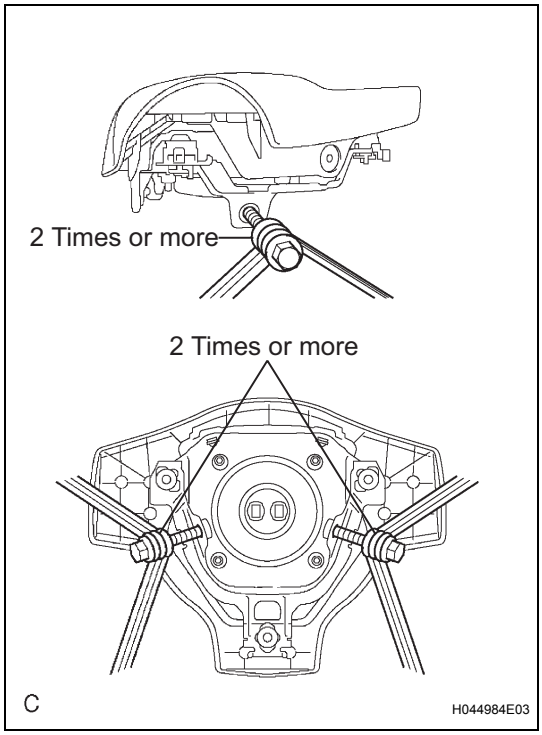
NOTICE:

- **Tighten the bolts by hand until they become difficult to turn.**
- **Do not tighten the bolts excessively.**

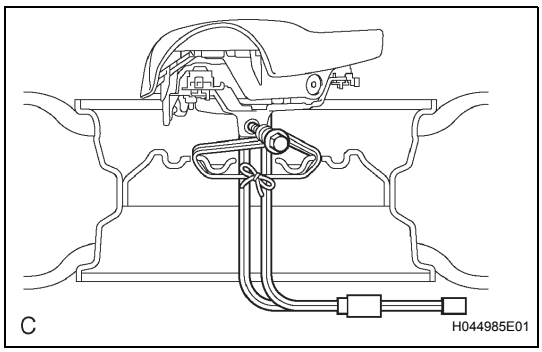
RS



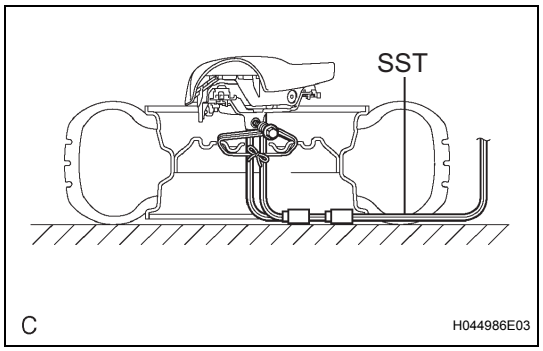
(2) After connecting SST to each other, connect them to the steering pad.
SST 09082-00802 (09082-10801, 09082-30801)



(3) Wind 3 wire harnesses at least twice around the bolts installed on the left and right sides of the steering pad.
CAUTION:
- **Tightly wind the wire harnesses around the bolts so that there is no slack.**
- **Make sure that the wire harnesses are tight. If there is slack in a wire harness, the steering pad may come loose when the airbag is deployed.**



(4) Face the airbag deployment side of the steering pad upward. Separately tie the left and right sides of the steering pad to a disc wheel through the hub nut holes. Position the SST connector so that it hangs downward through the hub hole in the disc wheel.
CAUTION:
- **Make sure that the wire harnesses are tight. If there is slack in a wire harness, the steering pad may come loose when the airbag is deployed.**
- **Always tie down the steering pad with the airbag deployment side facing upward.**



(d) Install SST.

CAUTION:

Place the tire with disc wheel and steering pad on a level surface.

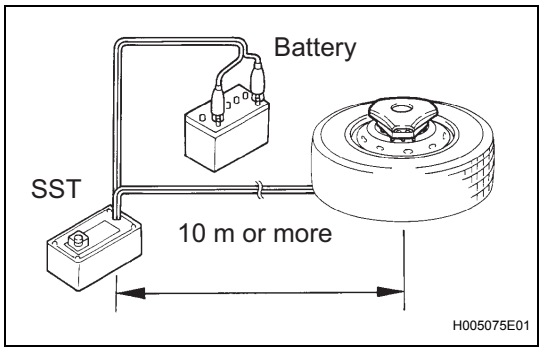
(1) Connect the connector of SST.

SST 09082-00700

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.

(2) Move SST at least 10 m (33 ft.) away from the steering pad.



(e) Cover the steering pad with a cardboard box or tires.

(1) Covering method using a cardboard box:
Cover the steering pad with the cardboard box and place weights of at least 19 kg (43 lb) on the cardboard box in 4 places.

Cardboard box size:

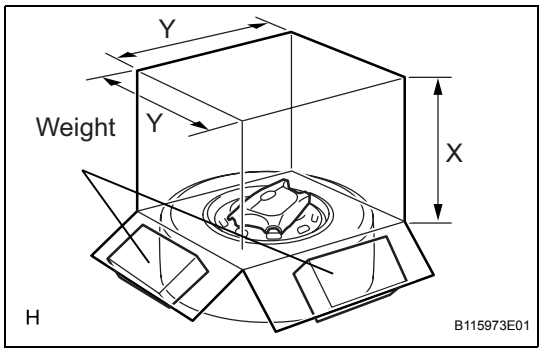
X minimum = 460 mm (18.11 in.)

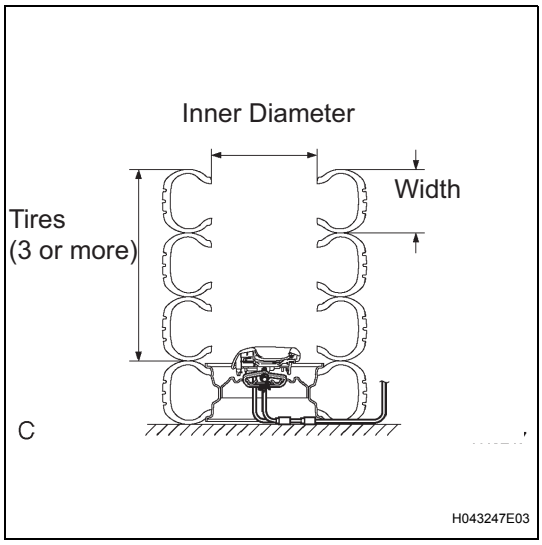
Y minimum = 650 mm (25.59 in.)

NOTICE:

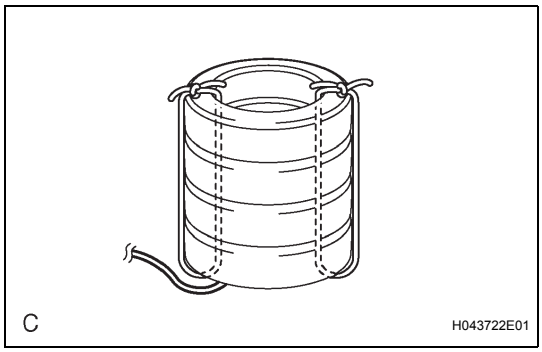
- **When dimension Y of the cardboard box exceeds the tire dimension, X should be the following size.**

  X minimum = 460 mm (18.11 in.) + width of tire
- **If using a cardboard box that is smaller than the specified size, the cardboard box will break during airbag deployment.**

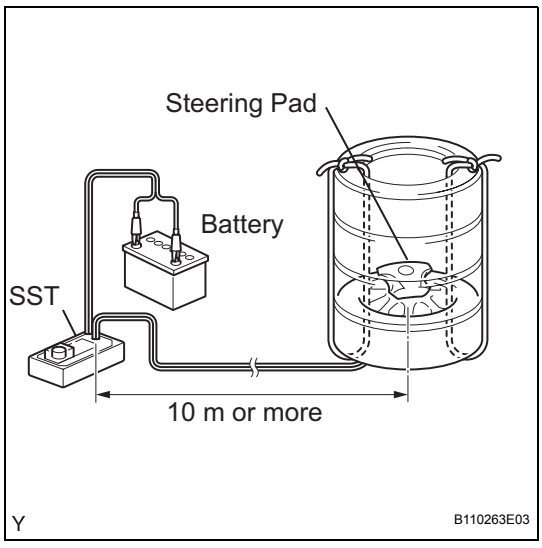




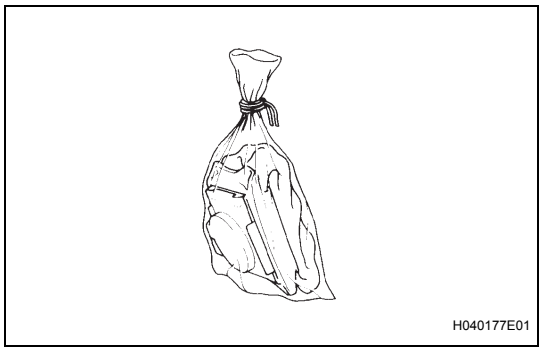
(2) Covering method using tires:
Place at least 3 tires (without disc wheels) on top of the tire (with disc wheel and steering pad).
Tire size:
Width minimum:
185 mm (7.28 in.)
Inner diameter minimum:
360 mm (14.17 in.)
CAUTION:
Do not use tires with disc wheels to cover the tire (with disc wheel and steering pad).
NOTICE:
- **Use tires that you are planning to throw away, as the airbag deployment may damage the tires.**
- **Do not place the SST connector under the tire as the connector may be damaged.**



(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harnesses are tight. If there is slack in a wire harness, the tires may come loose when the airbag is deployed.



(f) Deploy the airbag.
(1) Connect the SST red clip to the positive (+) battery terminal and the black clip to the negative (-) battery terminal.
(2) Check that no one is within a 10 m (33 ft.) radius of the steering pad.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tires.
HINT:
The airbag is deployed as the SST activation switch LED illuminates.



(g) Dispose of the steering pad.
CAUTION:
- **The steering pad becomes extremely hot when the airbag is deployed. Do not touch it for at least 30 minutes after deployment.**
- **Do not apply water to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the steering pad from the disc wheel.
(2) Place the steering pad in a plastic bag, tie it tightly and dispose of it in the same way as other general parts.

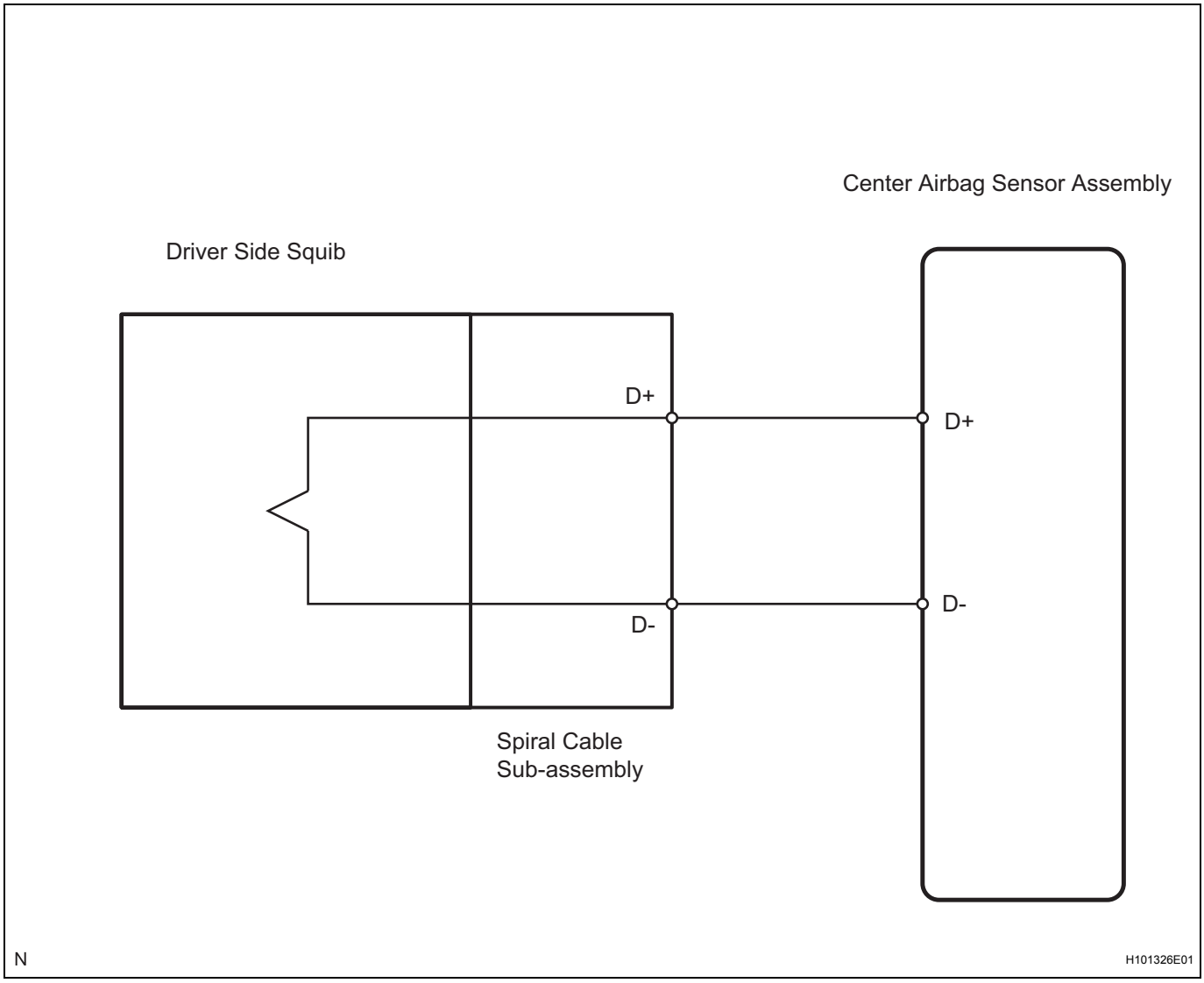
DTC	B0101/14	Open in Driver Side Squib Circuit

DESCRIPTION

The driver side squib circuit consists of the center airbag sensor, the spiral cable and the steering pad. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0101/14 is recorded when an open is detected in the driver side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0101/14	• Open in driver side squib circuit • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad (driver side squib) • Spiral cable sub-assembly • Center airbag sensor assembly • Instrument panel wire

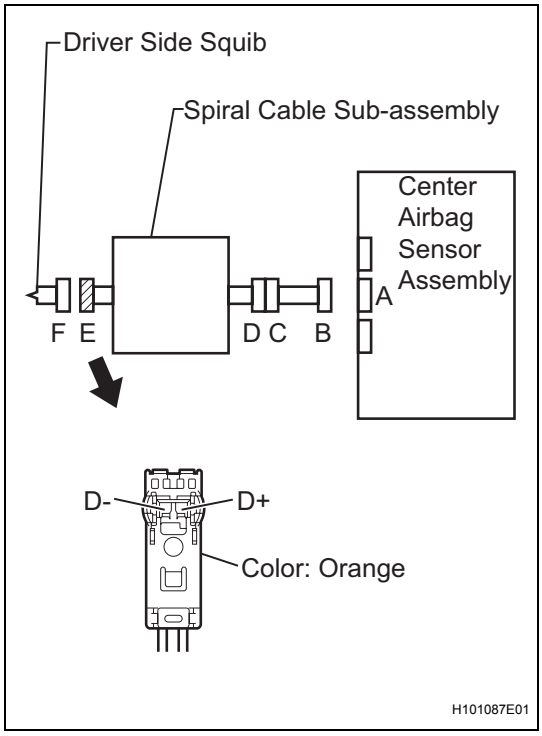
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR ASSEMBLY - STEERING PAD ASSEMBLY)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and steering pad.
(d) Measure the resistance according to the value(s) in the table below.

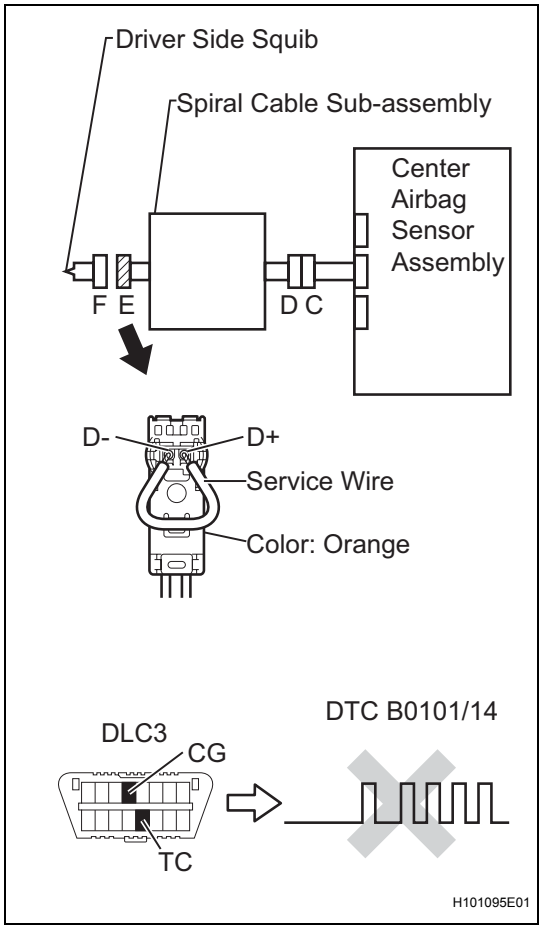
Standard resistance

Tester Connection (Connector "E")	Specified Condition
D+ - D-	Below 1 Ω

NG → **Go to step 4**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect D+ and D- of the connector "E".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

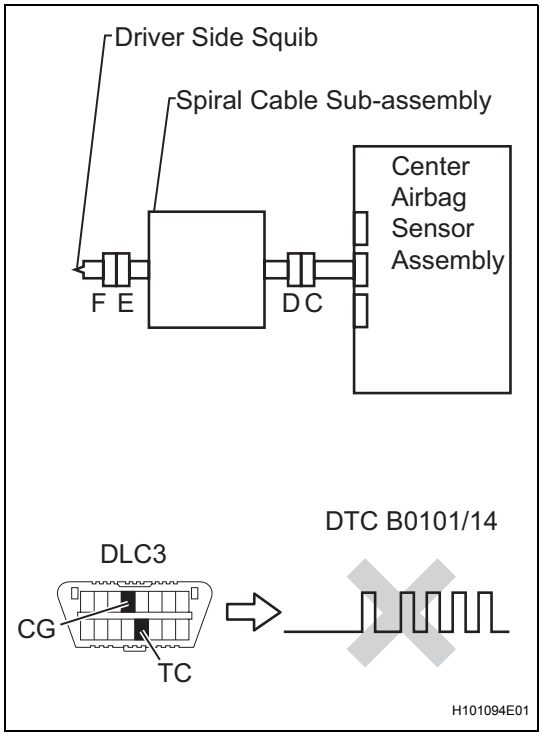
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check the DTC (see page RS-30).
OK:
DTC B0101/14 is not output.
HINT:
Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

RS

3	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "E".
(d) Connect the steering pad connectors.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0101/14 is not output.

HINT:

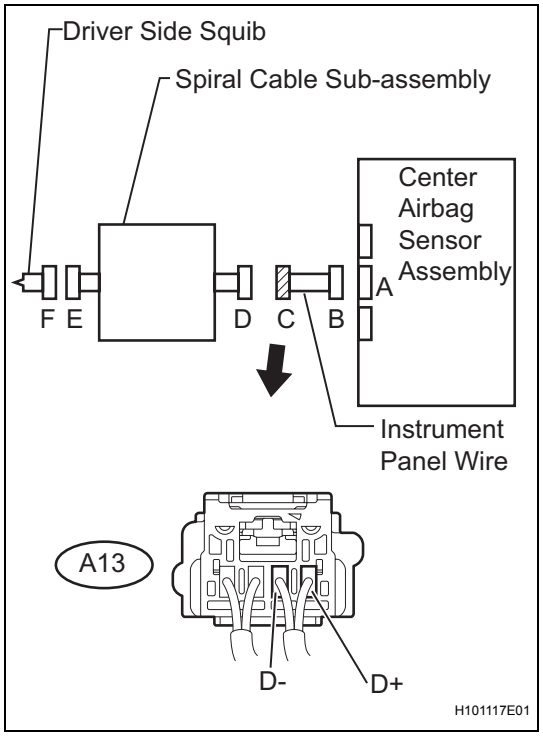
Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG → **REPLACE STEERING PAD ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

4 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument panel wire connector from the spiral cable.

(b) Measure the resistance according to the value(s) in the table below.

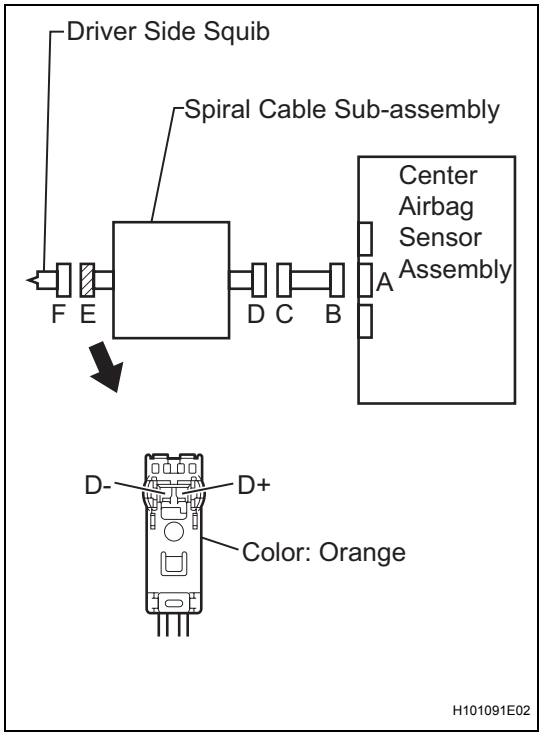
Standard resistance

Tester Connection (Connector "C")	Specified Condition
A13-1 (D+) - A13-2 (D-)	Below 1 Ω

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "E")	Specified Condition
D+ - D-	Below 1 Ω

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

INSPECTION

1. INSPECT SPIRAL CABLE SUB-ASSEMBLY

(a) Check that there are no scratches or cracks on its connector, and that the cable does not have cracks, dents or chipping.

RS

INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. INSTALL SPIRAL CABLE SUB-ASSEMBLY

(a) Check that the front wheels are facing straight ahead.

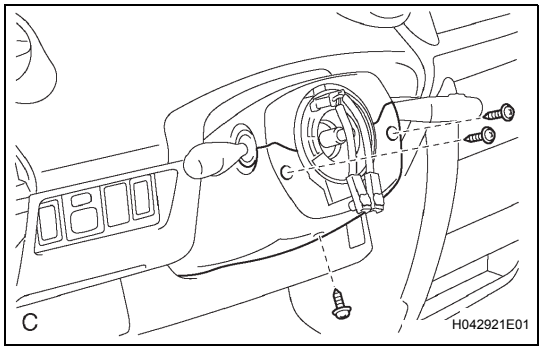
(b) Set the turn signal switch to the neutral position.
NOTICE:
Make sure that the turn signal switch is in the neutral position, as the pin of the turn signal switch may be snapped.

(c) Install the spiral cable.
NOTICE:
When replacing the spiral cable with a new one, remove the lock pin before installing the steering wheel.

(d) Connect the connector to the spiral cable.
NOTICE:
When handling the airbag connector, do not damage the airbag wire harness.

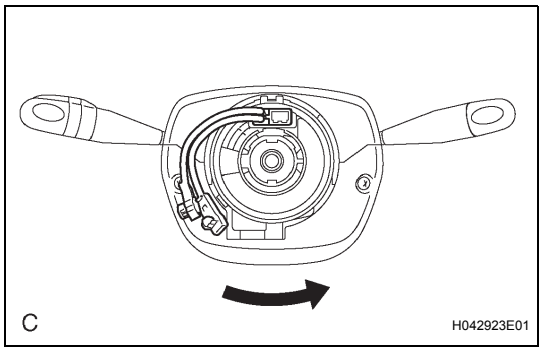
2. INSTALL STEERING COLUMN COVER

(a) Install the steering column covers with the 3 screws.

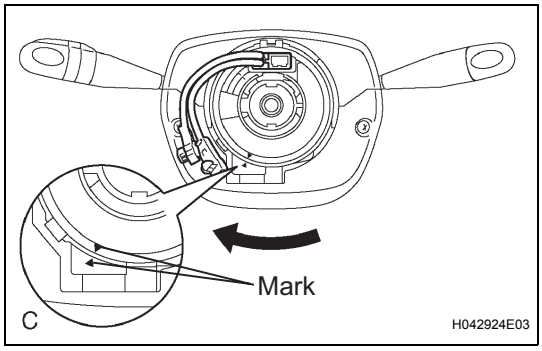


3. POSITION SPIRAL CABLE

(a) Slowly rotate the spiral cable counterclockwise by hand until it feels firm.
NOTICE:
Do not use the airbag wire harness to turn the spiral cable.



(b) Rotate the spiral cable clockwise approximately 2.5 turns to align the marks.
NOTICE:
Do not use the airbag wire harness to turn the spiral cable.
HINT:
The spiral cable will rotate approximately 2.5 turns to the left and right from the center.



4. INSTALL STEERING WHEEL ASSEMBLY

5. **INSTALL STEERING PAD ASSEMBLY (See page RS-288)**

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

7. **INSPECT STEERING PAD ASSEMBLY (See page RS-289)**

8. **PERFORM INITIALIZATION**
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
   (a) Perform initialization (see pageIN-23).

9. **CHECK SRS WARNING LIGHT**
   (a) Check the SRS warning light (see page RS-28).

10. **INSPECT STEERING WHEEL POSITION**

RS

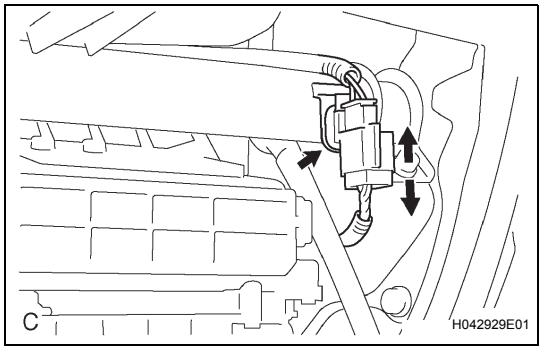
REMOVAL

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

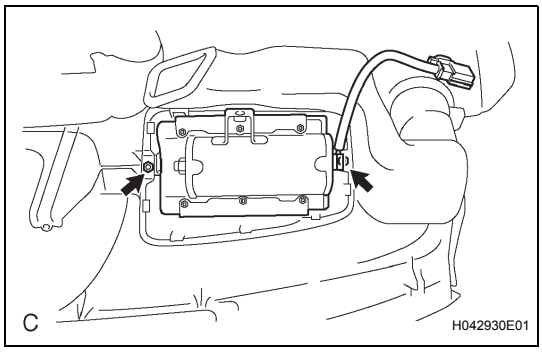
2. **REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY (See page IP-6)**

3. **DISCONNECT PASSENGER AIRBAG CONNECTOR**
   (a) Disconnect the clamp.
   (b) Disconnect the front passenger airbag connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.

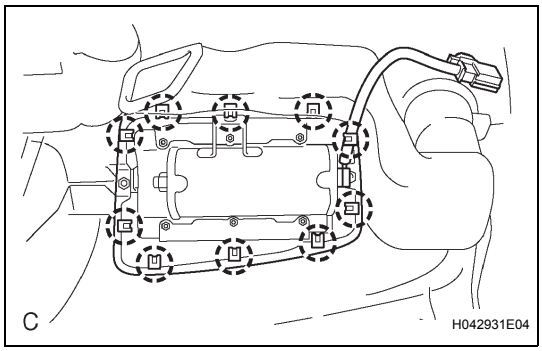


4. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY**
   (a) Remove the instrument panel (see pageIP-4).

5. **REMOVE FRONT PASSENGER AIRBAG ASSEMBLY**
   (a) Remove the 2 nuts.

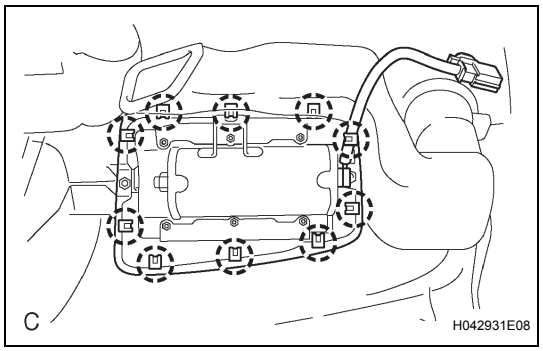


   (b) Detach the 10 claws and remove the front passenger airbag.



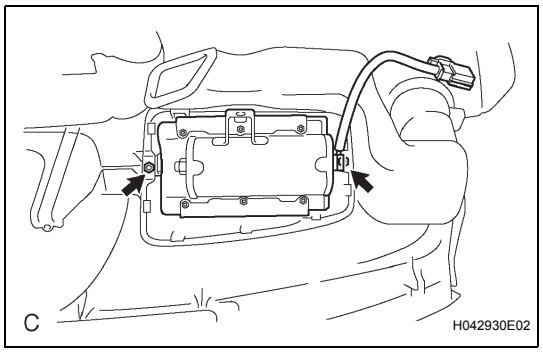
INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-28).



1. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

(a) Attach the 10 claws to install the front passenger airbag.



(b) Install the 2 nuts.

2. INSTALL INSTRUMENT PANEL SUB-ASSEMBLY

(a) Install the instrument panel (see pageIP-10).

NOTICE:
When handling the airbag connector, do not damage the airbag wire harness.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION

(a) Perform initialization (see pageIN-23).

NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

5. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

RS

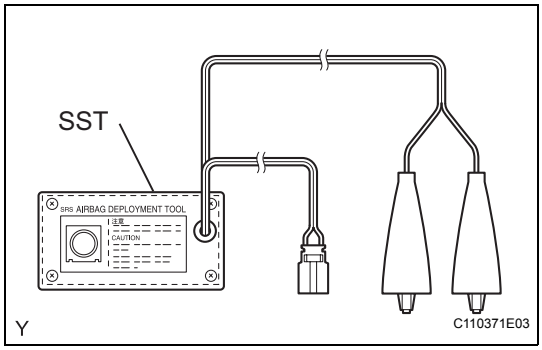
RS

DISPOSAL

HINT:
When scrapping a vehicle equipped with an SRS or disposing of the front passenger airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a front passenger airbag with an unactivated airbag.**
- **The airbag produces a loud, exploding sound when it activates. Perform the operation where it will not be a nuisance to people nearby.**
- **When activating the airbag, always use the specified SST (SRS airbag deployment tool).**
- **Perform procedures in a place away from electrical interference.**
- **When activating the airbag, stand at least 10 m (33 ft.) away from the airbag.**
- **The airbag becomes very hot when it is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

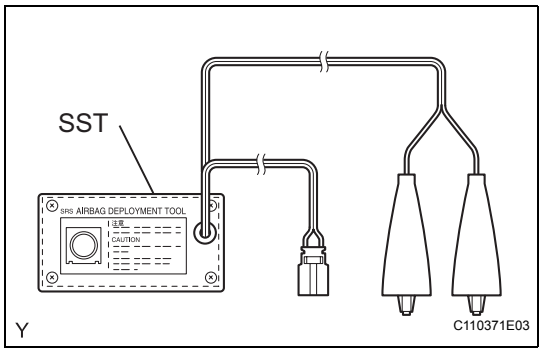


1. DISPOSE OF FRONT PASSENGER AIRBAG ASSEMBLY TOGETHER WITH VEHICLE

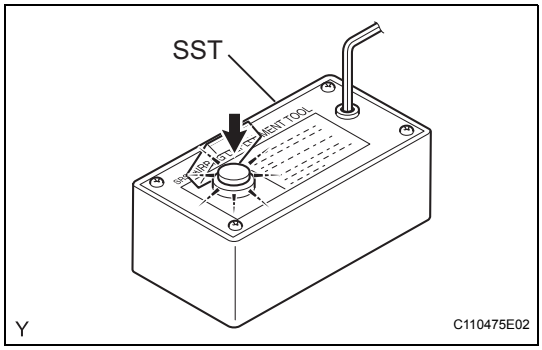
HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check if SST is functioning properly.
SST 09082-00700

(1) Connect the SST's red clip to the positive (+) battery terminal and the black clip to the negative (-) battery terminal.
HINT:
The yellow connector will be used to connect to another SST in a later step.



(2) Press the SST activation switch, and check that the LED of the SST activation switch illuminates.
CAUTION:
If the LED illuminates when the activation switch is not pressed, SST may have a malfunction, in which case that SST should not be used.

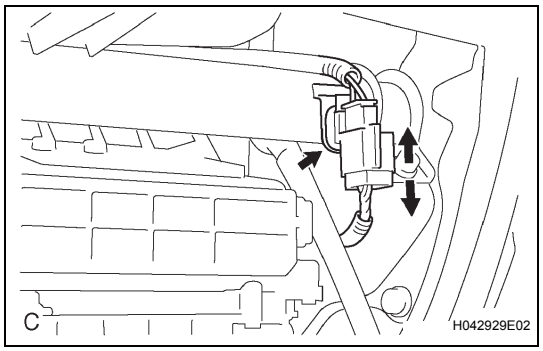


(3) Disconnect SST from the battery.

(b) Follow the "Precaution" (see page RS-1).

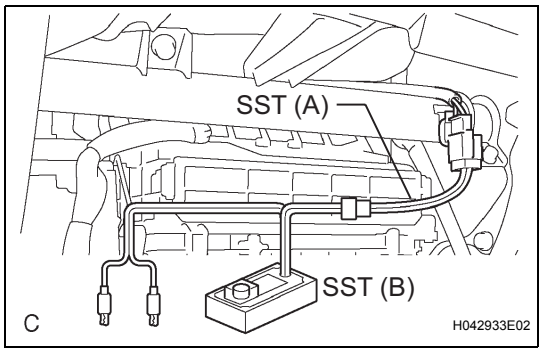
(c) Disconnect the cable from the negative (-) battery terminal.
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

(d) Remove the glove compartment door (see page IP-4).

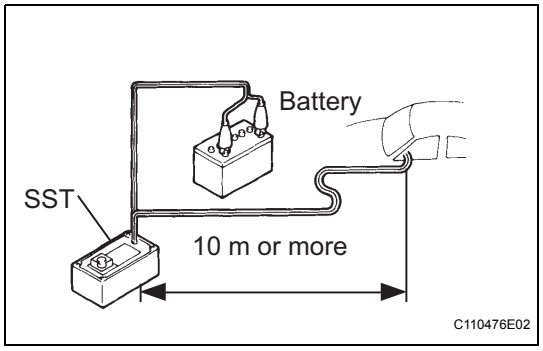


(e) Install SST.

(1) Disconnect the front passenger airbag connector.
NOTICE:
When handling the airbag connector, do not damage the airbag wire harness.



(2) Connect SST (A) to SST (B). Then connect SST (B)'s connector to the cable.
SST 09082-00700, 09082-00780
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move SST at least 10 m (33 ft.) away from the front side window.

(4) Maintain a small opening in the front side window for the SST wire harness. Close the remaining windows of the vehicle. Close all doors.
NOTICE:
Take care not to damage the SST wire harness.

(5) Connect the SST red clip to the positive (+) battery terminal and the black clip to the negative (-) battery terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (33 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The airbag becomes extremely hot when it is deployed. Do not touch it for at least 30 minutes after deployment.**

RS

- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

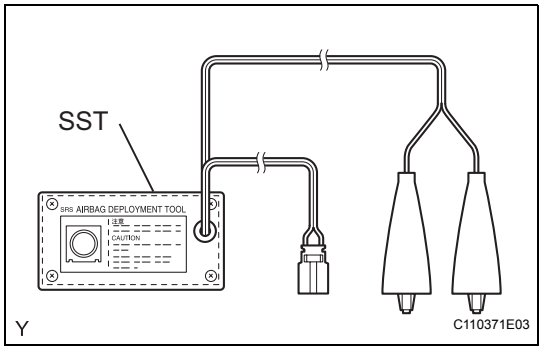
HINT:
The airbag is deployed as the SST activation switch LED illuminates.

2. DISPOSE OF ONLY FRONT PASSENGER AIRBAG ASSEMBLY

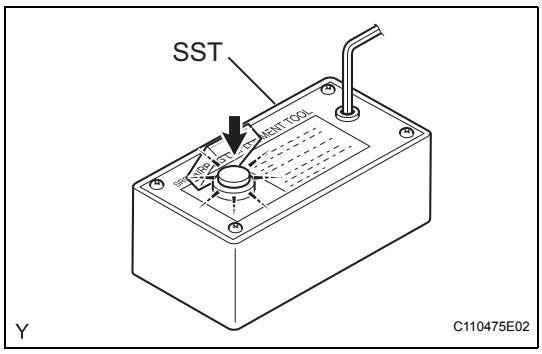
NOTICE:

- **When disposing of the airbag, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.



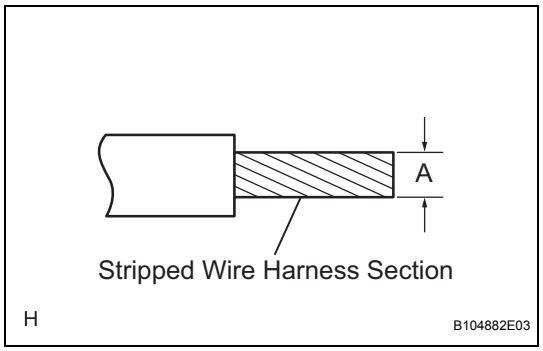
(a) Check if SST is functioning properly.
SST 09082-00700
(1) Connect the SST red clip to the positive (+) battery terminal and the black clip to the negative (-) battery terminal.
HINT:
The yellow connector will be used to connect to another SST in a later step.



(2) Press the SST activation switch, and check that the LED of the SST activation switch illuminates.
CAUTION:
If the LED illuminates when the activation switch is not pressed, SST may have a malfunction, in which case that SST should not be used.
(3) Disconnect SST from the battery.

(b) Remove the front passenger airbag (see page RS-301).
CAUTION:

- **When removing the airbag, work must be started at least 90 seconds after the ignition switch is turned OFF and after the cable is disconnected from the negative (-) battery terminal.**
- **When storing the airbag, keep the airbag deployment side facing upward.**



(c) Using service wire harnesses for the vehicle, tie down the airbag to a tire.

Wire harness:

Stripped wire harness section

A:

1.25 mm^2 or more (0.0019 in.^{2} or more)

NOTICE:

Use a tire that you are planning to throw away, as the airbag deployment may damage the tire.

CAUTION:

Do not use wire harnesses that are too thin or any other substitute items to tie down the front passenger airbag assembly. They may snap when the airbag deploys. Always use vehicle wire harnesses that have an area of at least 1.25 mm^2 (0.0019 in.^{2}).

HINT:

To calculate the area of the stripped wire harness section:

Area = 3.14 x Diameter^2 /4

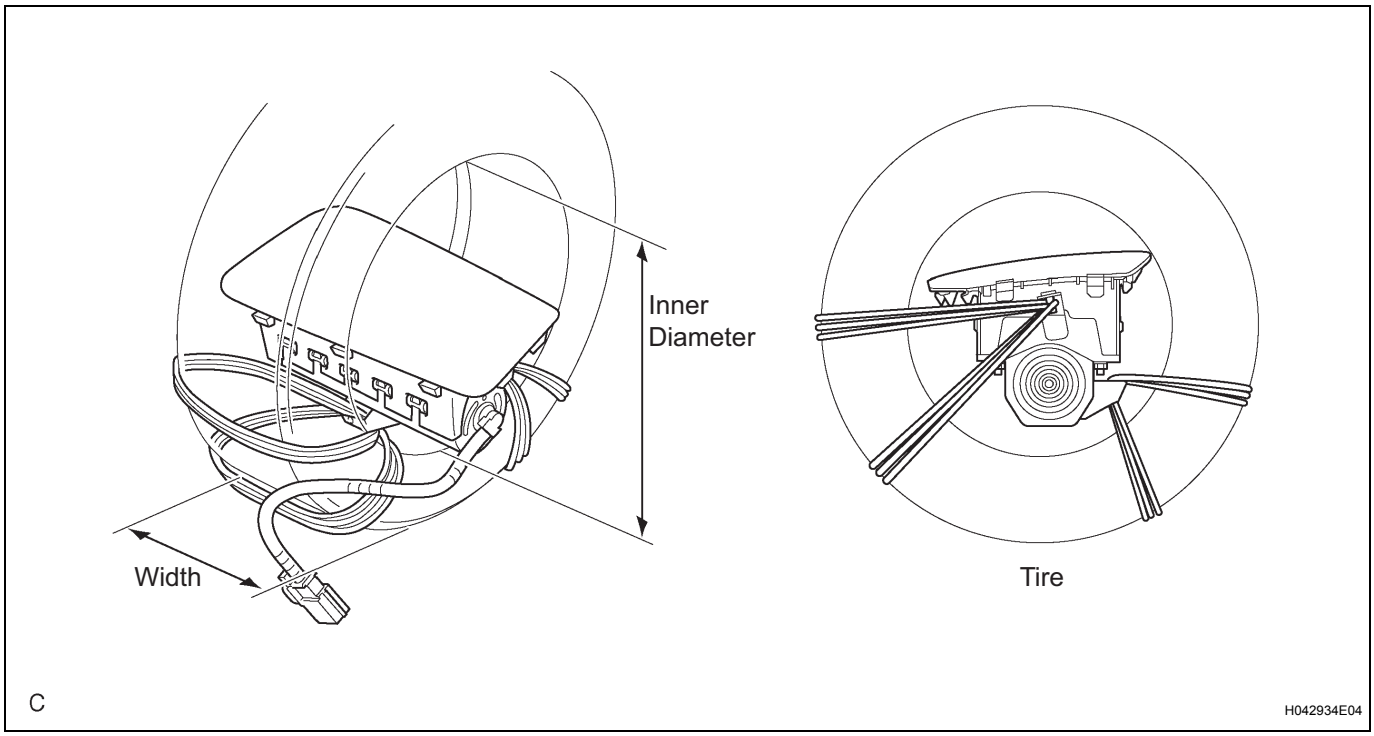
(1) Position the airbag inside the tire so that the brackets contact the tire.

Tire size:

Width minimum: 185 mm (7.28 in.)

Inner diameter minimum: 360 mm (14.17 in.)

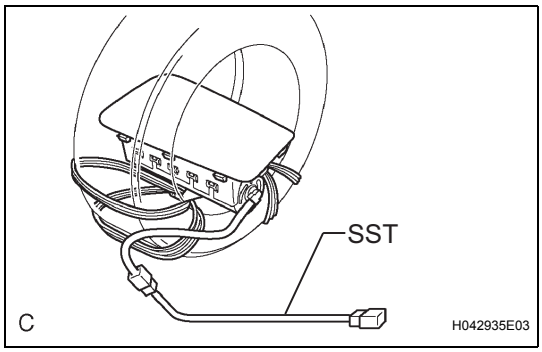
(2) Wind 3 wire harnesses at least twice around the airbag brackets and tire.



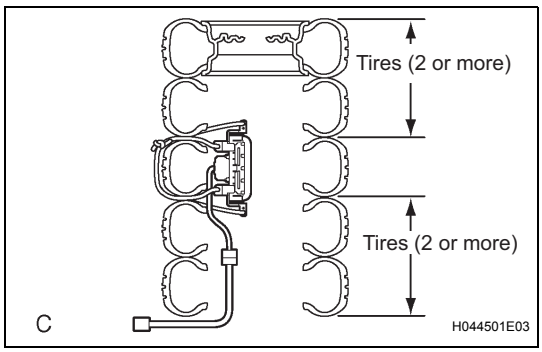
CAUTION:

- **Tightly wind the wire harnesses around the brackets so that there is no slack.**

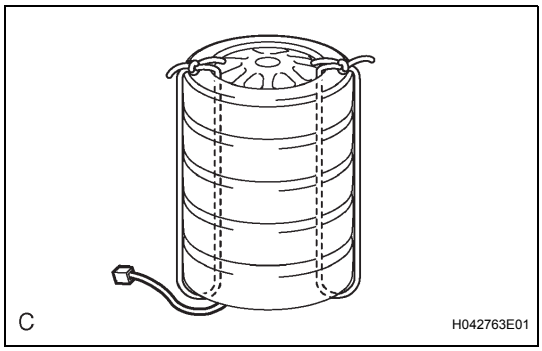
- **Make sure that the wire harnesses are tight. If there is slack in a wire harness, the airbag may come loose when it is deployed.**
- **Always tie down the airbag with the airbag deployment side facing inside the tire.**



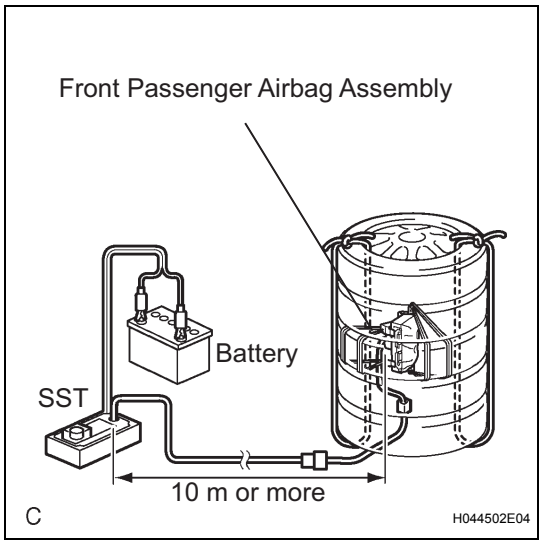
(d) Install SST.
(1) Connect the SST connector to the airbag.
SST 09082-00780



(e) Place the tires.
(1) Place at least 2 tires under the tire to which the airbag is tied.
(2) Place at least 2 tires on top of the tire to which the airbag is tied. The top tire should have a disc wheel installed.
NOTICE:
- **Do not place the SST connector under the tire as the connector may be damaged.**
- **Use a disc wheel that you are planning to throw away, as the airbag deployment will damage the disc wheel.**
- **Use tires that you are planning to throw away, as the airbag deployment may damage the tires.**

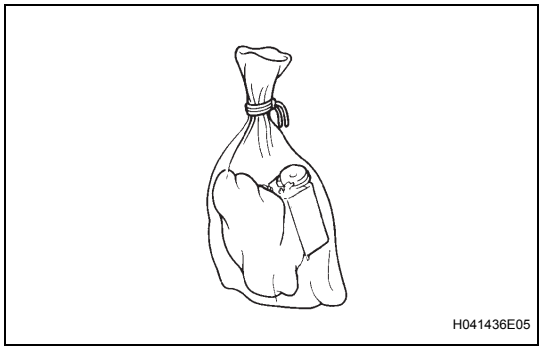


(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harnesses are tight. If there is slack in a wire harness, the tires may come loose when the airbag is deployed.



(f) Install SST.
(1) Connect the SST connector.
SST 09082-00700
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

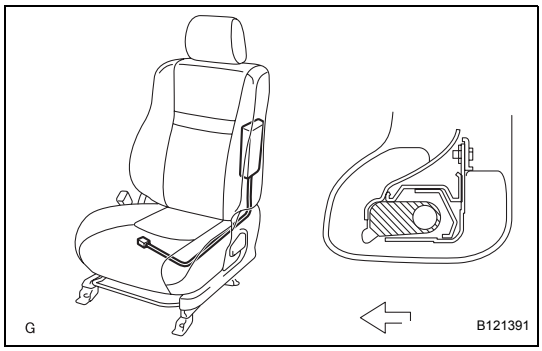
(g) Deploy the airbag.
(1) Connect the SST red clip to the positive (+) battery terminal and the black clip to the negative (-) battery terminal.
(2) Check that no one is within a 10 m (33 ft.) radius of the airbag.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tires.
HINT:
The airbag is deployed as the SST activation switch LED illuminates.



(h) Dispose of the airbag.
CAUTION:
- **The airbag becomes extremely hot when it is deployed. Do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the airbag from the tire.
(2) Place the airbag in a plastic bag, tie it tightly and dispose of it in the same way as other general parts.

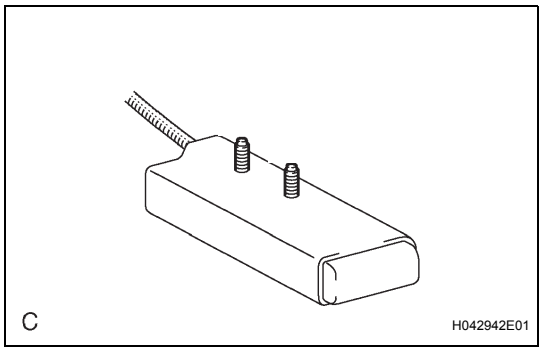
RS



FRONT SEAT SIDE AIRBAG ASSEMBLY

ON-VEHICLE INSPECTION

1. **CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (see page RS-33).
   (b) With the front seat airbag installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front seat assembly with a new one:
   Cuts, minute cracks or marked discoloration on the front seatback assembly around the front seat airbag assembly.
   CAUTION:
   For removal and installation procedures of the front seat airbag, be sure to follow the correct procedures.



2. **CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)**
   (a) Perform a diagnostic system check (see page RS-33).
   (b) With the front seat airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front seat airbag with a new one:
   - Cuts, minute cracks or marked discoloration on the front seat airbag.
   - Cracks or other damage to the wire harness or connector.

   CAUTION:
   For removal and installation procedures of the front seat airbag, be sure to follow the correct procedures.

DISPOSAL

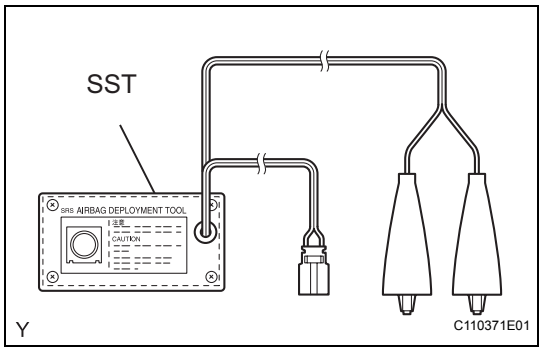
HINT:
When scrapping a vehicle equipped with an SRS or disposing of the front seat airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

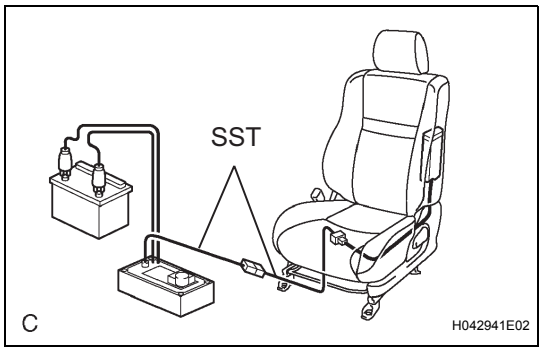
- **Never dispose of a front seat airbag assembly that has an unactivated airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool).**
- **Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft.) away from the airbag assembly.**
- **The airbag becomes very hot when it is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

1. DISPOSE OF FRONT SEAT SIDE AIRBAG ASSEMBLY TOGETHER WITH VEHICLE

HINT:
Prepare a battery as the power source to deploy the airbag.

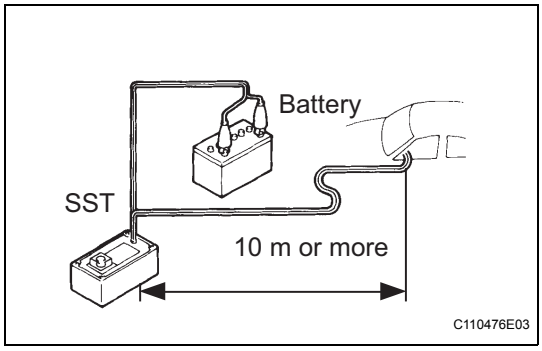


(a) Check if SST is functioning properly (see page RS-289).
(b) Follow the "Precaution" (see page RS-1).
(c) Disconnect the cable from the negative (-) battery terminal. Wait at least 90 seconds after disconnecting the cable to prevent the airbag from deploying.
(d) Remove the front seat (see page SE-3).
HINT:
Keep the front seat assembly in the cabin.
(e) Install the SST.
(1) Disconnect the yellow connector from the front seat airbag.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.



(2) Connect the SST connector to the front seat airbag connector.
SST 09082-00700, 09082-00750
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

(3) Install the front seat (see page SE-9).



(4) Move the SST at least 10 m (33 ft.) away from the vehicle front side window.

(5) Maintaining enough clearance for the SST wire harness in the front side window, close all the doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.

(6) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.

(f) Deploy the airbag.

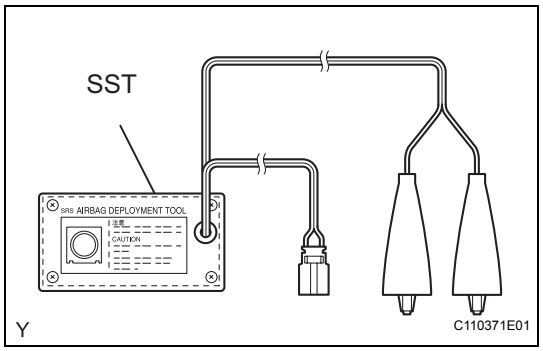
(1) Check that no one is inside the vehicle or within a 10 m (33 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The airbag becomes very hot when it is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

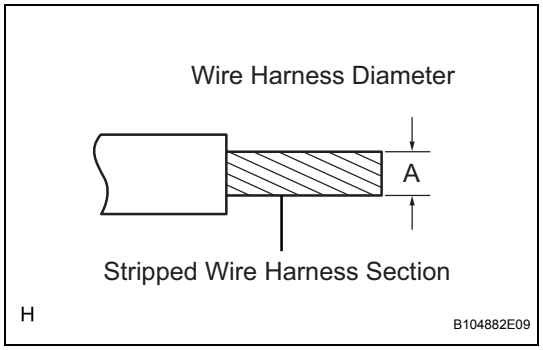
2. DISPOSE OF ONLY FRONT SEAT SIDE AIRBAG ASSEMBLY
NOTICE:
- **When disposing of the front seat airbag, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

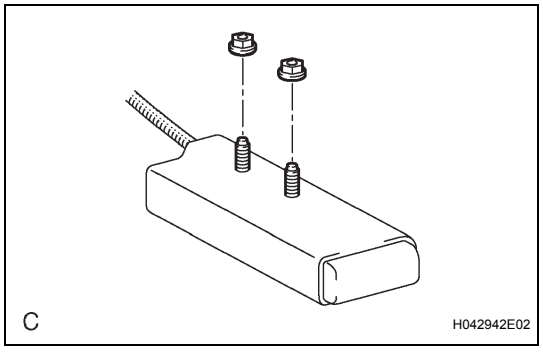


(a) Check if SST is functioning properly (see page RS-289).

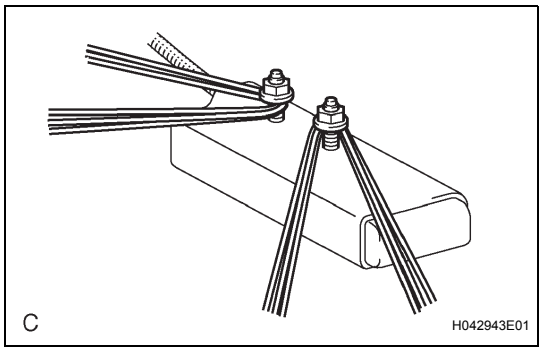
(b) Remove the front seat airbag.
   (1) Remove the front seat (see page SE-3).
   (2) Remove the 2 nuts and the front seat airbag from the seatback assembly.
   CAUTION:
   - **When removing the front seat airbag, work must be started at least 90 seconds after the ignition switch is turned OFF and the negative (-) terminal cable is disconnected from the battery.**
   - **When storing the front seat airbag, keep the airbag deployment side facing upward.**



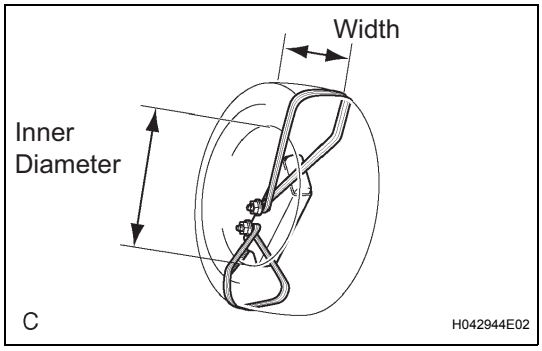
(c) Using a service wire harness for the vehicle, tie down the front seat airbag to the tire.
Wire harness:
Stripped wire harness section
A:
1.25 mm^2 or more (0.0019 $in.^2$ or more)
HINT:
To calculate the area of the stripped wire harness section:
Area = 3.14 x $Diameter^2/4$
CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the front seat airbag, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).



   (1) Install the 2 nuts to the front seat airbag.



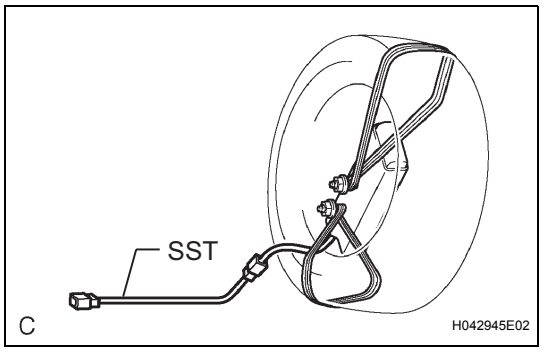
(2) Wind the wire harness around the stud bolts of the front seat airbag as shown in the illustration.



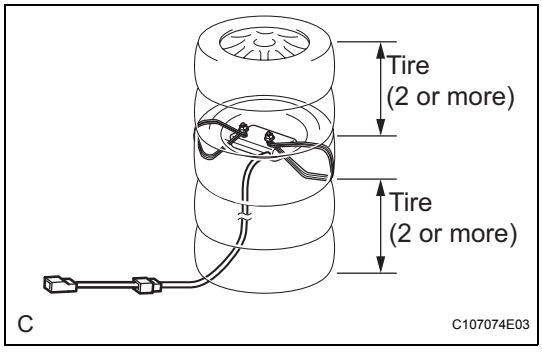
(3) Position the front seat airbag inside the tire.
Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)
CAUTION:
- **Make sure that the wire harness is tight. If there is slack in the wire harness, the front seat airbag may become loose due to the shock when the airbag is deployed.**
- **Always tie down the front seat airbag with the airbag deployment direction facing inside the tire.**

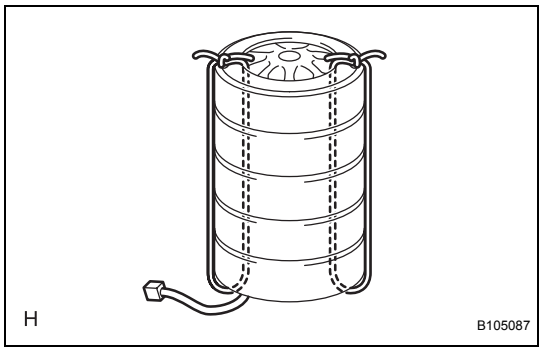
NOTICE:
Use tires that you are planning to throw away, as the airbag deployment may damage the tires.

(d) Install the SST.
(1) Connect the SST connector to the front seat airbag connector.
SST 09082-00750

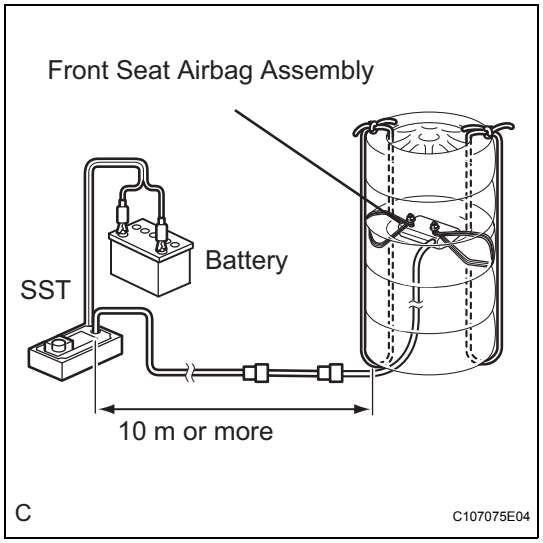


(e) Place the tires.
(1) Place at least 2 tires under the tire to which the front seat airbag is tied.
(2) Place at least 2 tires over the tire to which the front seat airbag is tied. The top tire should have a disc wheel installed.
NOTICE:
Do not place the SST connector under the tire because it could be damaged.



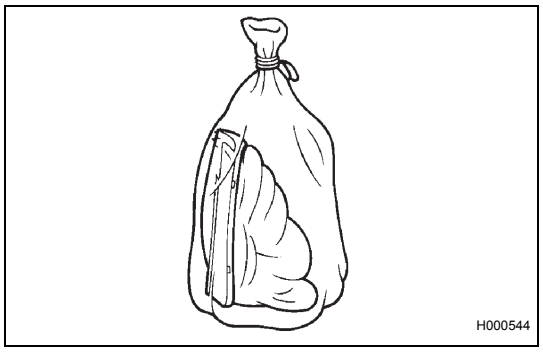


(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(f) Install the SST.
(1) Connect the SST connector.
SST 09082-00700
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(g) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
(2) Check that no one is within a 10 m (33 ft.) radius of the airbag.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tire.
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.



(h) Dispose of the front seat airbag assembly.
CAUTION:
- **The airbag becomes very hot when it is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the front seat airbag from the tire.
(2) Place the front seat airbag in a plastic bag, tie it tightly and dispose of it in the same way as other general parts.

RS

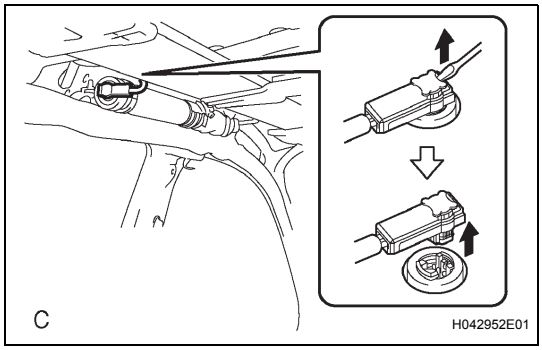
REMOVAL

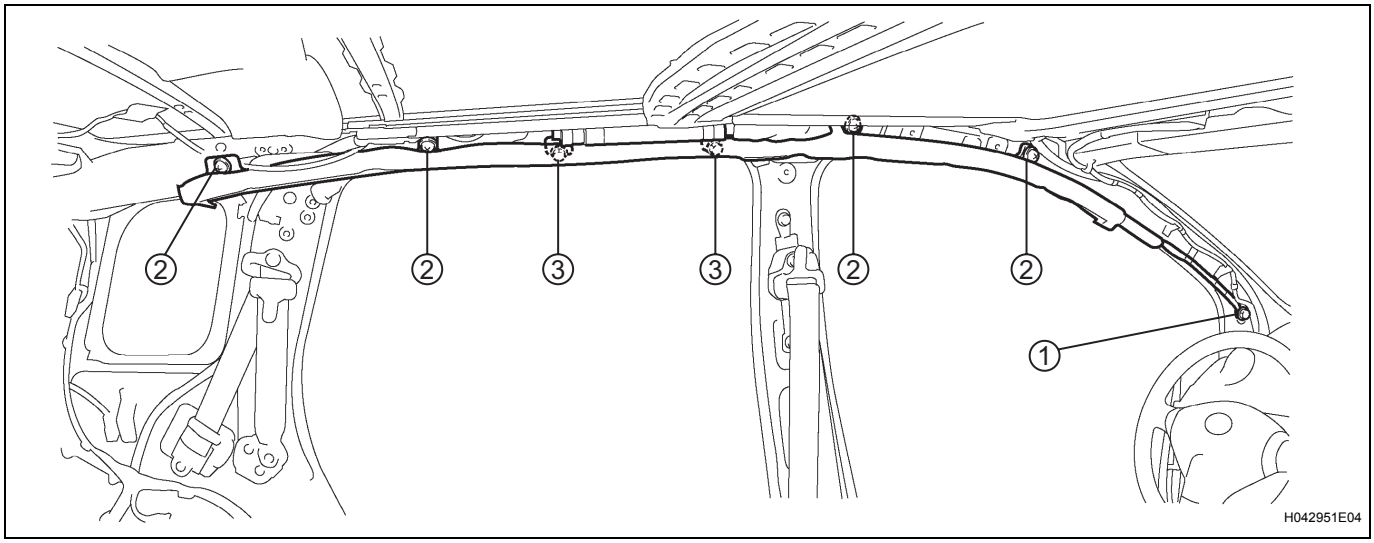
CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE ROOF HEADLINING ASSEMBLY**
   (a) Remove the roof headlining (see page IR-7).

3. **REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY**
   (a) Disconnect the connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
   (b) Remove the 3 bolts, 4 screws and curtain shield airbag in the order shown in the illustration.



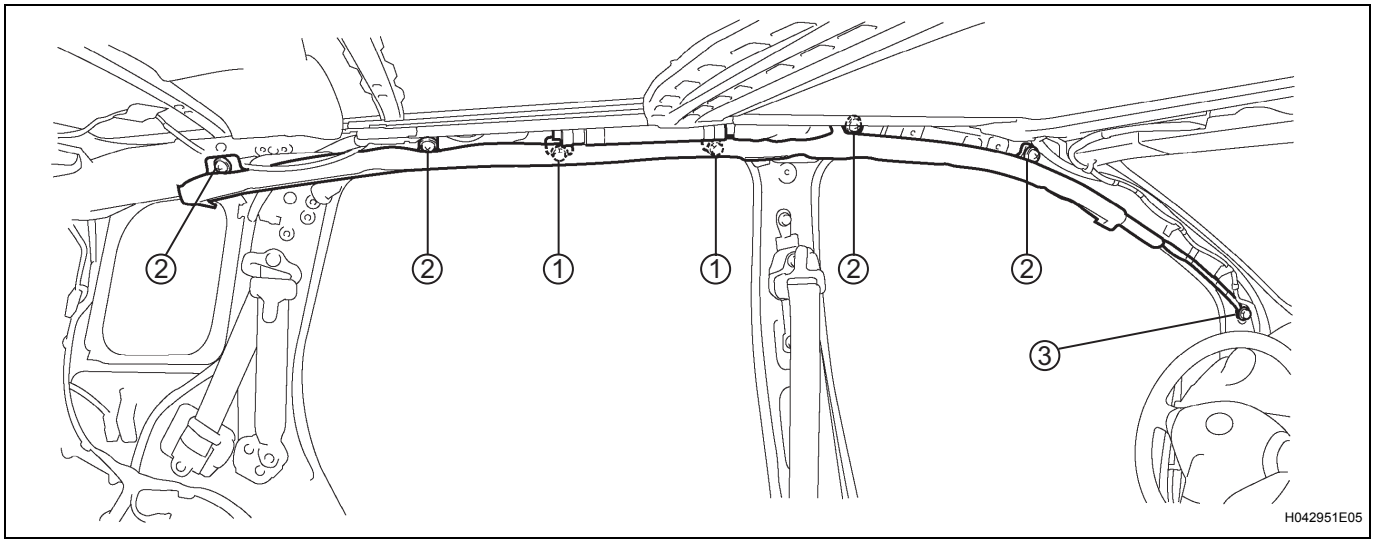


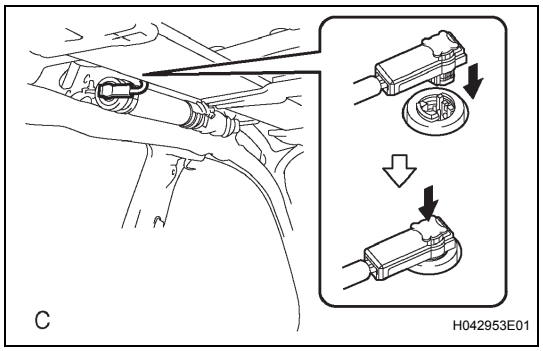
INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Install the curtain shield airbag with 3 new bolts and 4 new screws in the order shown in the illustration.
NOTICE:
Do not twist the curtain shield airbag assembly when installing it.
Torque: 14 N*m (143 kgf*cm, 10 ft.*lbf)





(b) Connect the connector.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

2. INSTALL ROOF HEADLINING ASSEMBLY

(a) Install the roof headlining (see page IR-12).

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

5. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

RS

DISPOSAL

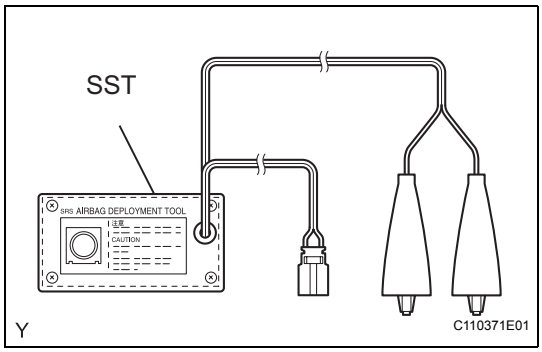
HINT:
When scrapping a vehicle equipped with an SRS or disposing of the curtain shield airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

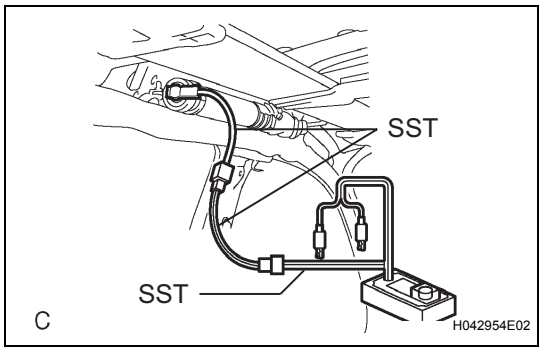
- **Never dispose of a curtain shield airbag that has an unactivated airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool).**
- **Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft.) away from the airbag.**
- **The airbag becomes very hot when it is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

1. DISPOSE OF CURTAIN SHIELD AIRBAG ASSEMBLY TOGETHER WITH VEHICLE

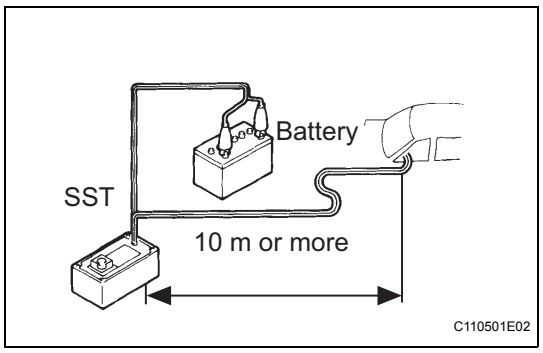
HINT:
Prepare a battery as the power source to deploy the airbag.



(a) Check if SST is functioning properly (see page RS-289).
(b) Follow the "Precaution" (see page RS-1).
(c) Disconnect the cable from the negative battery terminal. Wait at least 90 seconds after disconnecting the cable to prevent the airbag from deploying.
(d) Remove the roof headlining assembly (see page IR-7).
(e) Install the SST.
  (1) Disconnect the connector from the curtain shield airbag.
  NOTICE:
  When handling the airbag connector, take care not to damage the airbag wire harness.



(2) After connecting the SST to each other, connect them to the curtain shield airbag.
SST 09082-00700, 09082-00802 (09082-10801, 09082-20801)
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



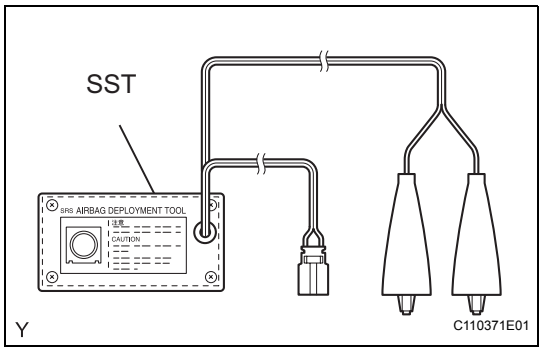
(3) Move the SST at least 10 m (33 ft.) away from the vehicle rear side window.
(4) Maintaining enough clearance for the SST wire harness in the rear side window, close all the doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.
(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.

(f) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft.) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The airbag becomes very hot when it is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

2. DISPOSE OF ONLY CURTAIN SHIELD AIRBAG ASSEMBLY
NOTICE:
- **When disposing of the curtain shield airbag, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

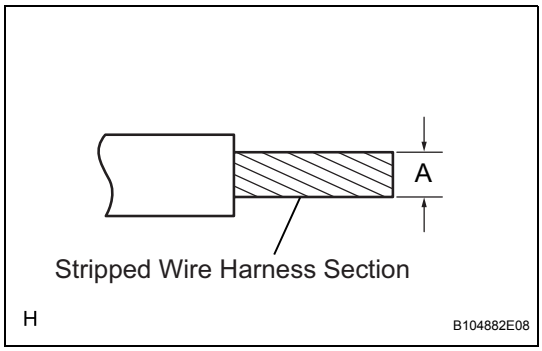


(a) Check if SST is functioning properly (see page RS-289).

(b) Remove the curtain shield airbag assembly (see page RS-311).

CAUTION:
When removing the curtain shield airbag, work must be started at least 90 seconds after the ignition switch is turned OFF and the negative (-) terminal cable is disconnected from the battery.

(c) Cut off the deployment section of the curtain shield airbag.



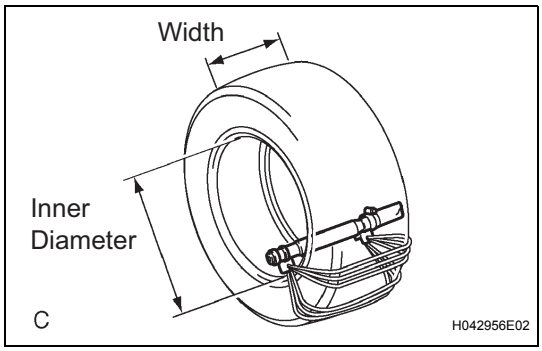
(d) Using a service wire harness for the vehicle, tie down the curtain shield airbag to the tire.

Wire harness:
Stripped wire harness section
A:
1.25 mm^2 or more (0.0019 in.^{2} or more)

CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the curtain shield airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 in.^{2}).

HINT:
To calculate the area of the stripped wire harness section:

Area = 3.14 x Diameter^2/4

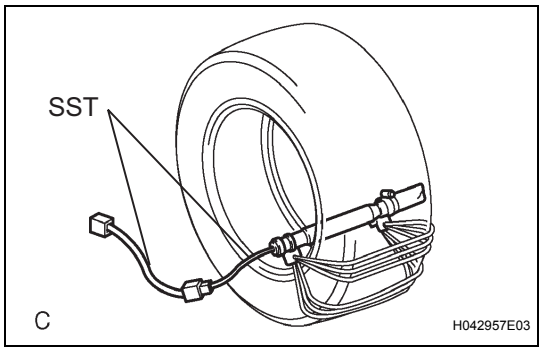


(1) Position the curtain shield airbag inside the tire as shown in the illustration.

Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)

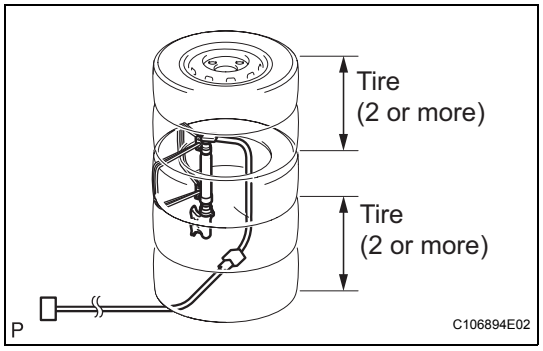
CAUTION:
Make sure that the wire harness is tight. If there is slack in the wire harness, the curtain shield airbag assembly may become loose due to the shock when the airbag is deployed.

NOTICE:
Use tires that you are planning to throw away, as the airbag deployment may damage the tires.

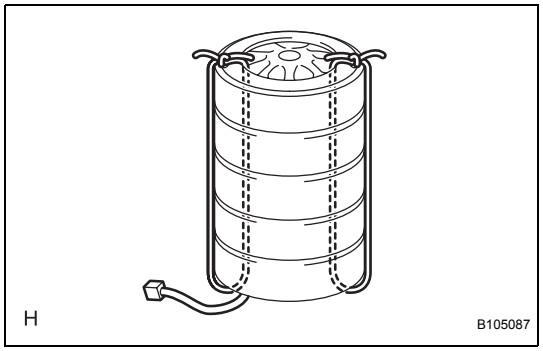


(e) Install the SST.
(1) After connecting the SST to each other, connect them to the curtain shield airbag.
SST 09082-00802 (09082-10801, 09082-20801)

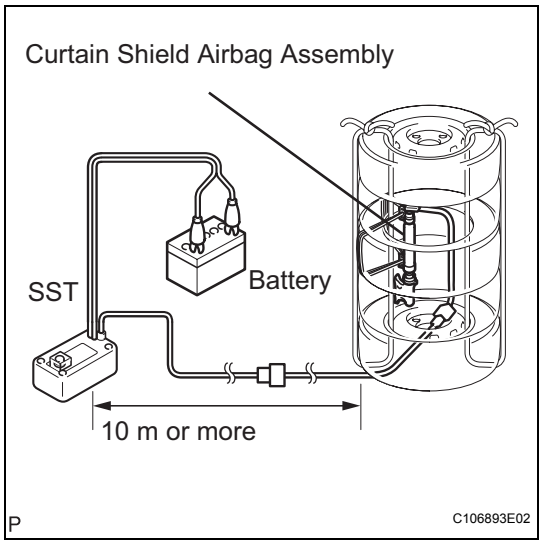
(f) Place the tires.
CAUTION:
Place the curtain shield airbag so that its deployment direction is away from the ground.



(1) Place at least 2 tires under the tire to which the curtain shield airbag is tied.
(2) Place at least 2 tires over the tire to which the curtain shield airbag is tied. The top tire should have a disc wheel installed.
NOTICE:
Do not place the SST connector under the tire because it could be damaged.



(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness may result in the tires coming free due to the shock when the airbag is deployed.

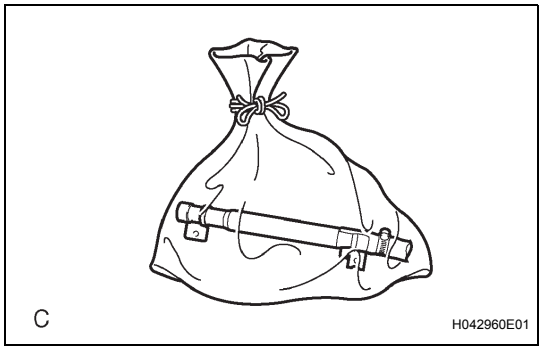


(g) Install the SST.
(1) Connect the SST connector.
SST 09082-00700
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(h) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
(2) Check that no one is within a 10 m (33 ft.) radius of the airbag.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tire.

RS

HINT:
The airbag is deployed as the LED of the SST activation switch comes on.



(i) Dispose of the curtain shield airbag.
CAUTION:
- **The airbag becomes very hot when it is deployed. Do not touch it for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a deployed airbag.**
- **Do not apply water to a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

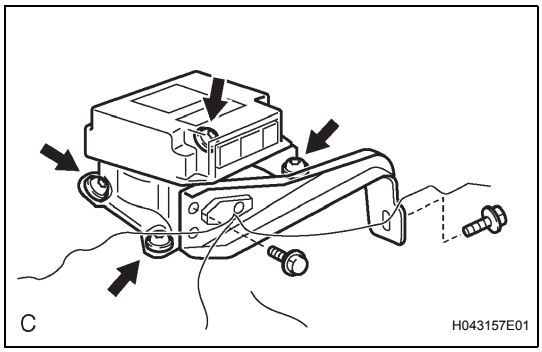
(1) Remove the curtain shield airbag from the tire.
(2) Place the curtain shield airbag in a plastic bag, tie it tightly and dispose of it in the same way as other general parts.

RS

REMOVAL

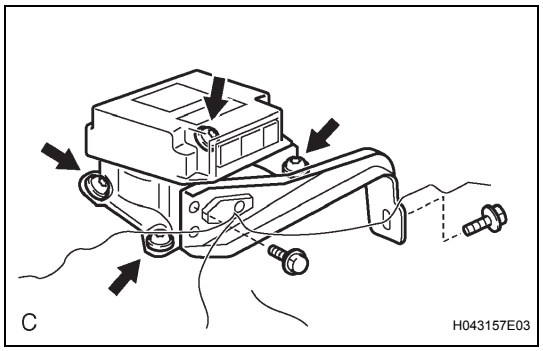
CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY**
   (a) Remove the instrument panel (see pageIP-4).
3. **REMOVE LOWER INSTRUMENT PANEL ASSEMBLY**
   (a) Remove the lower instrument panel (see pageIP-17).
4. **REMOVE REAR NO. 2 AIR DUCT**
5. **REMOVE REAR NO. 1 AIR DUCT**
6. **REMOVE CENTER AIRBAG SENSOR ASSEMBLY**
   (a) Remove the 2 bolts and instrument panel mounting bracket.
   (b) Disconnect the airbag sensor connectors.
   (c) Using a T40 "torx" socket, remove the 4 screws and airbag sensor.



INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).



1. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY**
   (a) Using a T40 "torx" socket, install the airbag sensor with the 4 screws.
   Torque: 20 N*m (200 kgf*cm, 14 ft.*lbf)
   CAUTION:
   - **If the airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

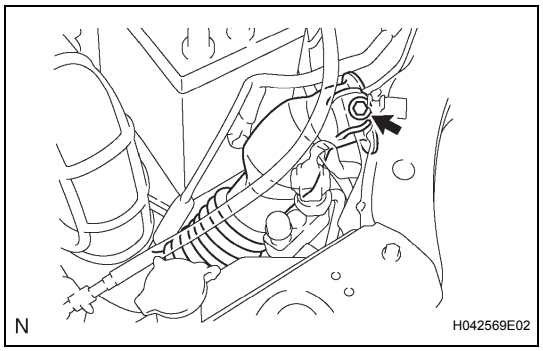
   (b) Connect the airbag sensor connectors.
   (c) Install the instrument panel mounting bracket with the 2 bolts.
2. **INSTALL REAR NO. 2 AIR DUCT**
3. **INSTALL REAR NO. 1 AIR DUCT**
4. **INSTALL LOWER INSTRUMENT PANEL ASSEMBLY**
   (a) Install the lower instrument panel (see page IP-22).
5. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY**
   (a) Install the instrument panel (see page IP-10).
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
8. **CHECK SRS WARNING LIGHT**
   (a) Check the SRS warning light (see page RS-28).

RS

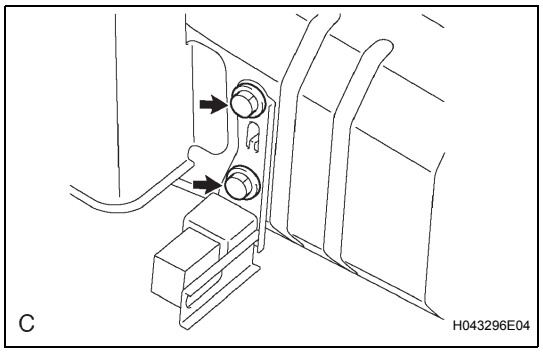
REMOVAL

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

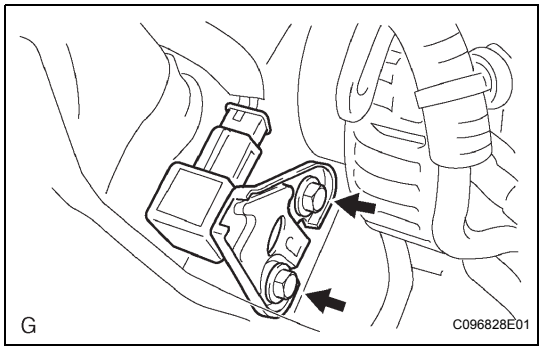
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



2. REMOVE NO. 1 AIR CLEANER INLET
(a) Remove the bolt and air cleaner inlet.



3. REMOVE FRONT AIRBAG SENSOR LH
(a) Disconnect the sensor connector.
(b) Remove the 2 bolts and sensor.

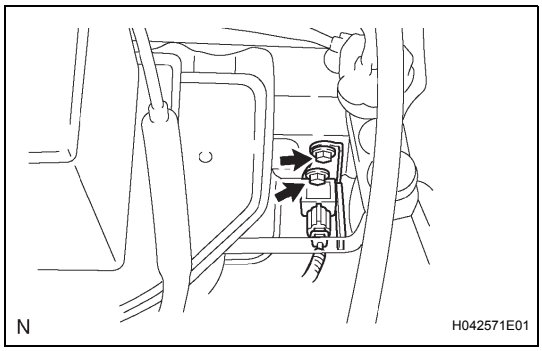


4. REMOVE FRONT AIRBAG SENSOR RH
(a) Disconnect the sensor connector.
(b) Remove the 2 bolts and sensor.

RS

INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

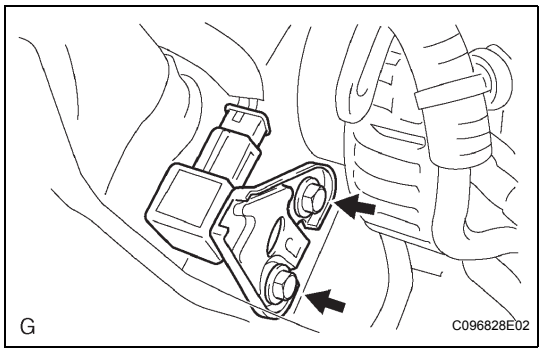


1. INSTALL FRONT AIRBAG SENSOR LH

(a) Install the sensor with the 2 bolts.
Torque: 17.5 N*m (178 kgf*cm, 13 ft.*lbf)
CAUTION:
- **If the airbag sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace it with a new one.**
- **When installing the airbag sensor, make sure that the SRS wiring does not interfere with other parts and is not pinched between other parts.**

(b) Check that there is no free play in the installation parts of the sensor.

(c) Connect the sensor connector.

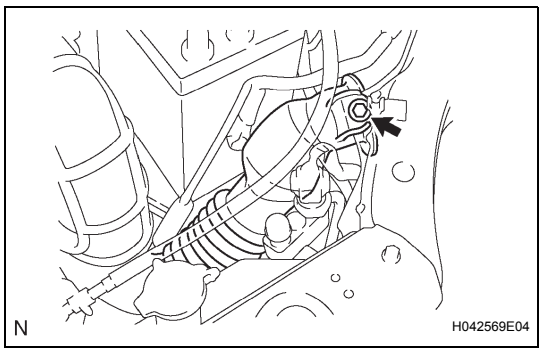


2. INSTALL FRONT AIRBAG SENSOR RH

(a) Install the sensor with the 2 bolts.
Torque: 17.5 N*m (178 kgf*cm, 13 ft.*lbf)
NOTICE:
- **If the airbag sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace it with a new one.**
- **When installing the airbag sensor, make sure that the SRS wiring does not interfere with other parts and is not pinched between other parts.**

(b) Check that there is no free play in the installation parts of the sensor.

(c) Connect the sensor connector.



3. INSTALL NO. 1 AIR CLEANER INLET

(a) Install the air cleaner inlet with the bolt.

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. PERFORM INITIALIZATION

(a) Perform initialization (see pageIN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

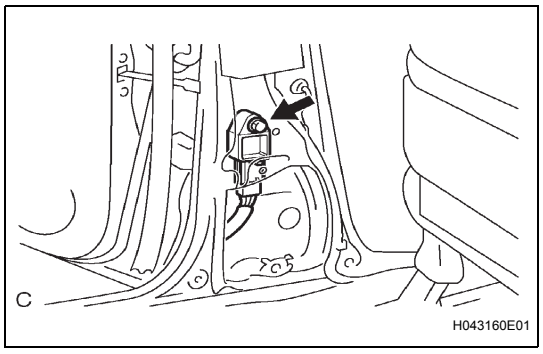
6. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

REMOVAL

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
   HINT:
   - Use the same procedures for the RH side and LH side.
   - The procedures listed below are for the LH side.
2. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-7)**
3. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-7)**
4. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
5. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**
6. **REMOVE CENTER PILLAR GARNISH LOWER LH (See page IR-8)**
7. **REMOVE FRONT SEAT OUTER BELT ASSEMBLY LH (See page SB-9)**
8. **REMOVE SIDE AIRBAG SENSOR ASSEMBLY LH**
   (a) Remove the nut and sensor.
   (b) Disconnect the connector.



RS

INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **INSTALL SIDE AIRBAG SENSOR ASSEMBLY LH**
   (a) Install the sensor with the nut.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
   CAUTION:
   - **If the airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

   (b) Check that there is no looseness in the installation parts of the sensor.
   (c) Connect the connector.
2. **INSTALL FRONT SEAT OUTER BELT ASSEMBLY LH (See page SB-10)**
3. **INSTALL CENTER PILLAR GARNISH LOWER LH (See page IR-16)**
4. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH**
5. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
6. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-17)**
7. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-17)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
10. **CHECK SRS WARNING LIGHT**
    (a) Check the SRS warning light (see page RS-28).

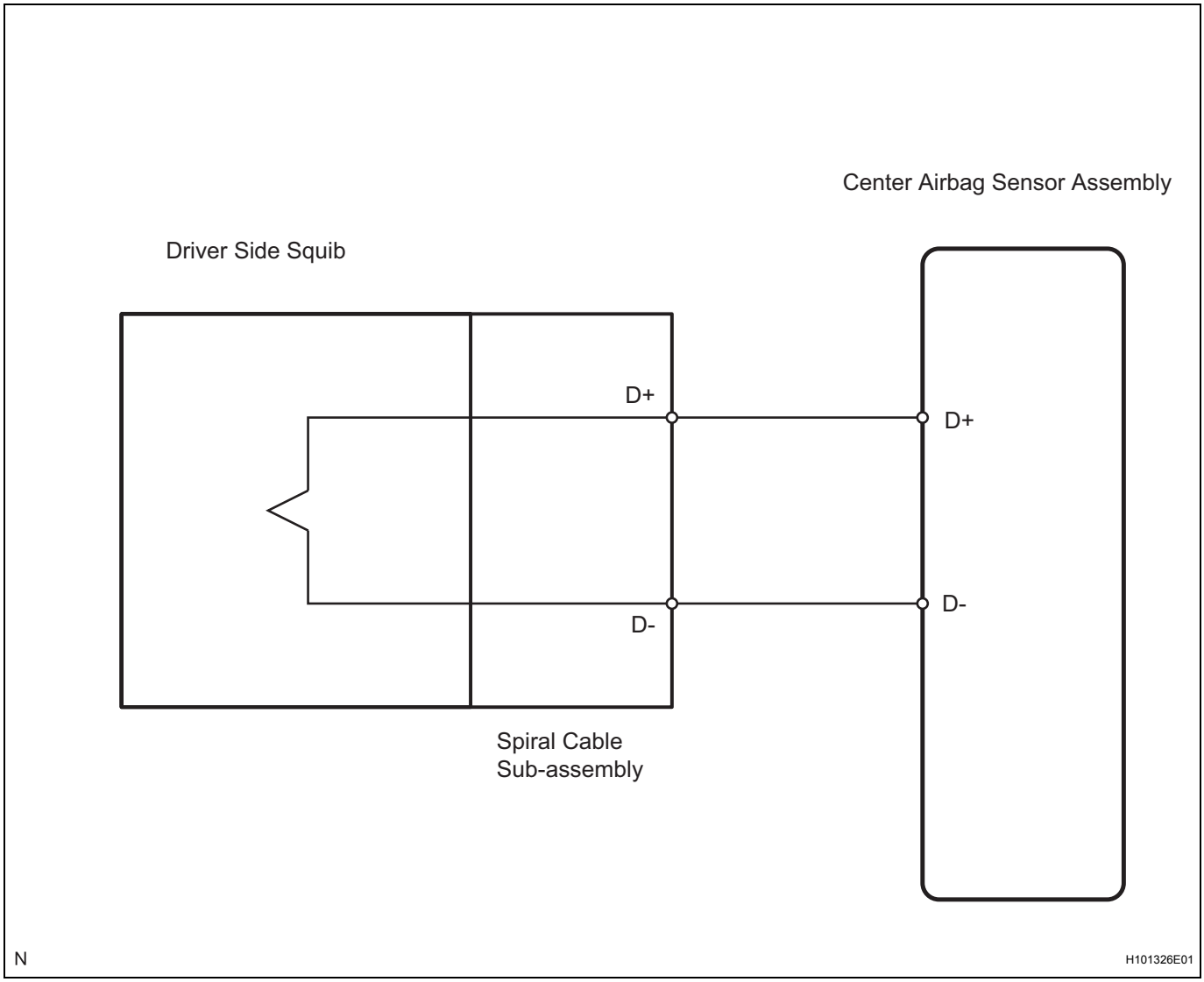
DTC	B0102/11	Short to GND in Driver Side Squib Circuit

DESCRIPTION

The driver side squib circuit consists of the center airbag sensor, the spiral cable and the steering pad. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0102/11 is recorded when a ground short is detected in the driver side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0102/11	• Short in driver side squib circuit (to ground) • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad (driver side squib) • Spiral cable sub-assembly • Center airbag sensor assembly • Instrument panel wire

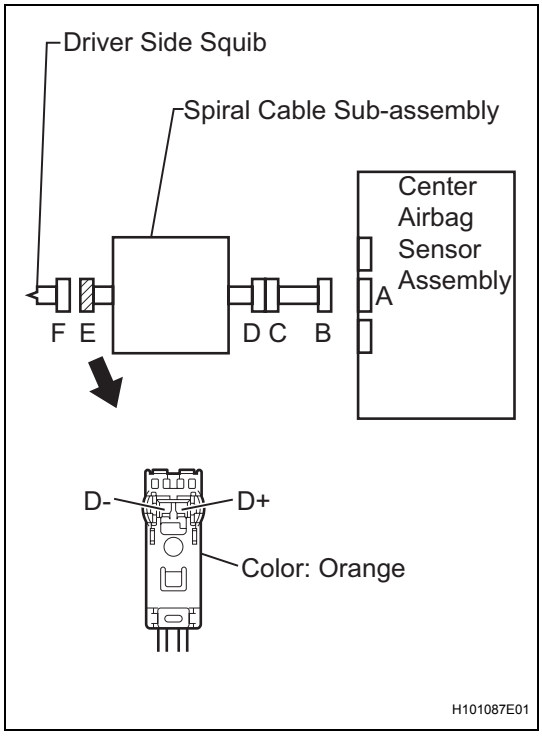
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR - STEERING PAD ASSEMBLY)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and steering pad.
(d) Measure the resistance according to the value(s) in the table below.

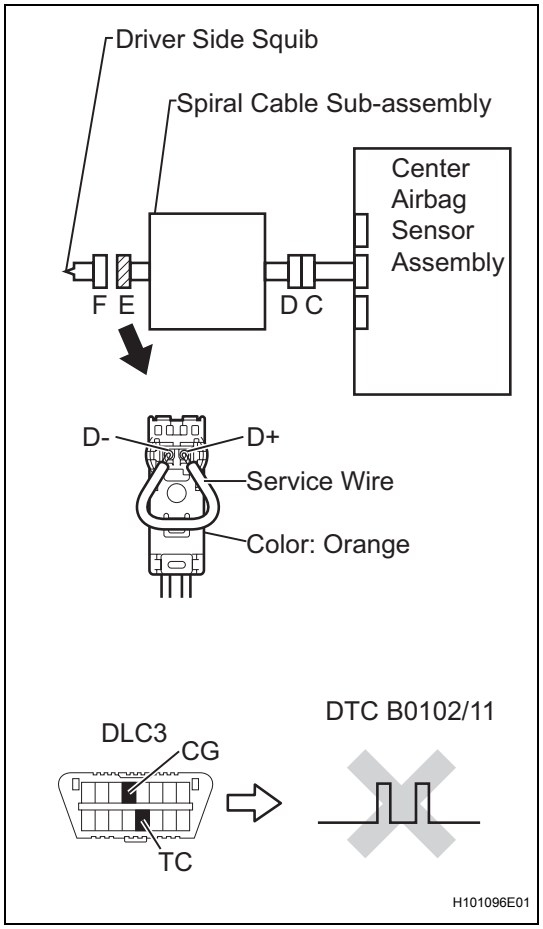
Standard resistance

Tester Connection (Connector "E")	Specified Condition
D+ - Body ground	1 MΩ or higher
D- - Body ground	1 MΩ or higher

NG → **Go to step 5**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Using a service wire, connect D+ and D- of the connector "E".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn the ignition switch to ON, and wait at least for 60 seconds.
(e) Clear the DTC stored in memory (see page RS-30).
(f) Turn the ignition switch to LOCK.
(g) Turn the ignition switch to ON, and wait at least for 60 seconds.
(h) Check DTC (see page RS-30).
OK:
DTC B0102/11 is not output.
HINT:
Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

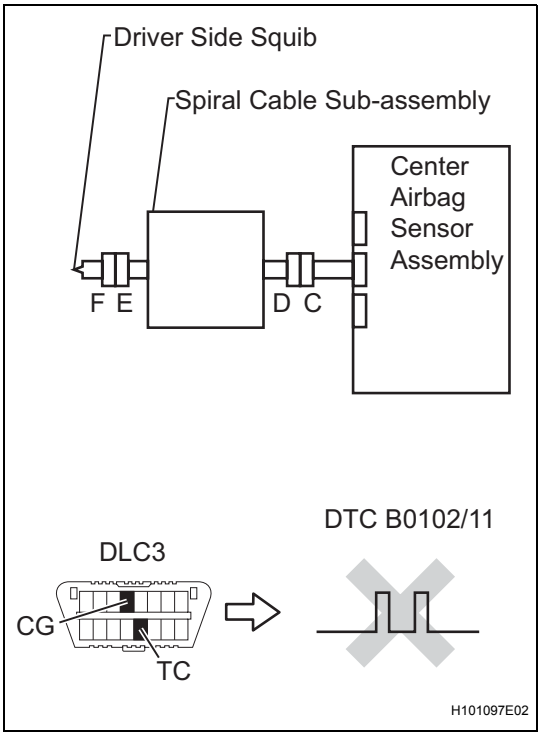
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

RS

RS

3	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "E".
(d) Connect the connectors to the steering pad.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0102/11 is not output.

HINT:

Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG → **REPLACE STEERING PAD ASSEMBLY**

OK

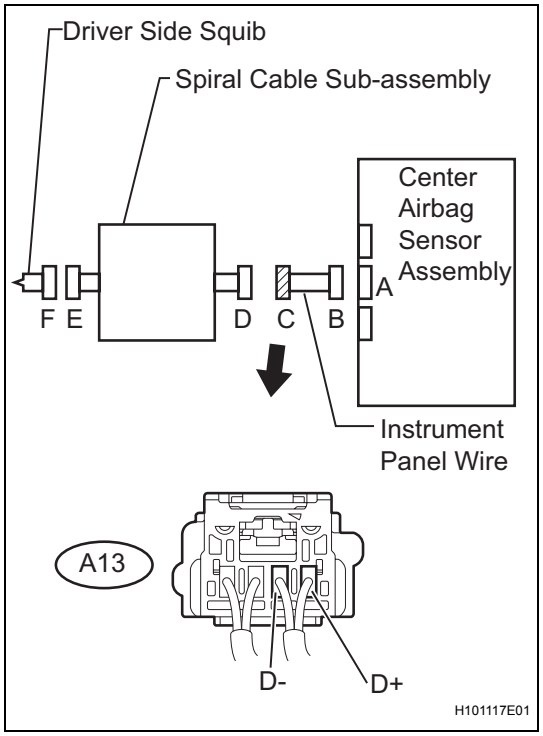
4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

5 CHECK INSTRUMENT PANEL WIRE



(a) Disconnect the instrument wire connector from the spiral cable.

(b) Measure the resistance according to the value(s) in the table below.

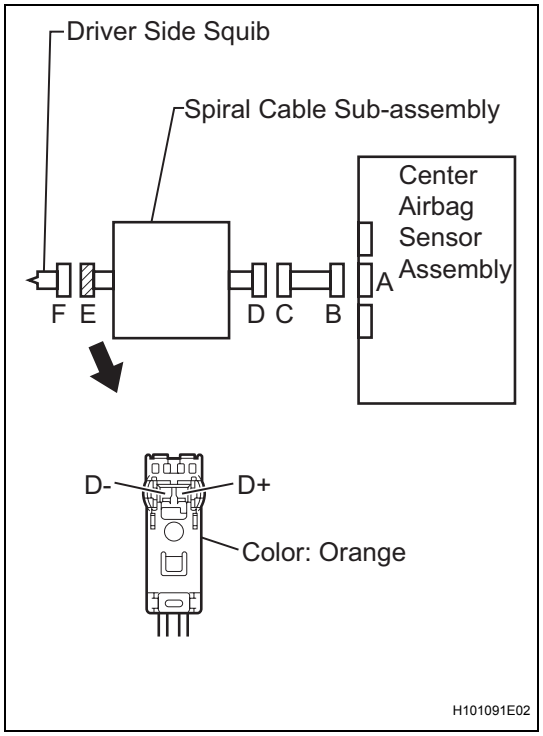
Standard resistance

Tester Connection (Connector "C")	Specified Condition
A13-1 (D+) - Body ground	1 MΩ or higher
A13-2 (D-) - Body ground	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Connector "E")	Specified Condition
D+ - Body ground	1 MΩ or higher
D- - Body ground	1 MΩ or higher

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

7	USE SIMULATION METHOD TO CHECK

NG → Go to step 1

RS

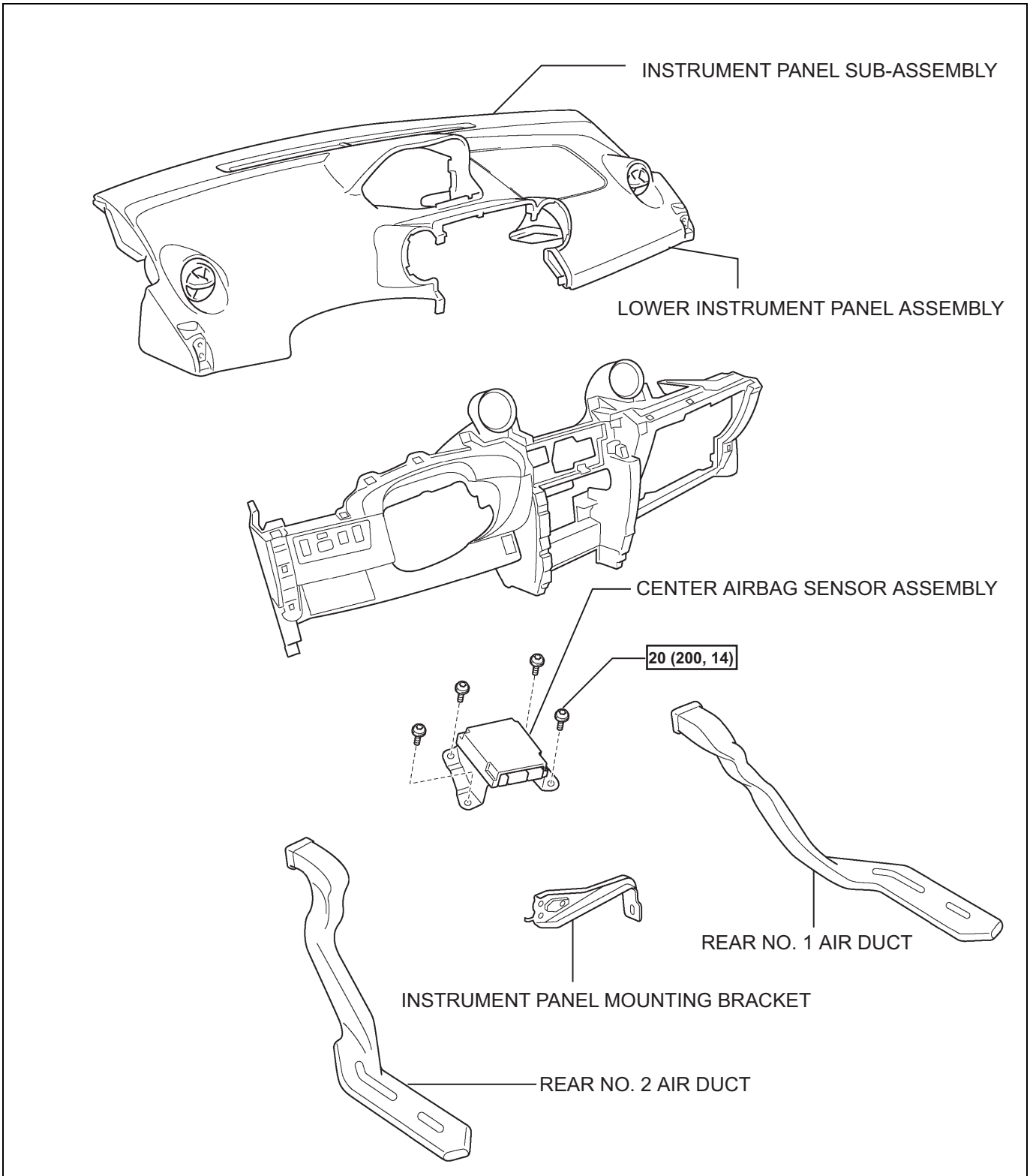
OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

CENTER AIRBAG SENSOR ASSEMBLY

COMPONENTS

RS



ON-VEHICLE INSPECTION

1. **CHECK CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)**
   (a) Perform a diagnostic system check (see page RS-33).

2. **CHECK CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)**
   (a) Perform a diagnostic system check (see page RS-33).

3. **CHECK CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG DEPLOYED)**
   (a) Replace the center airbag sensor.
   CAUTION:
   For removal and installation of the center airbag sensor assembly, be sure to follow the correct procedures.

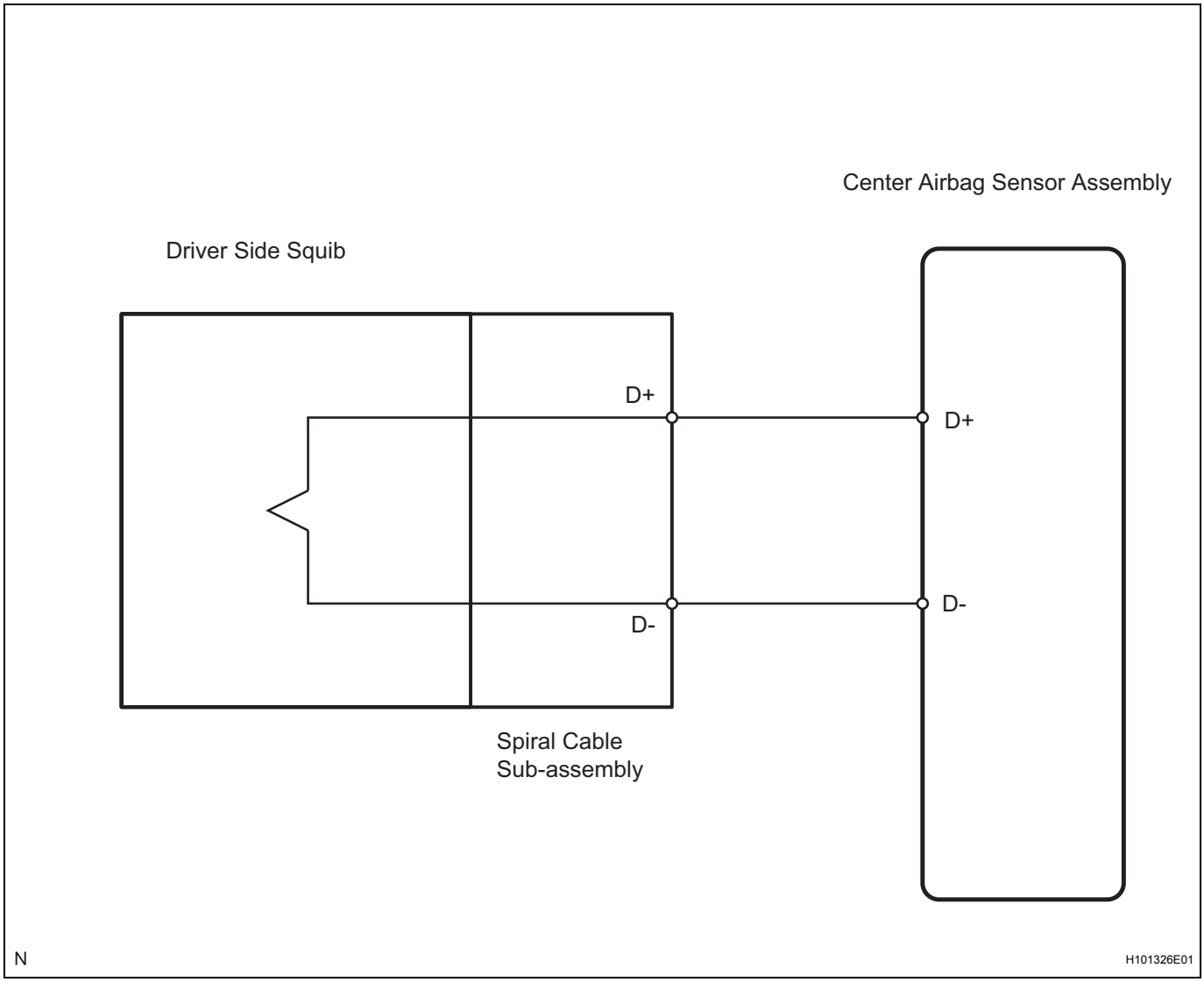
DTC	B0103/12	Short to B+ in Driver Side Squib Circuit

DESCRIPTION

The driver side squib circuit consists of the center airbag sensor, the spiral cable and the steering pad. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0103/12 is recorded when a B+ short is detected in the driver side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0103/12	• Short circuit in driver side squib circuit (to B+) • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor malfunction	• Steering pad (driver side squib) • Spiral cable sub-assembly • Center airbag sensor assembly • Instrument panel wire

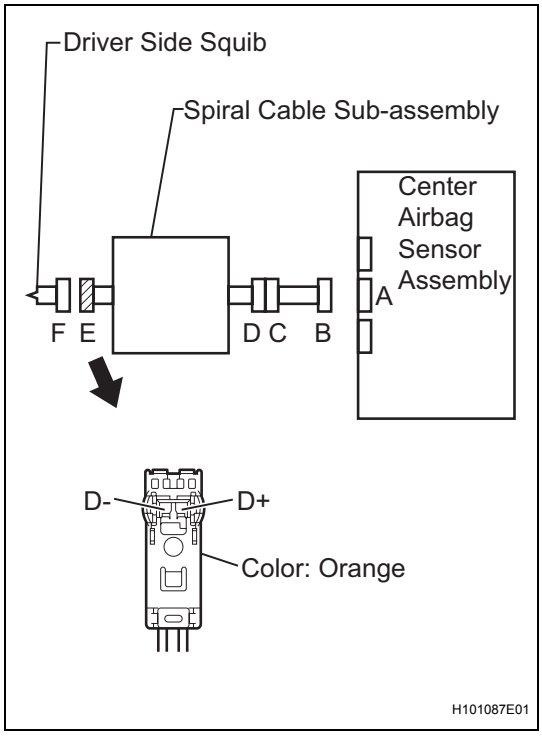
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DRIVER SIDE SQUIB CIRCUIT (CENTER AIRBAG SENSOR - STEERING PAD ASSEMBLY)

RS



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor and steering pad.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Measure the voltage according to the value(s) in the table below.

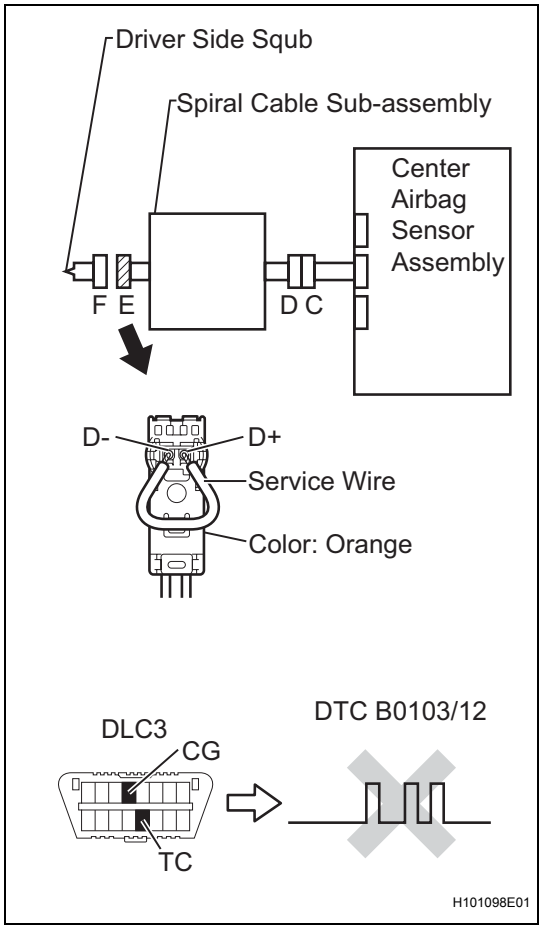
Standard voltage

Tester Connection (Connector "E")	Condition	Specified Condition
D+ - Body ground	Ignition switch ON	Below 1 V
D- - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 5**

OK

2	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the center airbag sensor.
(d) Using a service wire, connect D+ and D- of the connector "E".
NOTICE:
- **Twist the end of the service wire in order to insert to the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

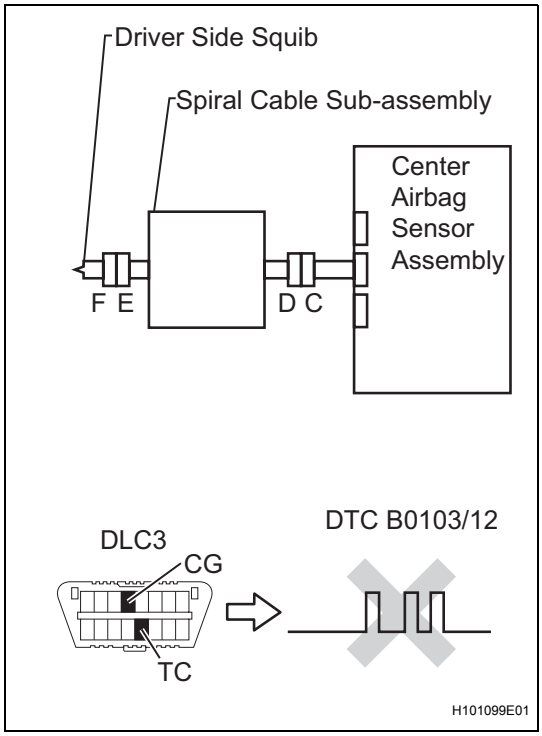
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).
OK:
DTC B0103/12 is not output.
HINT:
Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

RS

3	CHECK STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the service wire from the connector "E".
(d) Connect the connector to the steering pad.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Clear the DTC stored in memory (see page RS-30).
(h) Turn the ignition switch to LOCK.
(i) Turn the ignition switch to ON, and wait at least for 60 seconds.
(j) Check the DTC (see page RS-30).

OK:

DTC B0103/12 is not output.

HINT:

Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG → **REPLACE STEERING PAD ASSEMBLY (DRIVER SIDE SQUIB)**

OK

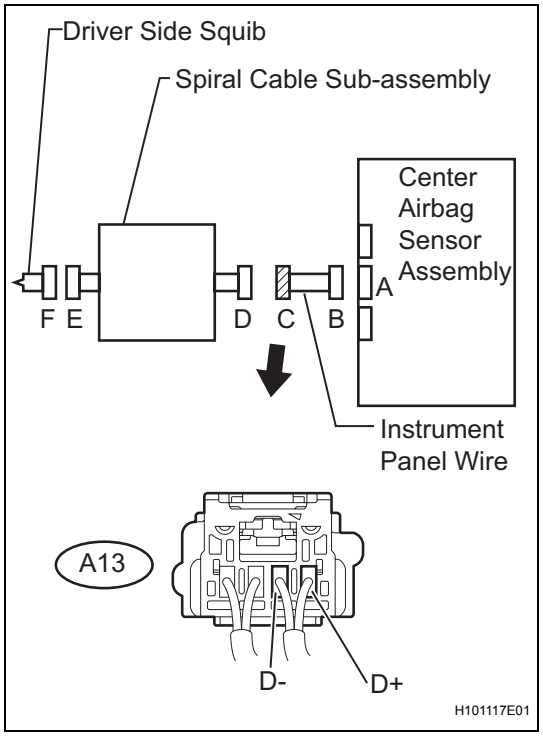
4	USE SIMULATION METHOD TO CHECK

NG → **Go to step 1**

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

5 CHECK INSTRUMENT PANEL WIRE



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the instrument panel wire connector from the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and turn the ignition switch to ON.
(e) Measure the voltage according to the value(s) in the table below.

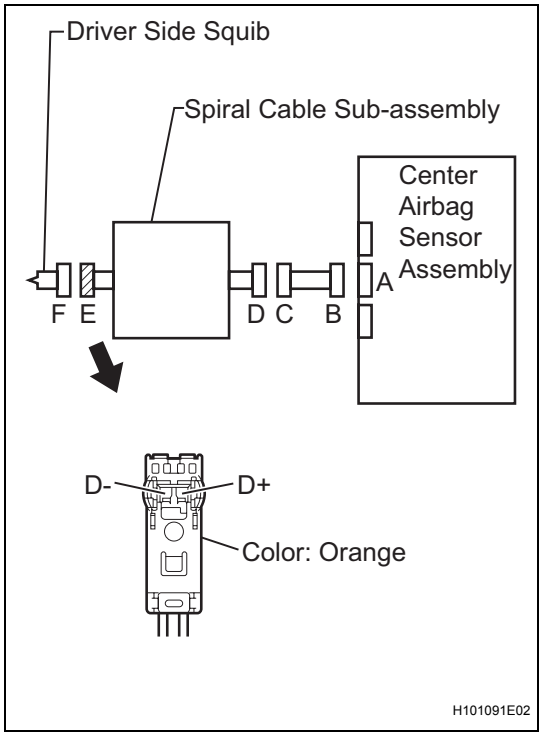
Standard voltage

Tester Connection (Connector "C")	Condition	Specified Condition
A13-1 (D+) - Body ground	Ignition switch ON	Below 1 V
A13-2 (D-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE SUB-ASSEMBLY



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Connector "E")	Condition	Specified Condition
D+ - Body ground	Ignition switch ON	Below 1 V
D- - Body ground	Ignition switch ON	Below 1 V

NG → **REPLACE SPIRAL CABLE SUB-ASSEMBLY**

OK

7	USE SIMULATION METHOD TO CHECK

NG → Go to step 1

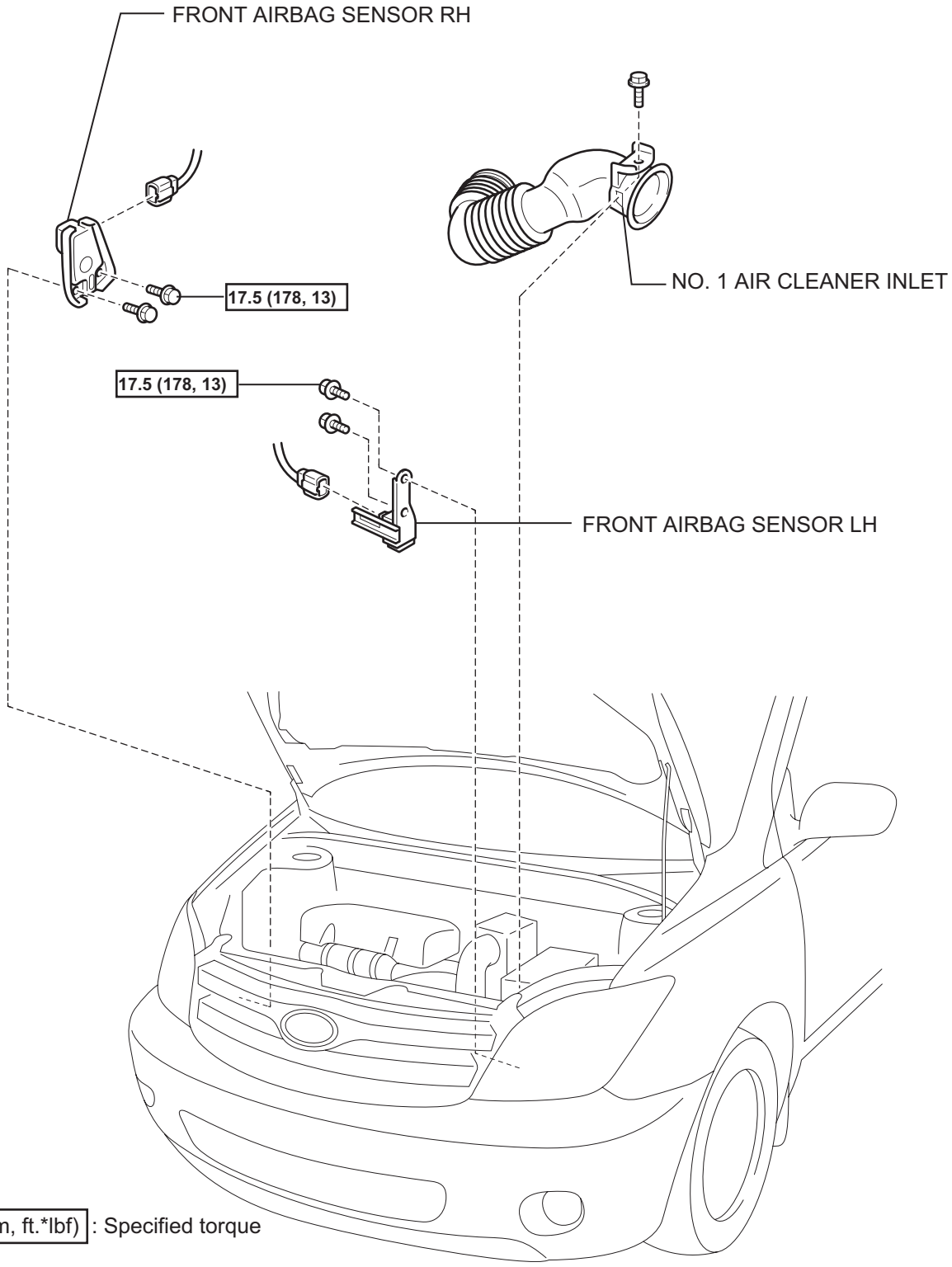
RS

OK

REPLACE ALL SRS COMPONENTS INCLUDING WIRE HARNESS

FRONT AIRBAG SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

T

C119031E02

ON-VEHICLE INSPECTION

1. **CHECK FRONT AIRBAG SENSOR (VEHICLE NOT INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)**
   (a) Perform a diagnostic system check (see page RS-33).

2. **CHECK FRONT AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)**
   (a) Perform a diagnostic system check (see page RS-33).
   (b) If the front fender of the vehicle or its periphery are damaged, perform a visual check:
   - Check for cracks, dents or chips in the case.
   - Check for cracks, dents, chips and scratches in the connector.
   - Check for peeling of the label or damage on the serial number.

   If any of the defects mentioned above are present, replace the front airbag sensor with a new one.
   CAUTION:
   For removal and installation of the front airbag sensor, be sure to follow the correct procedures.

3. **CHECK FRONT AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG DEPLOYED)**
   (a) Replace the front airbag sensor.
   CAUTION:
   For removal and installation of the front airbag sensor, be sure to follow the correct procedures.
   HINT:
   If the airbags have deployed, replace the front airbag sensor on the side in which the collision occurred. Replace both if necessary.

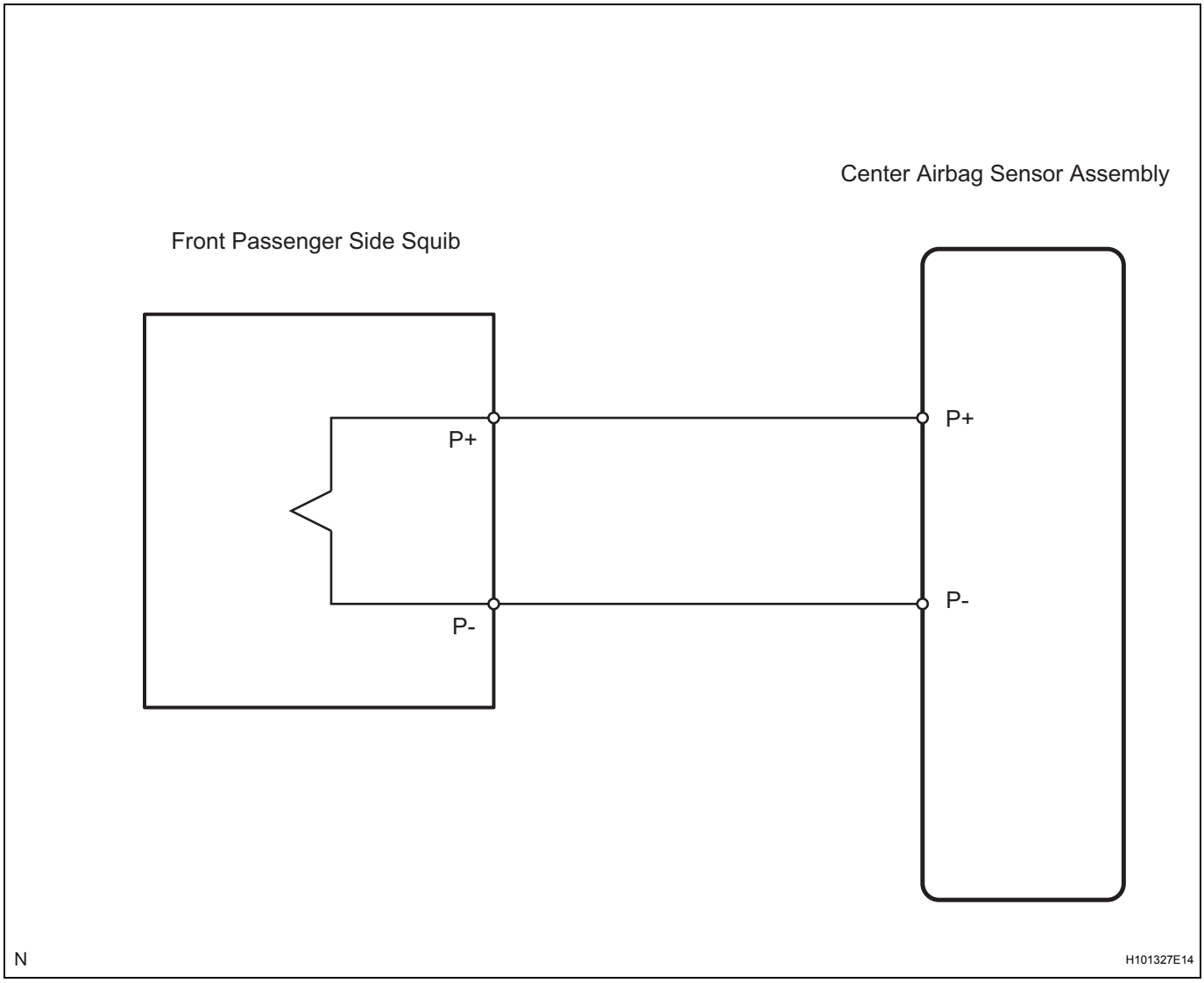
DTC	B0105/53	Short in Front Passenger Side Squib Circuit

DESCRIPTION

The front passenger side squib circuit consists of the center airbag sensor and the front passenger airbag. The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0105/53 is recorded when a short is detected in the front passenger side squib circuit.

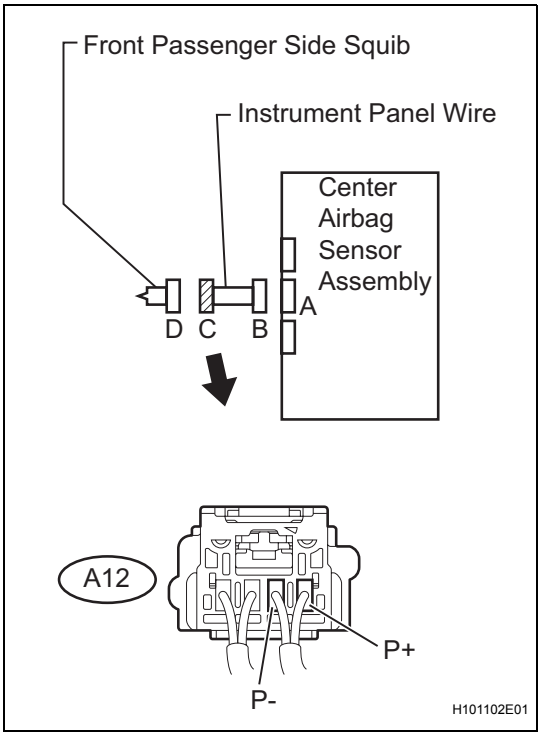
DTC No.	DTC Detection Condition	Trouble Area
B0105/53	• Short in front passenger side squib circuit • Front passenger side squib malfunction • Center airbag sensor malfunction	• Front passenger airbag assembly (front passenger side squib) • Center airbag sensor assembly • Instrument panel wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK INSTRUMENT PANEL WIRE (FRONT PASSENGER SIDE SQUIB CIRCUIT)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the center airbag sensor.
(d) Release the activation prevention mechanism built into the connector "B" (see page RS-18).
(e) Measure the resistance according to the value(s) in the table below.

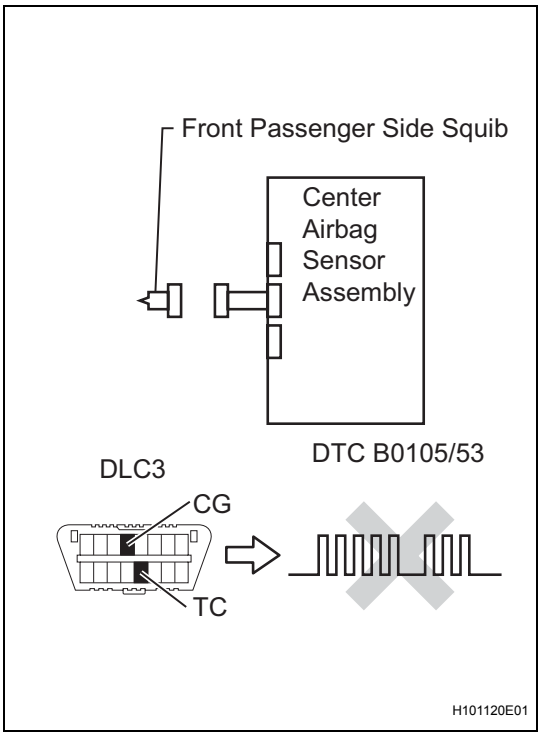
Standard resistance

Tester connection (Connector "C")	Specified Condition
A12-1 (P+) - A12-2 (P-)	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

2 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(c) Turn the ignition switch to ON, and wait at least for 60 seconds.
(d) Clear the DTC stored in memory (see page RS-30).
(e) Turn the ignition switch to LOCK.
(f) Turn the ignition switch to ON, and wait at least for 60 seconds.
(g) Check the DTC (see page RS-30).

OK:

DTC B0105/53 is not output.

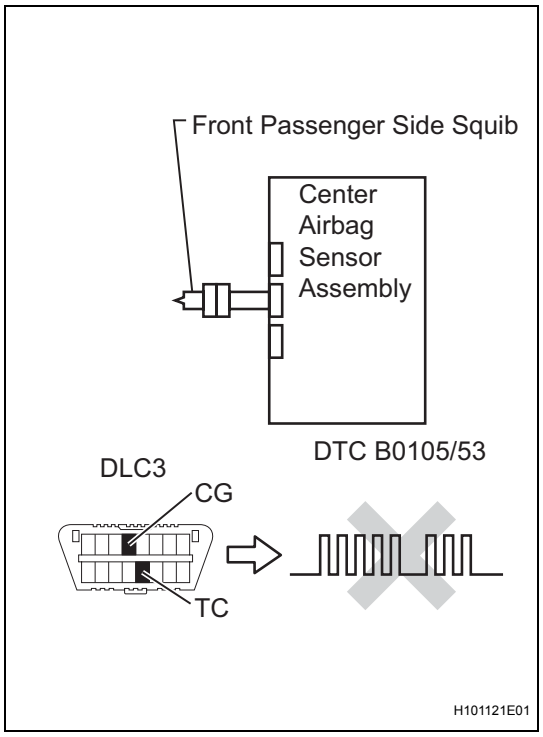
HINT:

Codes other than code B0105/53 may be output at this time, but they are not relevant to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB)



(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the front passenger airbag.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(e) Turn the ignition switch to ON, and wait at least for 60 seconds.
(f) Clear the DTC stored in memory (see page RS-30).
(g) Turn the ignition switch to LOCK.
(h) Turn the ignition switch to ON, and wait at least for 60 seconds.
(i) Check the DTC (see page RS-30).

OK:

DTC B0105/53 is not output.

HINT:

Codes other than code B0105/53 may be output at this time, but they are not relevant to this check.

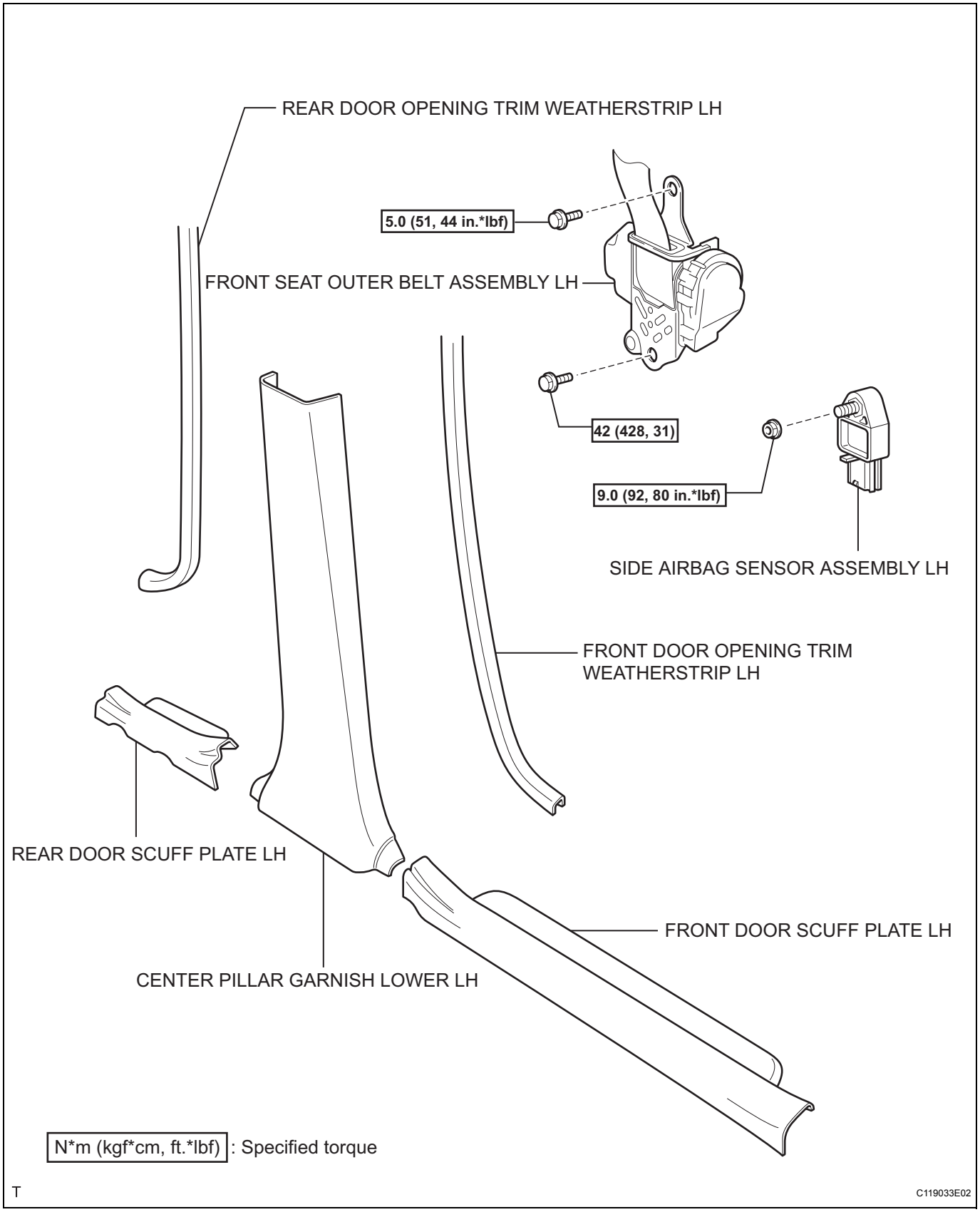
NG → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK

SIDE AIRBAG SENSOR

COMPONENTS



ON-VEHICLE INSPECTION

1. **CHECK SIDE AIRBAG SENSOR (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (see page RS-33).

2. **CHECK SIDE AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)**
   (a) Perform a diagnostic system check (see page RS-33).
   (b) When the center pillar of the vehicle or its area is damaged, check if there is any damage to the side airbag sensor. If there are any defects as mentioned below, replace the side airbag sensor with a new one:
   - Cracks, dents or chips on the sensor housing.
   - Cracks or other damage to the connector.
   - Peeling off of the label or damage to the serial number.

   CAUTION:
   For removal and installation procedures of the side airbag sensor, be sure to follow the correct procedure.

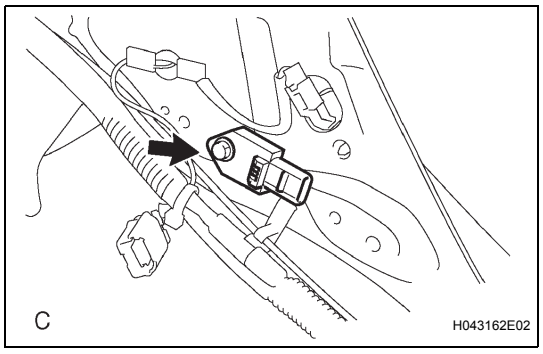
3. **CHECK SIDE AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG DEPLOYED)**
   (a) Replace the side airbag sensor.
   CAUTION:
   For removal and installation procedures of the side airbag sensor, be sure to follow the correct procedure.
   HINT:
   The side airbag sensor on the impacted side should be replaced after the front seat airbag assembly and curtain shield airbag assembly have deployed.

REMOVAL

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing (see page RS-1).
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

RS

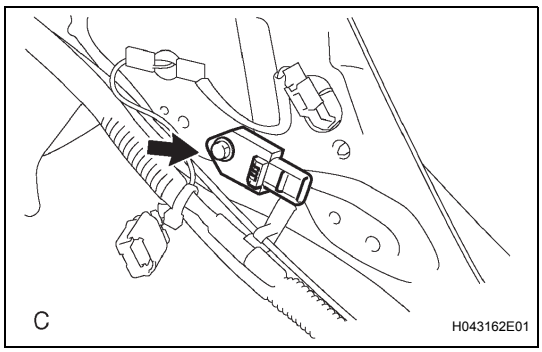
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 1 DECK BOARD**
3. **REMOVE REAR DECK TRIM COVER (See page IR-8)**
4. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-7)**
5. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**
6. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-12)**
7. **REMOVE REAR SEATBACK ASSEMBLY LH (See page SE-12)**
8. **REMOVE REAR SEATBACK HINGE SUB-ASSEMBLY LH (See page SE-12)**
9. **REMOVE REAR SEAT OUTER BELT ASSEMBLY LH (See page SB-23)**
10. **REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH (See page IR-9)**
11. **REMOVE REAR AIRBAG SENSOR LH**
    (a) Remove the bolt and sensor.
    (b) Disconnect the connector.



RS

INSTALLATION

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

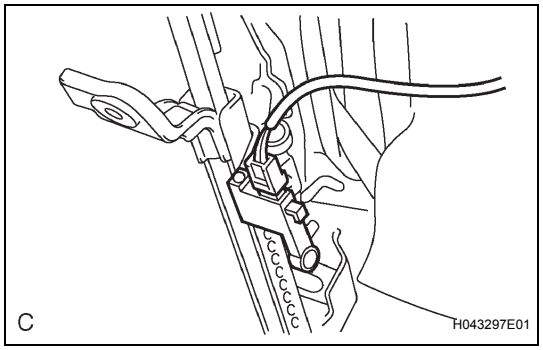


1. **INSTALL REAR AIRBAG SENSOR LH**
   (a) Remove the bolt and sensor.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
   CAUTION:
   - **If the airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
   (b) Check that there is no looseness in the installation parts of the airbag sensor.
   (c) Connect the connector.
2. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH (See page IR-15)**
3. **INSTALL REAR SEAT OUTER BELT ASSEMBLY LH (See page SB-25)**
4. **INSTALL REAR SEATBACK HINGE SUB-ASSEMBLY LH (See page SE-16)**
5. **INSTALL REAR SEATBACK ASSEMBLY LH (See page SE-17)**
6. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-17)**
7. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH**
8. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-17)**
9. **INSTALL REAR DECK TRIM COVER (See page IR-15)**
10. **INSTALL NO. 1 DECK BOARD**
11. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
12. **PERFORM INITIALIZATION**
    (a) Perform initialization (see pageIN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
13. **CHECK SRS WARNING LIGHT**
    (a) Check the SRS warning light (see page RS-28).

REMOVAL

CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).

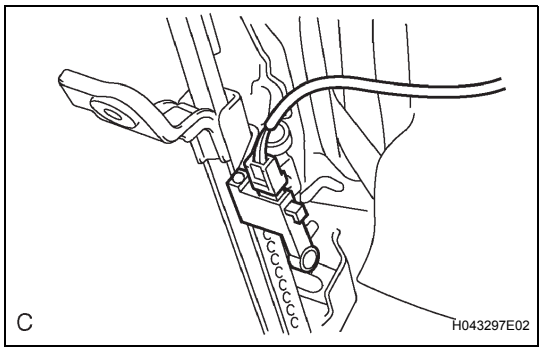
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT SEAT ASSEMBLY**
   (a) Remove the front seat assembly (see page SE-3).
3. **REMOVE SEAT POSITION AIRBAG SENSOR**
   (a) Disconnect the connector.
   (b) Using a T30 "torx" socket, remove the screw and seat position sensor.



RS

INSTALLATION

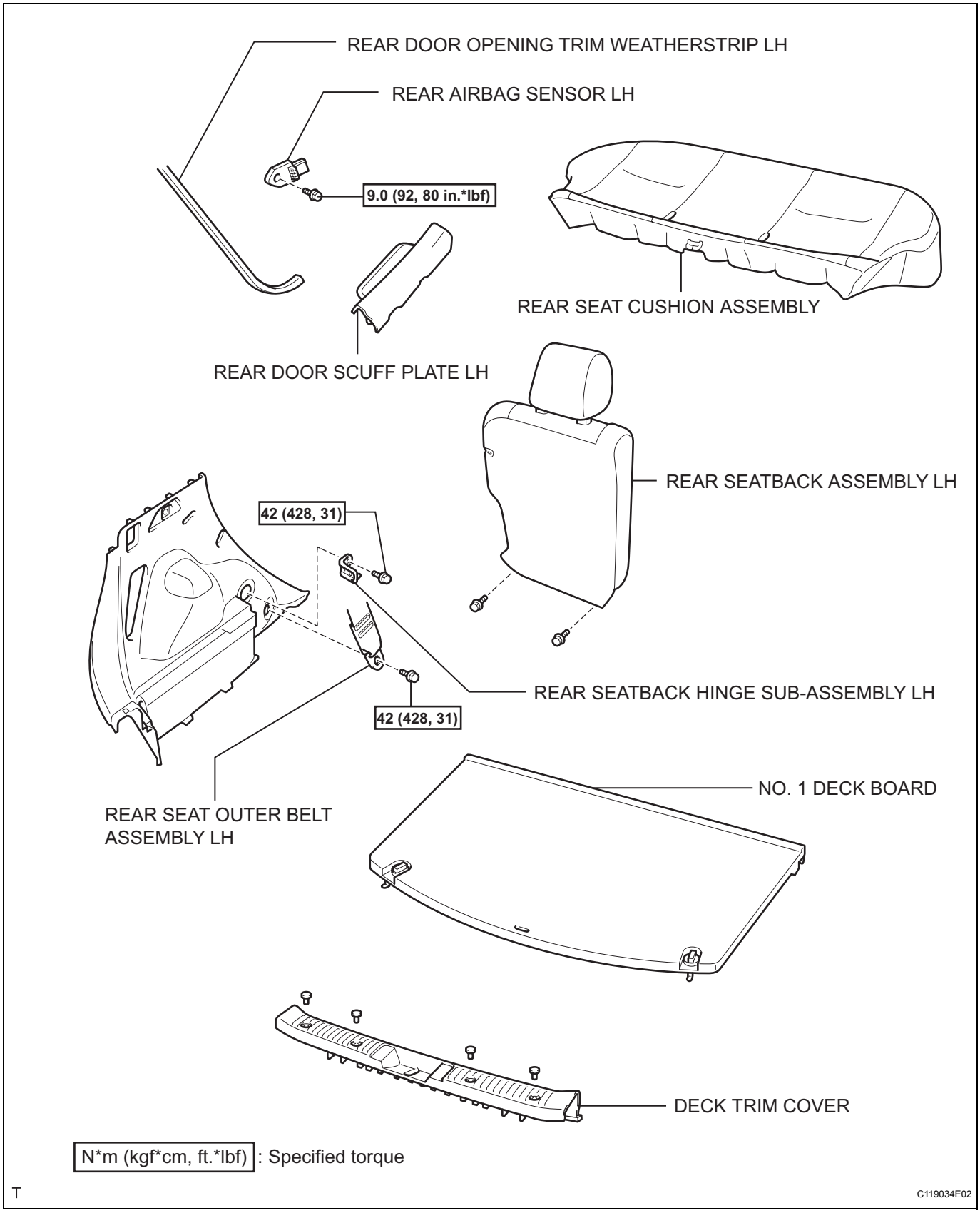
CAUTION:
Be sure to read the precautionary notices concerning the SRS airbag system before servicing it (see page RS-1).



1. **INSTALL SEAT POSITION AIRBAG SENSOR**
   (a) Connect the connector.
   (b) Install the sensor.
   (c) Using a T30 "torx" socket, install the screw.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   CAUTION:
   - **If the sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the sensor with a new one.**
   - **When installing the sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
2. **INSTALL FRONT SEAT ASSEMBLY**
   (a) Install the front seat assembly (see page SE-9).
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
5. **CHECK SRS WARNING LIGHT**
   (a) Check the SRS warning light (see page RS-28).

REAR AIRBAG SENSOR

COMPONENTS



ON-VEHICLE INSPECTION

1. **CHECK REAR AIRBAG SENSOR (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (see page RS-33).

2. **CHECK REAR AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG NOT DEPLOYED)**
   (a) Perform a diagnostic system check (see page RS-33).
   (b) When the quarter panel of the vehicle or its periphery is damaged, check if there is any damage to the rear airbag sensor. If there are any defects as mentioned below, replace the rear airbag sensor with a new one:
   - Cracks, dents or chips on the sensor housing.
   - Cracks or other damage to the connector.
   - Peeling off of the label or damage to the serial number.

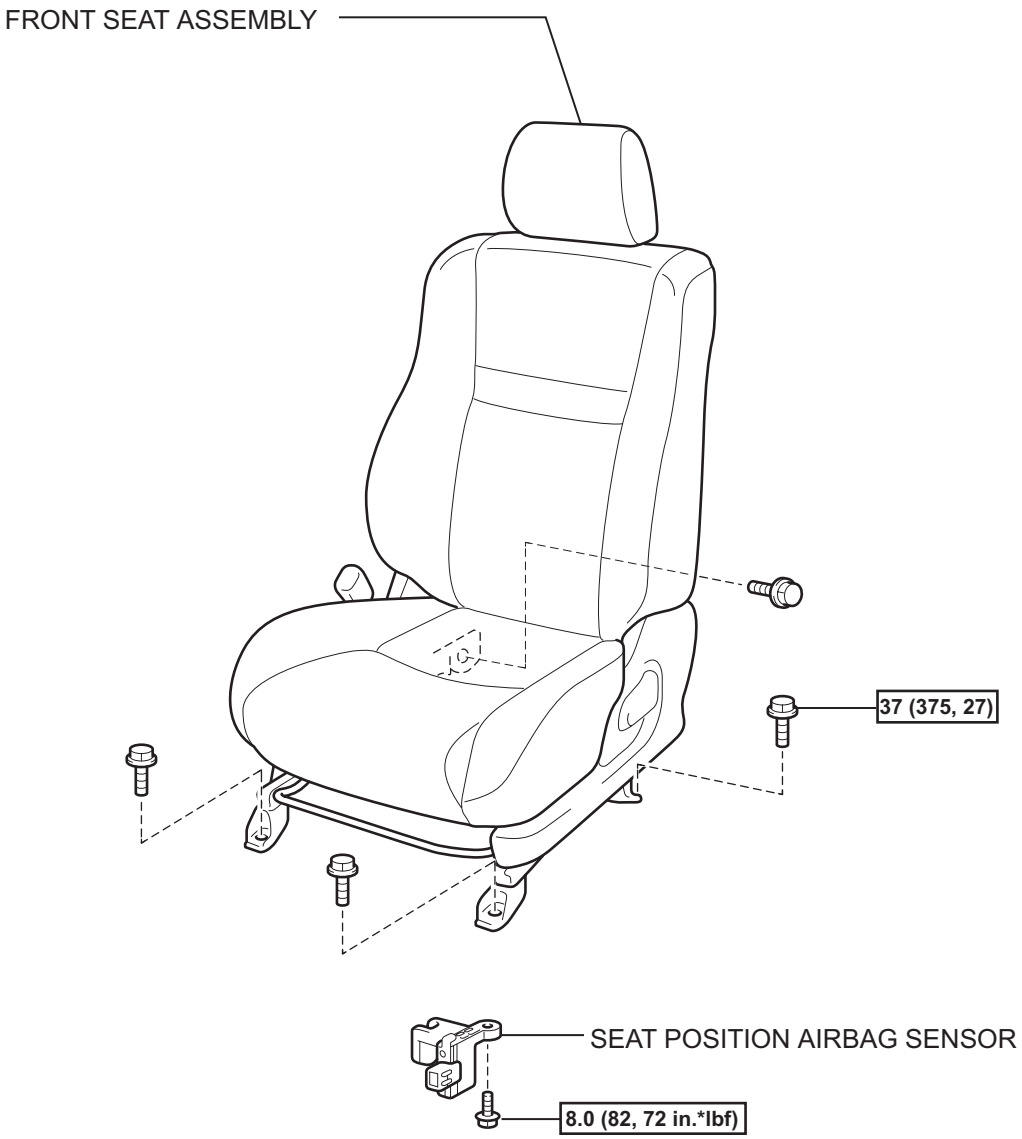
   CAUTION:
   For removal and installation procedures of the rear airbag sensor, be sure to following the correct procedures.

3. **CHECK REAR AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG DEPLOYED)**
   (a) Replace the rear airbag sensor.
   CAUTION:
   For removal and installation procedures of the rear airbag sensor, be sure to follow the correct procedures.
   HINT:
   The rear airbag sensor on the impacted side should be replaced after the curtain shield airbag assembly has deployed.

SEAT POSITION SENSOR

COMPONENTS

RS



N*m (kgf*cm, ft.*lbf) : Specified torque

T

C119032E03

ON-VEHICLE INSPECTION

1. **CHECK SEAT POSITION SENSOR (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (see page RS-33).

2. **CHECK SEAT POSITION SENSOR (VEHICLE INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (see page RS-33).
   (b) Even if the airbag was not deployed, check if there is any damage to the seat position sensor.
   If there are any defects as mentioned below, replace the seat position sensor with a new one:
   - Cracks, dents or chips on the sensor housing.
   - Cracks or other damage to the connector.

   CAUTION:
   For removal and installation procedures of the seat position sensor, be sure to follow the correct procedures.

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Seat belt warning system

Symptom	Suspected area	See page
Driver side seat belt warning light does not light up	1. GAUGE fuse	SB-2
	2. Combination meter	ME-46
	3. Center airbag sensor assembly	RS-325
	4. Front seat inner belt assembly LH	SB-5
	5. Wire harness	
Driver side seat belt warning light does not blink	1. Combination meter	ME-46
	2. Center airbag sensor assembly	RS-325
	3. Front seat inner belt assembly LH	SB-5
	4. Wire harness	
Passenger side seat belt warning light does not light up	1. GAUGE fuse	SB-2
	2. Front seat cushion pad RH	SB-5
	3. Instrument panel garnish sub-assembly	IP-2
	4. Front seat inner belt assembly RH	SB-5
	5. Combination meter	ME-49
	6. Wire harness	
Passenger side seat belt warning light does not blink	1. Instrument panel garnish sub-assembly	IP-2
	2. Front seat cushion pad RH	SB-5
	3. Front seat inner belt assembly RH	SB-5
	4. Combination meter	ME-49
	5. Wire harness	

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. **INSTALL FRONT SEAT INNER BELT ASSEMBLY RH**
   (a) Install the inner belt with the bolt.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

2. **INSTALL FRONT SEAT ASSEMBLY RH (See page SE-9)**

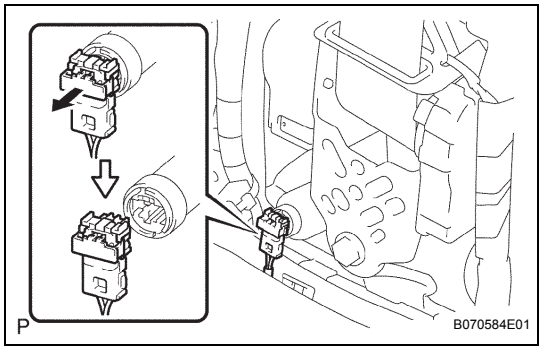
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

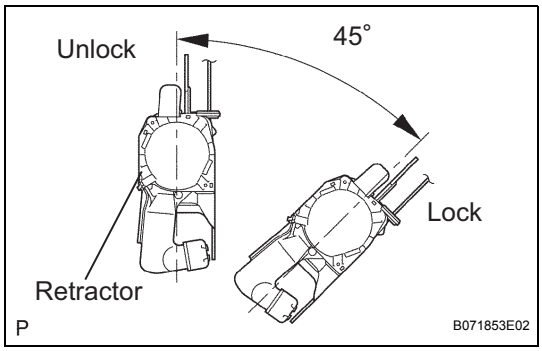
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-7)**
3. **REMOVE COWL SIDE TRIM BOARD RH (See page IR-7)**
4. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
5. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-7)**
6. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
7. **REMOVE CENTER PILLAR GARNISH LOWER RH (See page IR-8)**
8. **REMOVE FRONT SEAT OUTER BELT ASSEMBLY RH**
   CAUTION:
   Carefully read the notices for the pretensioner in the SRS airbag system section and the front seat outer belt section (see page RS-1).
   (a) Remove the floor anchor cover.
   (b) Remove the bolt and outer belt on the floor anchor side.
   (c) Remove the shoulder anchor cover.
   (d) Remove the bolt and outer belt on the shoulder anchor side.
   (e) Disconnect the pretensioner connector as shown in the illustration.
   (f) Remove the 2 bolts on the retractor side and remove the outer belt completely.



9. **REMOVE CENTER PILLAR GARNISH UPPER RH (See page IR-8)**
10. **REMOVE FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY**
    (a) Remove the 2 bolts and anchor adjuster.



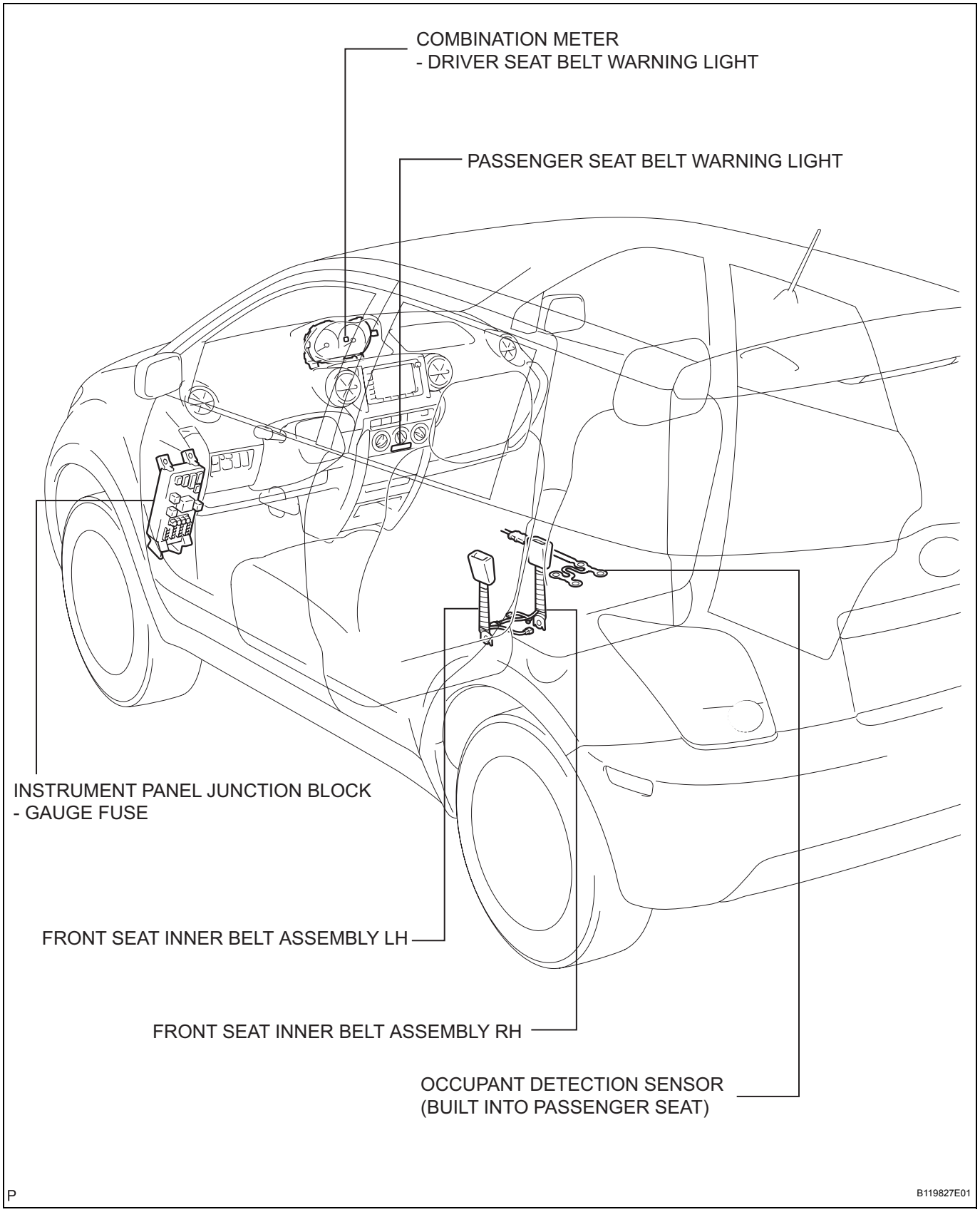
INSPECTION

1. INSPECT FRONT SEAT OUTER BELT ASSEMBLY
NOTICE:
Do not disassemble the retractor.

(a) When the inclination of the retractor is 15°or less, check that the belt can be pulled from the retractor.
When the inclination of the retractor is over 45°, check that the belt locks.
If the operation is not as specified, replace the belt.

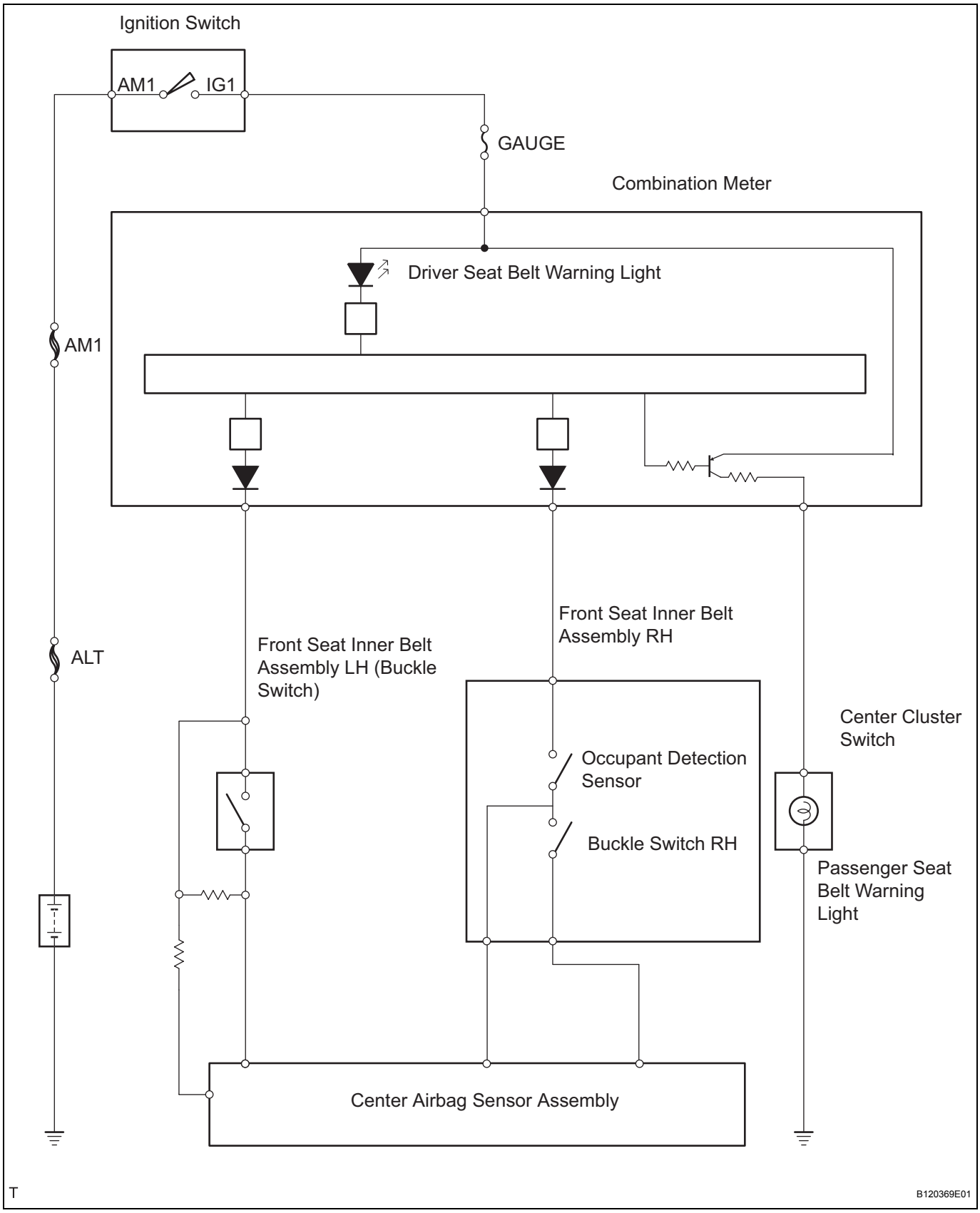
SEAT BELT WARNING SYSTEM

PARTS LOCATION



SB

SYSTEM DIAGRAM



INSTALLATION

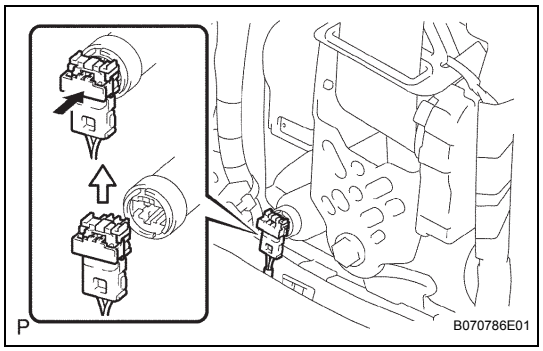
HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. **INSTALL FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY**
   (a) Install the anchor adjuster with the 2 bolts.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

2. **INSTALL CENTER PILLAR GARNISH UPPER RH (See page IR-16)**

3. **INSTALL FRONT SEAT OUTER BELT ASSEMBLY RH**
   (a) Install the outer belt with the 2 bolts on the retractor side.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf) for upper bolt
   42 N*m (428 kgf*cm, 31 ft.*lbf) for lower bolt



   (b) Connect the pretensioner connector as shown in the illustration.
   (c) Install the outer belt with the bolt on the shoulder anchor side.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   (d) Install the shoulder anchor cover.
   (e) Install the outer belt with the bolt on the floor anchor side.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   (f) Install the floor anchor cover.
   (g) With the belt installed, check that the belt locks when it is pulled out quickly.
   NOTICE:
   The check should be performed with the outer belt assembly installed.
   If the operation is not as specified, replace the belt.
   (h) Check the fastening function of the child restraint system.
   NOTICE:
   The check should be performed with the outer belt installed.
      (1) When the belt is pulled out fully, the belt should automatically try to retract.
      (2) After the belt has fully retracted, the belt should be able to be pulled out and retracted again.
      If the operation is not as specified, replace the belt.

4. **INSTALL CENTER PILLAR GARNISH LOWER RH (See page IR-16)**

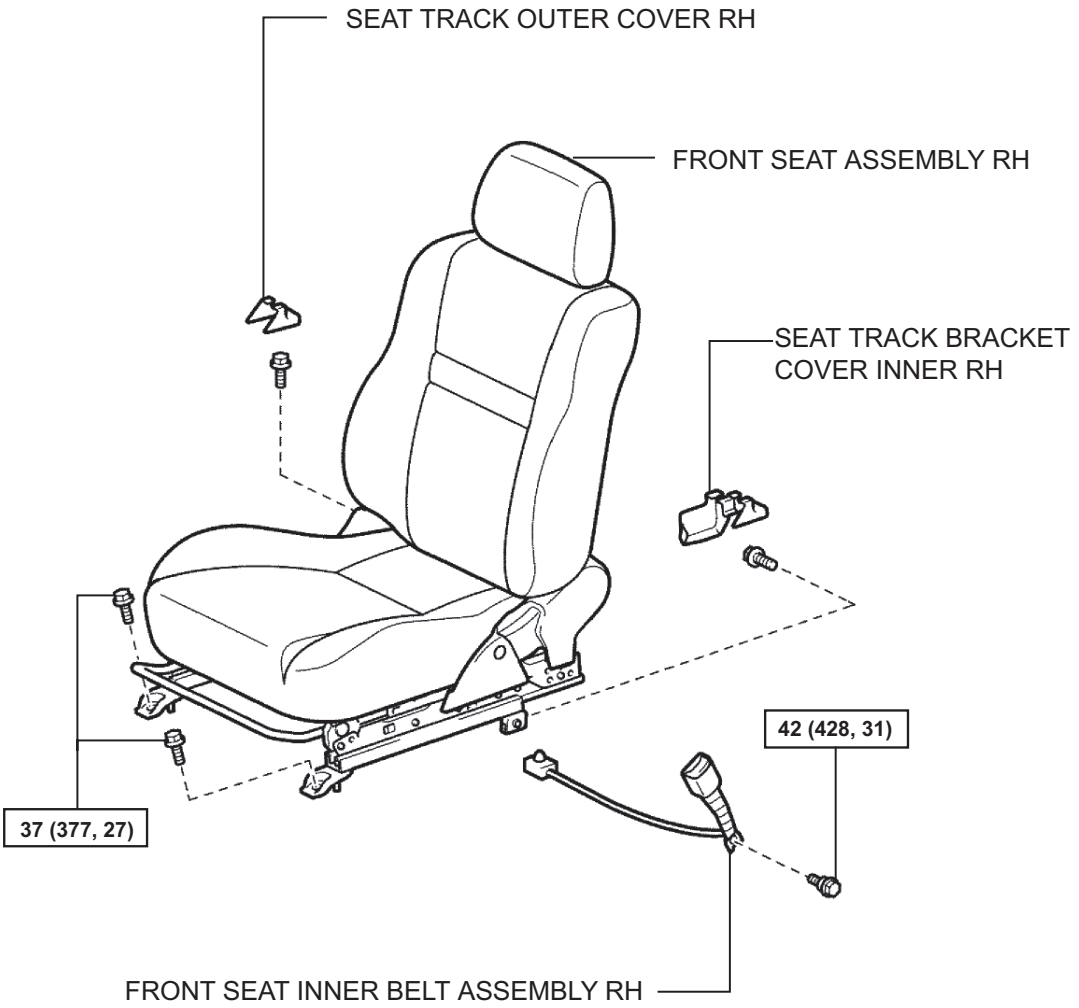
5. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**

6. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-17)**
7. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
8. **INSTALL COWL SIDE TRIM BOARD RH (See page IR-17)**
9. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-17)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FRONT SEAT INNER BELT ASSEMBLY

COMPONENTS

SB



N*m (kgf*cm, ft.*lbf) : Specified torque

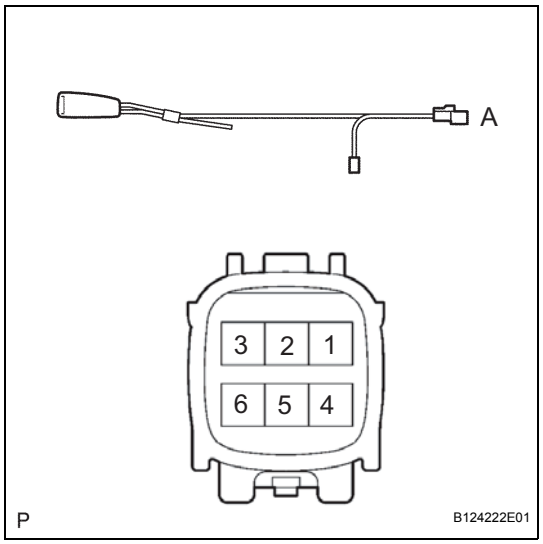
B122538E01

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT SEAT ASSEMBLY RH (See page SE-3)**
3. **REMOVE FRONT SEAT INNER BELT ASSEMBLY RH**
   (a) Remove the bolt and inner belt.

INSPECTION



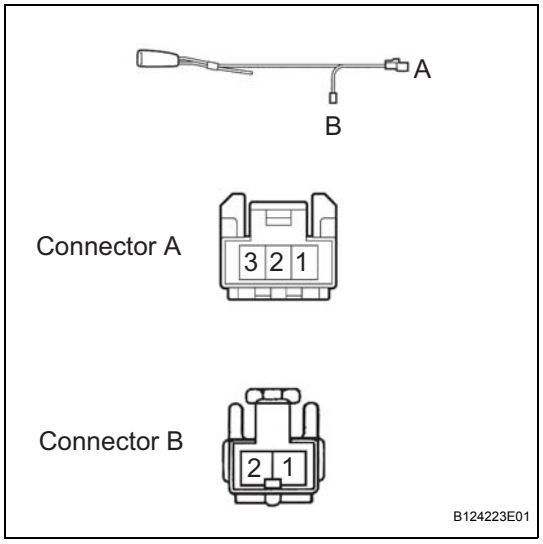
1. **INSPECT FRONT SEAT INNER BELT ASSEMBLY LH**
   (a) Check the buckle switch.
   (1) Fasten the seat belt (buckle switch is ON).
   (2) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	1,330 Ω
A-1 - A-3	10 kΩ or higher

   (3) Release the seat belt (buckle switch is OFF).
   (4) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	330 Ω
A-1 - A-3	Below 1 Ω

   If the result is not as specified, replace the inner belt assembly.



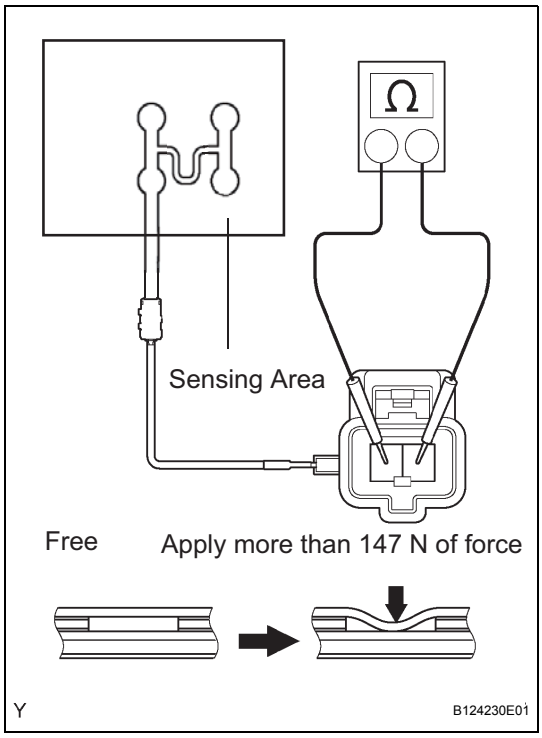
2. **INSPECT FRONT SEAT INNER BELT ASSEMBLY RH**
   (a) Check the buckle switch.
   (1) Fasten the seat belt (buckle switch is ON).
   (2) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	1,330 Ω
A-1 - B-2	10 kΩ or higher
A-3 - B-1	Below 1 Ω

   (3) Release the seat belt (buckle switch is OFF).
   (4) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	330 Ω
A-1 - B-2	Below 1 Ω
A-3 - B-1	Below 1 Ω

If the result is not as specified, replace the inner belt assembly.



3. INSPECT OCCUPANT DETECTION SENSOR

(a) Measure the resistance of the sensor.

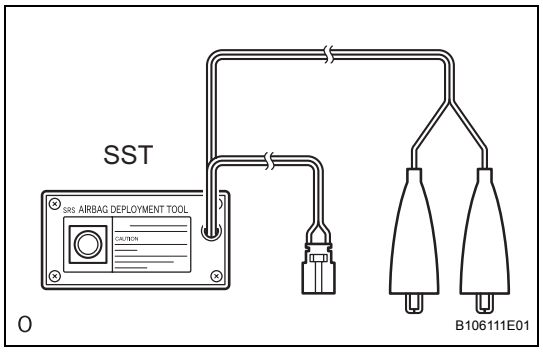
Standard resistance

Tester Connection	Specified Condition
Apply more than 147 N (15 kgf, 33 lbf) to occupant detection sensor	Below 100 Ω
Seat not occupied	1 MΩ or higher

If the result is not as specified, replace the front seat cushion pad.

DISPOSAL

HINT:
When scrapping vehicles equipped with a seat belt pretensioner or disposing of a front seat outer belt (with seat belt pretensioner), always first activate the seat belt pretensioner in accordance with the procedures described below. If any abnormality occurs during activation of the seat belt pretensioner, contact the SERVICE DEPARTMENT of TOYOTA MOTOR SALES, U.S.A., INC.

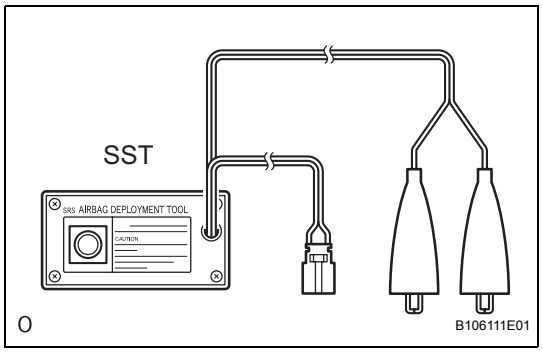


CAUTION:

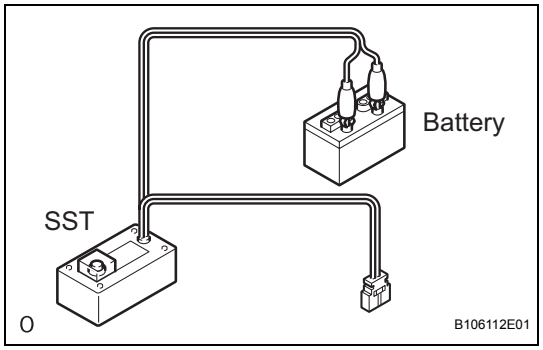
- **Never dispose of a front seat outer belt that has a non-activated pretensioner.**
- **The seat belt pretensioner produces a loud, exploding sound when it activates. Perform the operation where it will not be a nuisance to nearby people.**
- **When activating a front seat outer belt (with seat belt pretensioner), stand at least 10 m (33 ft.) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat outer belt with an activated pretensioner.**
- **Always wash your hands with water after completing the disposal.**
- **Do not apply water to a front seat outer belt that has an activated pretensioner.**
- **Perform procedures in a place away from electrical interference.**
- **When activating the seat belt pretensioner, always use the specified SST (SRS airbag deployment tool).**

1. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN INSTALLED IN VEHICLE)

HINT:
Prepare a battery to activate the seat belt pretensioner.

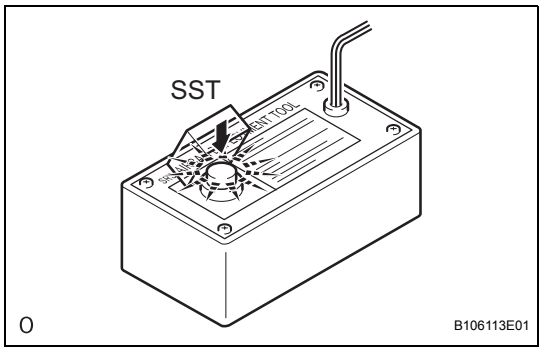


(a) Check if SST is functioning properly.
SST 09082-00700
NOTICE:
When activating the seat belt pretensioner, always use the specified SST.



(1) Connect the SST's red clip to the battery's positive (+) terminal and the black clip to the battery's negative (-) terminal.
HINT:
Do not connect the yellow connector. The yellow connector is used to connect to the seat belt pretensioner.

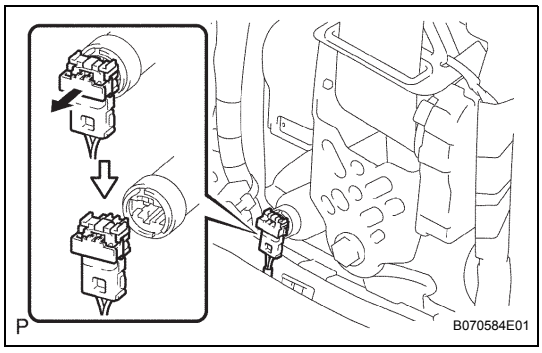
SB



(2) Press the SST activation switch and check that the LED of the SST activation switch illuminates.
NOTICE:
If the LED illuminates when the activation switch is not being pressed, SST may be malfunctioning. Replace SST with a new one.

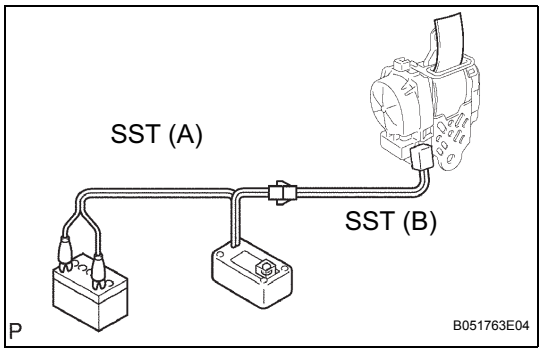
(b) Disconnect SST from the battery.

(c) Disconnect the pretensioner connector.
(1) Disconnect the cable from the negative (-) battery terminal.
(2) Check the SRS airbag system (see page RS-1).
(3) Remove the front door scuff plate (see page IR-7).
(4) Remove the rear door scuff plate (see page IR-7).
(5) Remove the front door opening trim (see page IR-7).
(6) Remove the rear door opening trim (see page IR-7).
(7) Remove the center pillar garnish lower (see page IR-8).

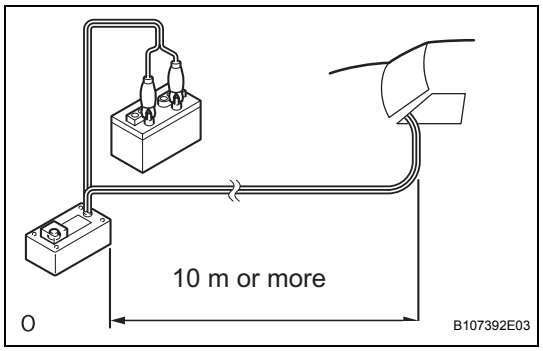


(8) Disconnect the pretensioner connector as shown in the illustration.

(d) Prepare SST for activation of the seat belt pretensioner.
(1) Install the floor anchor of the seat belt.



(2) Connect SST (A) to SST (B). Then connect SST (B)'s connector to the seat belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move SST at least 10 m (33 ft.) away from the front of the vehicle.
(4) Close all the doors and windows of the vehicle.
HINT:
Leave a gap in one of the windows for inserting SST wire harness.
NOTICE:
Take care not to damage SST wire harness.
(5) Connect the SST's red clip to the battery's positive (+) terminal and the black clip to the negative (-) terminal.

(e) Activate the seat belt pretensioner.
(1) Confirm that no one is inside the vehicle or within 10 m (33 ft.) of the vehicle.
(2) Press the SST activation switch to activate the seat belt pretensioner.
HINT:
The seat belt pretensioner operates at the same time the SST activation switch's LED illuminates.

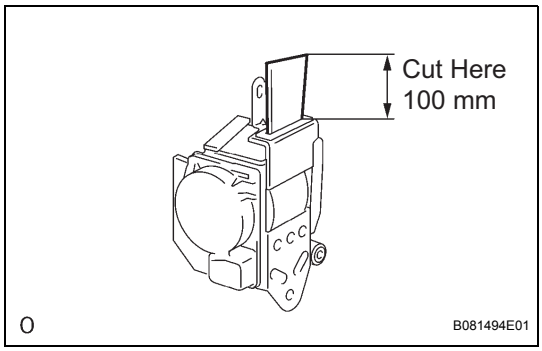
(f) Dispose of the front seat outer belt (with the seat belt pretensioner).
CAUTION:
- **Do not touch the front seat outer belt for at least 30 minutes after the seat belt pretensioner has been activated. It is very hot.**
- **Use gloves and safety glasses when handling a front seat outer belt whose pretensioner has been activated.**
- **Always wash your hands with water after completing the disposal.**
- **Do not apply water to a front seat outer belt that has an activated pretensioner.**

HINT:
When scrapping a vehicle, activate the seat belt pretensioner, and then scrap the vehicle with the activated front seat outer belt installed.

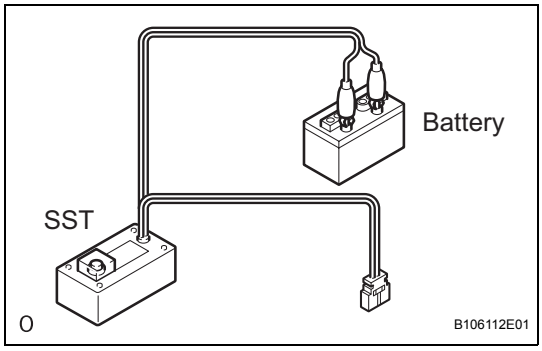
2. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)
NOTICE:
- **When only disposing of the front seat outer belt (with the seat belt pretensioner), never use the customer's vehicle to activate the seat belt pretensioner.**
- **Be sure to follow the procedures listed below when activating the seat belt pretensioner.**

SB

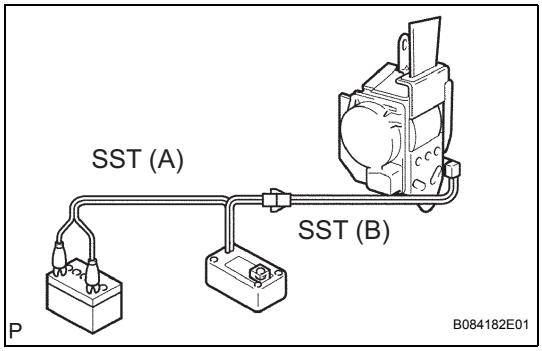
SB



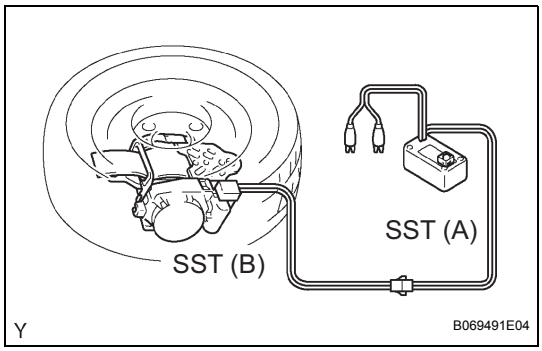
(a) Remove the front seat outer belt.
(1) Wind the seat belt with the retractor.
(2) When the seat belt is sufficiently wound, cut the seat belt approximately 100 mm (0.39 in.) from the retractor, as shown in the illustration.
HINT:
The seat belt is designed so that winding the seat belt before pretensioner activation will decrease the pulling power of the seat belt during pretensioner activation.



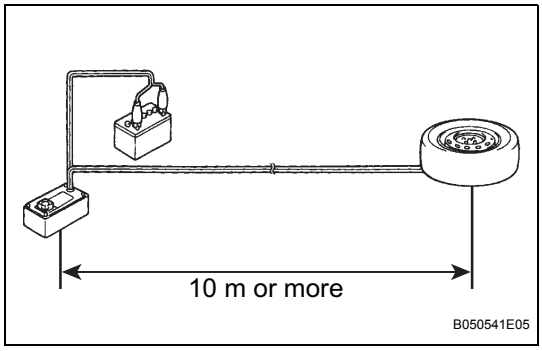
(b) Check if SST is functioning properly.
SST 09082-00700, 09082-00770
CAUTION:
When activating a seat belt pretensioner, always use the specified SST.



(c) Prepare SST for activation of the seat belt pretensioner.
(1) Connect SST (A) to SST (B). Then connect SST (B)'s connector to the seat belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Place the front seat outer belt on the ground and cover it with a tire (with wheel).
NOTICE:
Set up the front seat outer belt as shown in the illustration.



(3) Move SST at least 10 m (33 ft.) away from the wheel.
NOTICE:
Take care not to damage the SST wire harness.

(d) Activate the seat belt pretensioner.
(1) Connect the SST's red clip to the battery's positive (+) terminal and the black clip to the battery's negative (-) terminal.
(2) Check that no one is within 10 m (33 ft.) of the wheel.

(3) Press the SST activation switch to activate the seat belt pretensioner.
HINT:
The seat belt pretensioner operates at the same time the SST activation switch's LED illuminates.

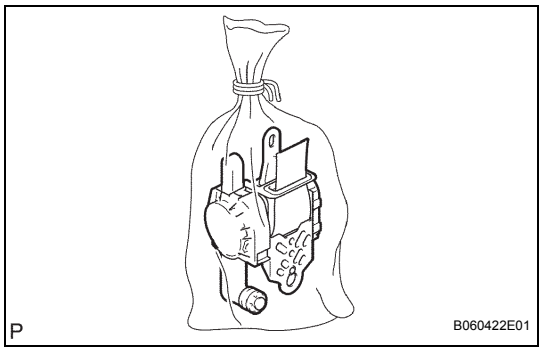
(e) Dispose of the front seat outer belt (with the seat belt pretensioner).

CAUTION:

- **Do not touch the front seat outer belt for at least 30 minutes after the seat belt pretensioner has been activated. It is very hot.**
- **Use gloves and safety glasses when handling a front seat outer belt whose pretensioner has been activated.**
- **Always wash your hands with water after completing the disposal.**
- **Do not apply water to a front seat outer belt that has an activated pretensioner.**

(1) Remove the tire (with wheel) and SST.

(2) Place the front seat outer belt in a plastic bag, tie the end tightly, and dispose of it in the same way as other general parts.

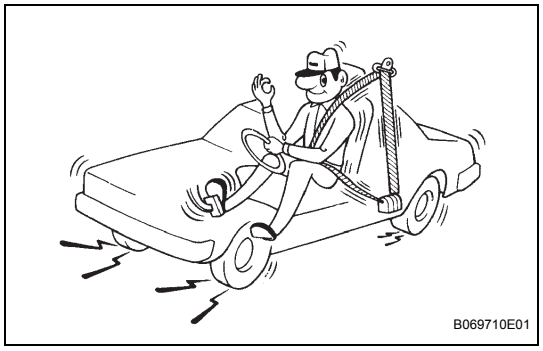


SB

FRONT SEAT OUTER BELT ASSEMBLY

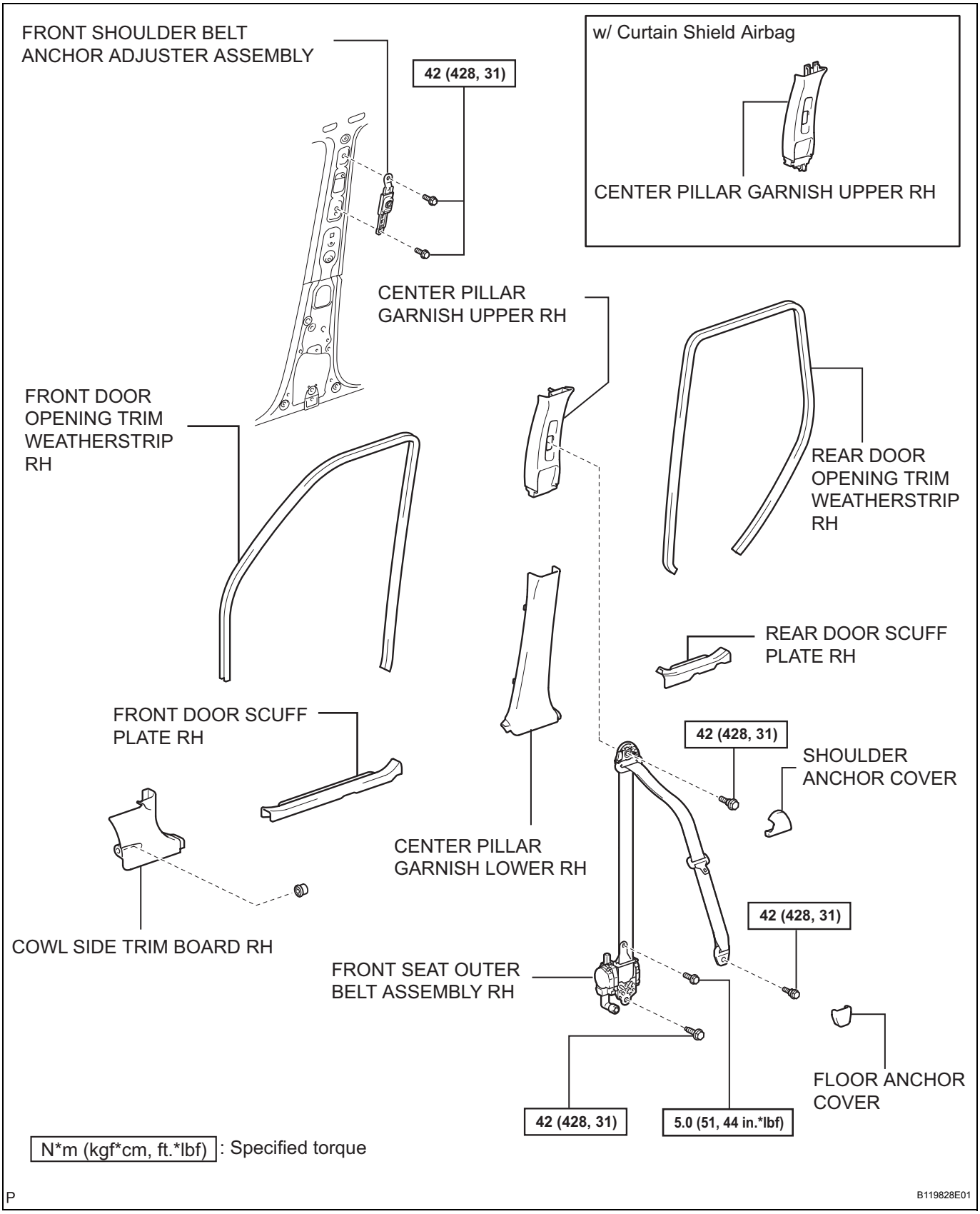
PRECAUTION

CAUTION:
Replace the faulty parts of the seat belt systems (outer belt, inner belt, bolts, nuts, adjustable shoulder anchor, tether anchor hardware and other related parts).
When inspecting a vehicle that was recently in a collision, be sure to check all of the seat belt systems regardless of whether or not the system was activated in the collision. Replace any damaged or malfunctioning systems.



1. RUNNING TEST (IN SAFE AREA)
CAUTION:
Conduct this test in a safe area.
(a) Fasten the front seat belts.
(b) Drive the vehicle at 16 km/h (10 mph) and firmly depress the brakes. Check that the belts lock and cannot be extended at this time.
If a belt does not lock, replace the seat belt assembly (see page SB-9).
HINT:
Inspect a seat belt assembly before installing it (see page SB-10).

COMPONENTS


FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY
42 (428, 31)
w/ Curtain Shield Airbag
CENTER PILLAR GARNISH UPPER RH
CENTER PILLAR GARNISH UPPER RH
FRONT DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR SCUFF PLATE RH
FRONT DOOR SCUFF PLATE RH
42 (428, 31)
SHOULDER ANCHOR COVER
CENTER PILLAR GARNISH LOWER RH
COWL SIDE TRIM BOARD RH
42 (428, 31)
FRONT SEAT OUTER BELT ASSEMBLY RH
FLOOR ANCHOR COVER
42 (428, 31)
5.0 (51, 44 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
P
B119828E01

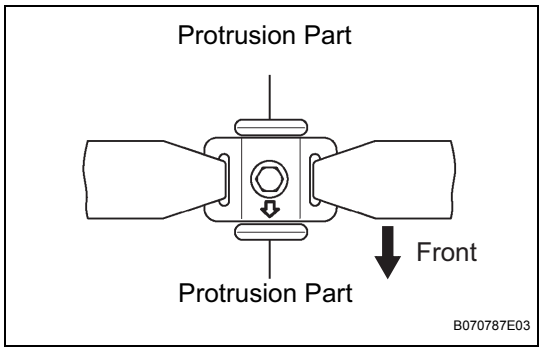
REMOVAL

1. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-12)**
2. **REMOVE REAR SEAT INNER BELT ASSEMBLY LH**
   (a) Remove the bolt and inner belt.
3. **REMOVE REAR SEAT INNER BELT ASSEMBLY RH**
   (a) Remove the bolt and inner belt.
4. **REMOVE REAR SEATBACK ASSEMBLY LH (See page SE-12)**
5. **REMOVE REAR SEATBACK ASSEMBLY RH (See page SE-12)**
6. **REMOVE CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Remove the 4 bolts and anchor bracket.

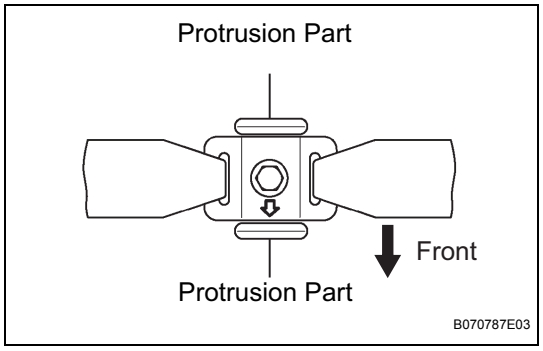
INSTALLATION

HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page IN-20).

1. **INSTALL CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Install the anchor bracket with the 4 bolts.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
2. **INSTALL REAR SEATBACK ASSEMBLY LH (See page SE-17)**
3. **INSTALL REAR SEATBACK ASSEMBLY RH (See page SE-17)**
4. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH**
   (a) Install the floor anchor and belt with the bolt, as shown in the illustration.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   NOTICE:
   Make sure that the anchor part does not run onto the protruding part of the floor panel.



5. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH**
   (a) Install the floor anchor and belt with the bolt, as shown in the illustration.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   NOTICE:
   Make sure that the anchor part does not run onto the protruding part of the floor panel.

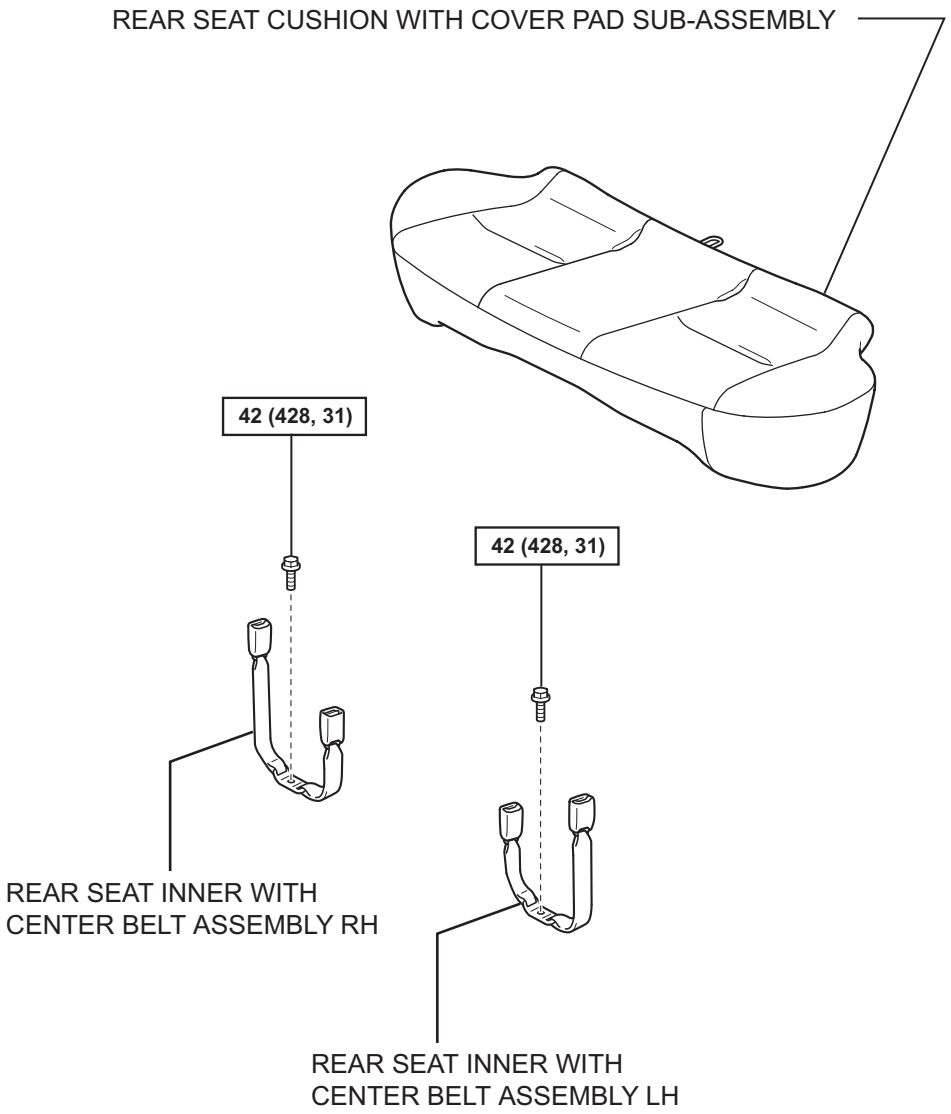


6. **INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-17)**

REAR SEAT INNER BELT ASSEMBLY

COMPONENTS

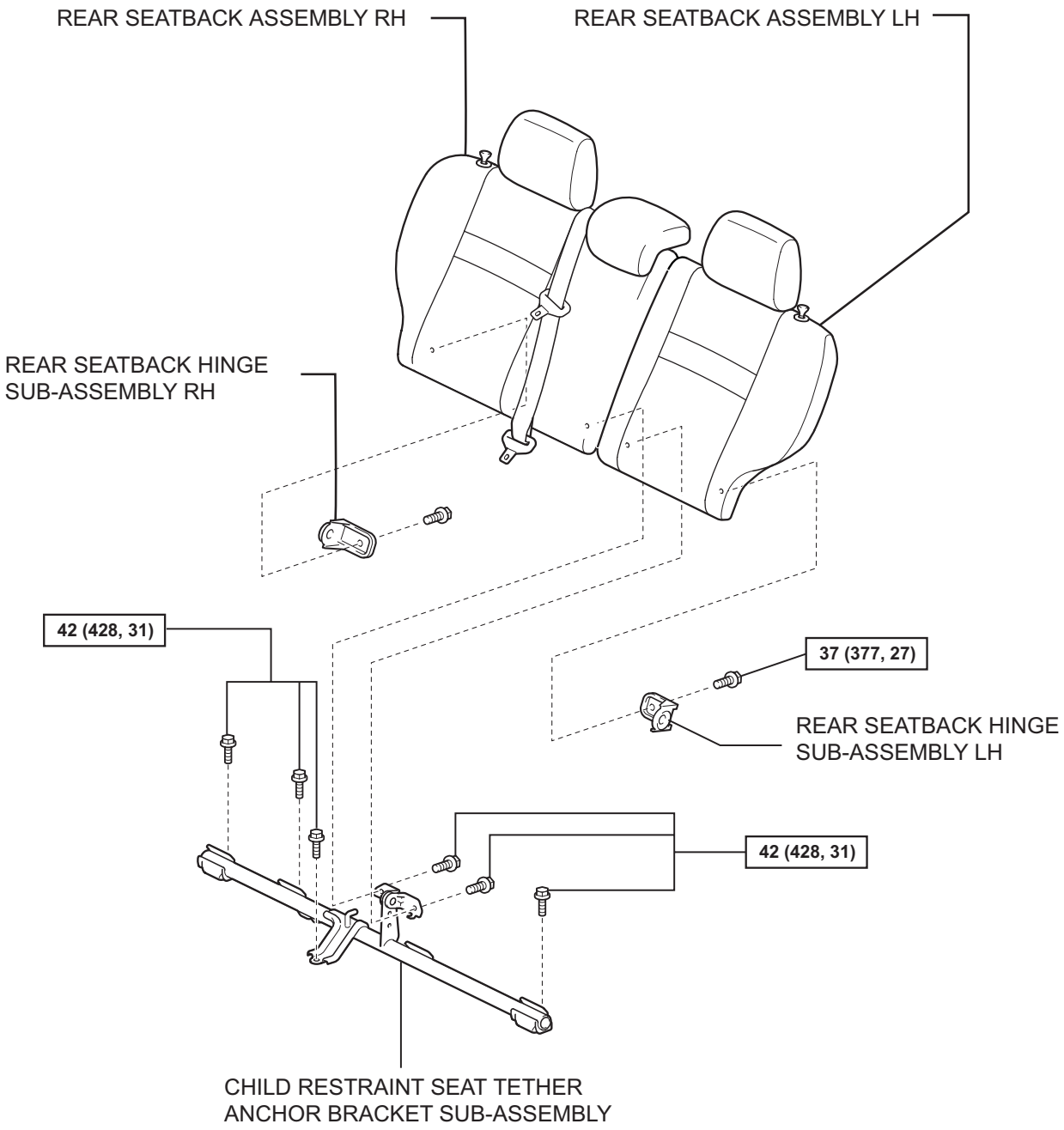
SB



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B121669E01



N*m (kgf*cm, ft.*lbf) : Specified torque

B121668E01

REMOVAL

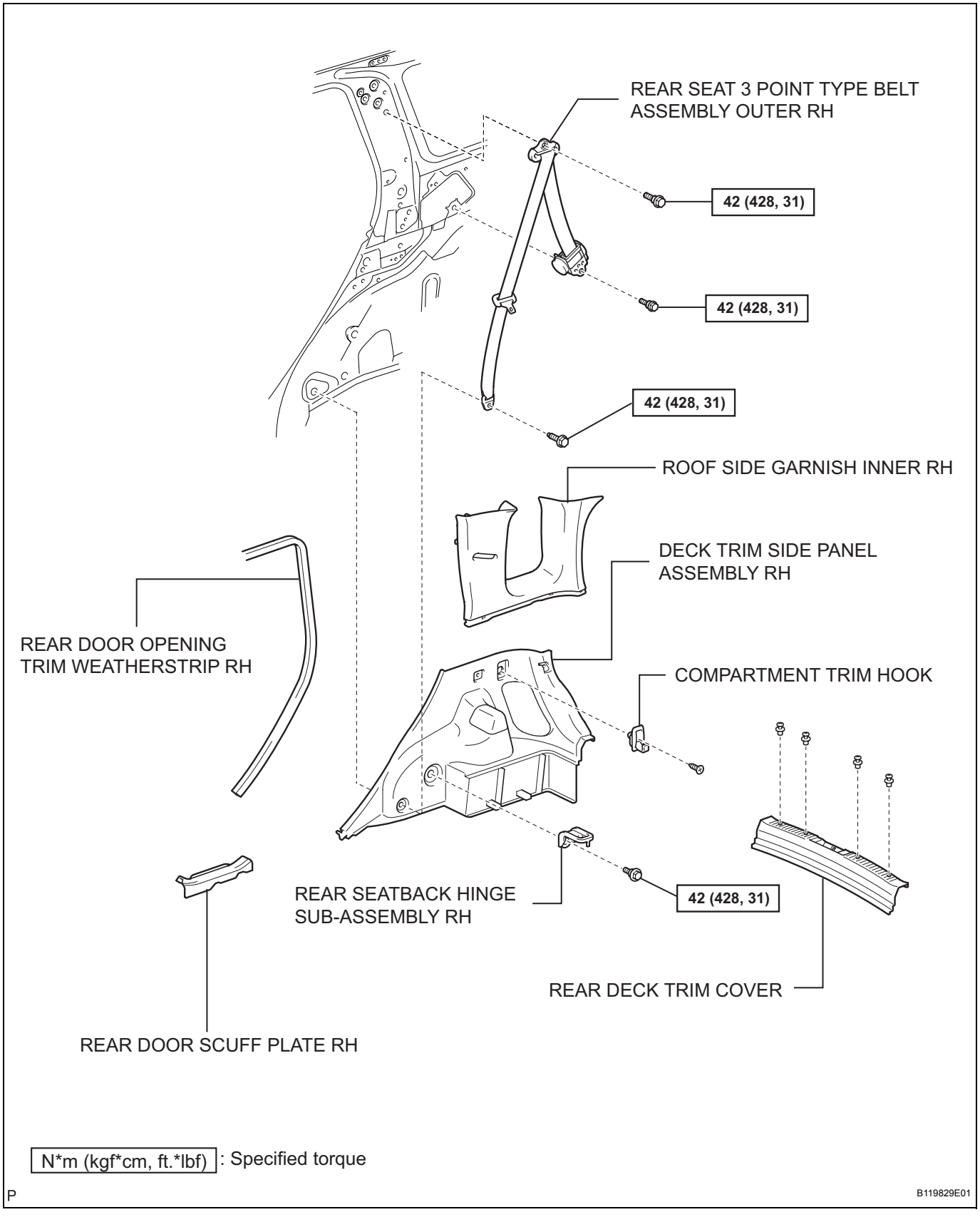
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-7)**
3. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
4. **REMOVE TONNEAU COVER ASSEMBLY**
5. **REMOVE NO. 1 DECK BOARD**
6. **REMOVE DECK FLOOR BOX RH (See page IR-8)**
7. **REMOVE SPARE WHEEL COVER ASSEMBLY**
8. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-12)**
9. **REMOVE REAR SEATBACK ASSEMBLY LH (See page SE-12)**
10. **REMOVE REAR SEATBACK ASSEMBLY RH (See page SE-12)**
11. **REMOVE REAR DECK TRIM COVER (See page IR-8)**
12. **REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (See page IR-9)**
13. **REMOVE ROOF SIDE GARNISH INNER RH (See page IR-9)**
14. **REMOVE REAR SEAT 3 POINT TYPE BELT ASSEMBLY RH**
    (a) Remove the 2 bolts and outer belt.
15. **REMOVE REAR SEAT BELT ASSEMBLY OUTER CENTER**
    HINT:
    RH side only.
    (a) Remove the rear seat headrest assembly (see page SE-13).
    (b) Remove the rear seatback lock release button (see page SE-13).
    (c) Remove the 2 tether anchor covers (see page SE-13).
    (d) Remove the 4 rear seat headrest supports (see page SE-13).
    (e) Remove the rear seatback stop button grommet (see page SE-14).

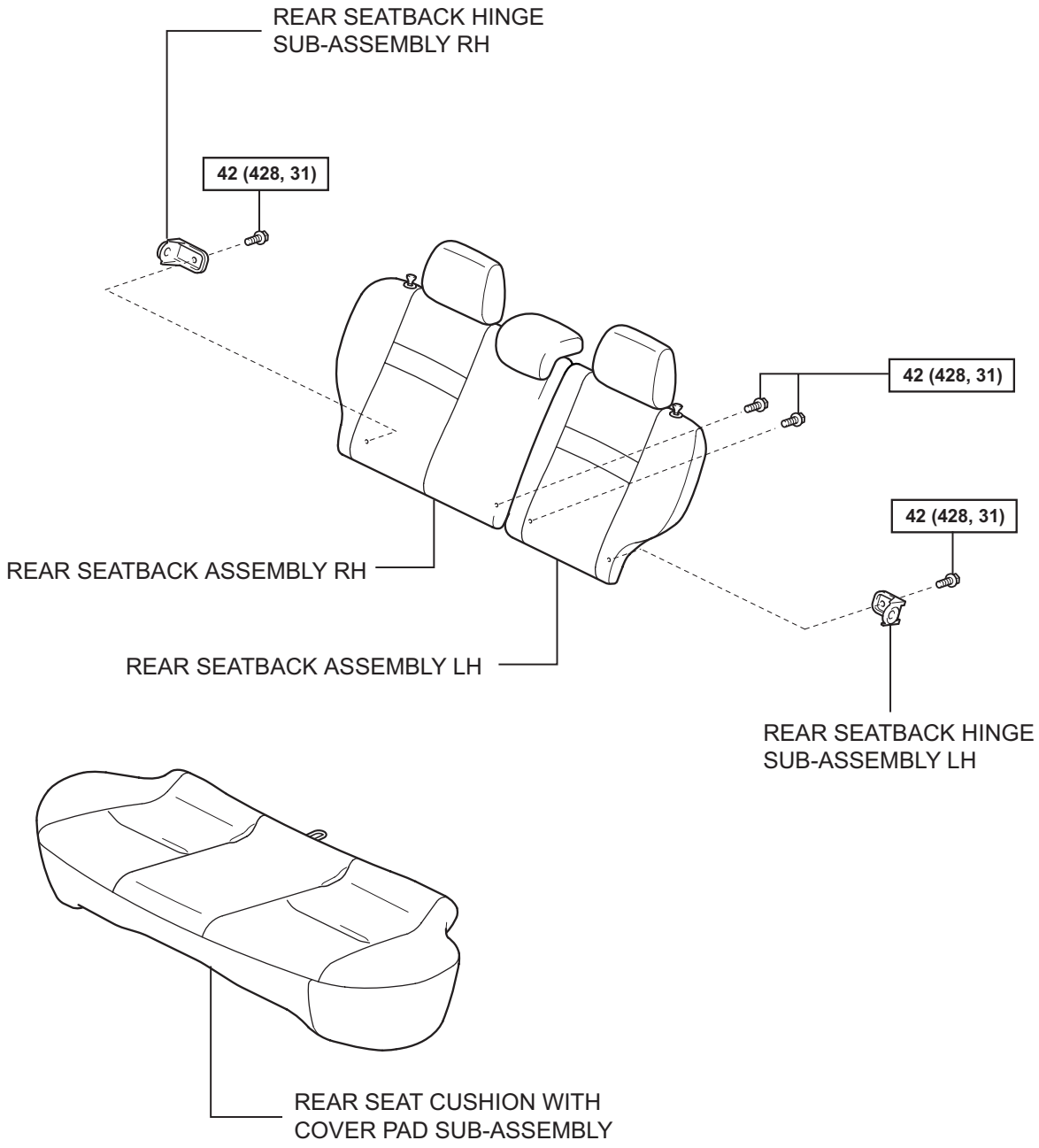
(f) Remove the rear seatback cover (with pad) RH (see page SE-14).
(g) Remove the nut on the retractor side and completely remove the belt.

REAR SEAT OUTER BELT ASSEMBLY

COMPONENTS



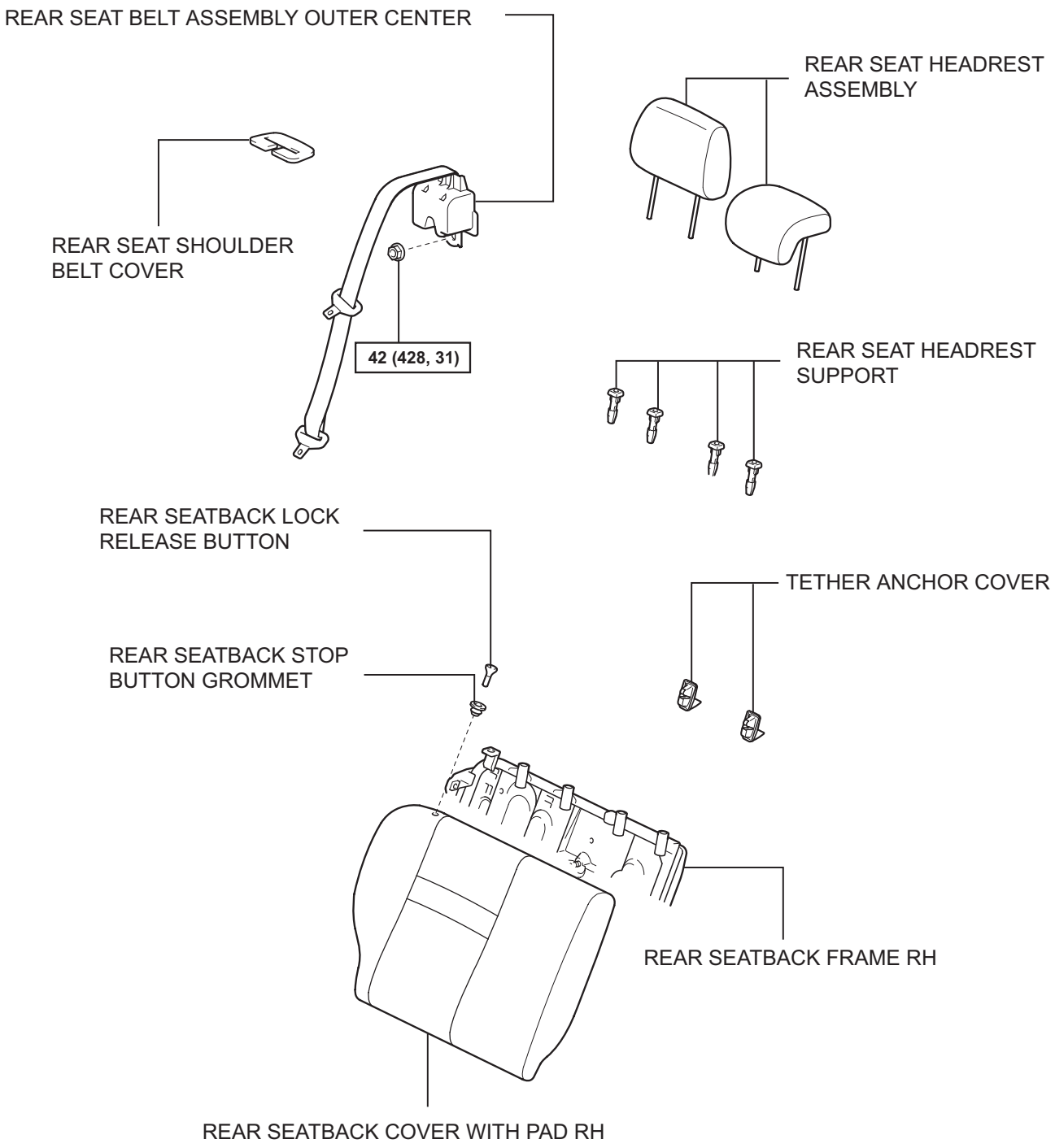
SB



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B121930E01

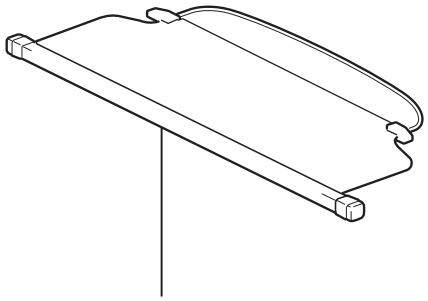


N*m (kgf*cm, ft.*lbf) : Specified torque

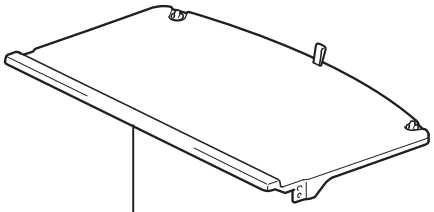
P

B122553E01

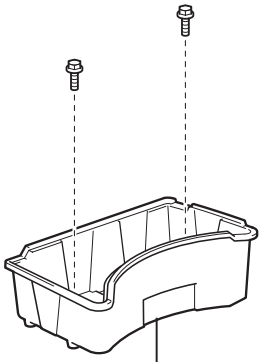
SB



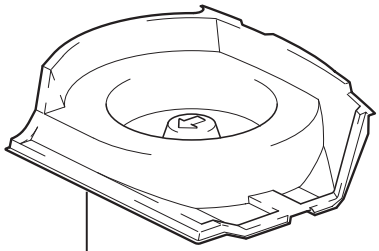
TONNEAU COVER ASSEMBLY



NO. 1 DECK BOARD



DECK FLOOR BOX RH



SPARE WHEEL COVER ASSEMBLY

P

B119831E01

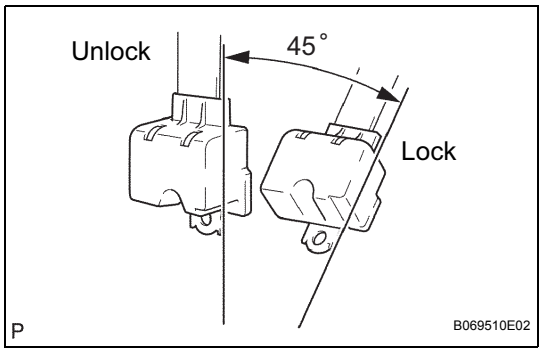
INSPECTION

1. INSPECT REAR SEAT OUTER BELT ASSEMBLY CENTER

NOTICE:

Do not disassemble the retractor.

(a) When the inclination of the retractor is 15°or less, check that the belt can be pulled from the retractor. When the inclination of the retractor is over 45°, check that the belt locks.
If the operation is not as specified, replace the belt.

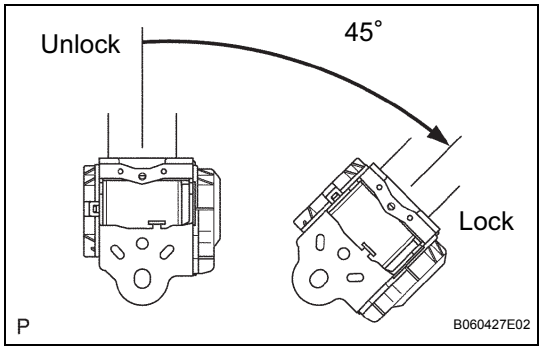


2. INSPECT REAR SEAT 3 POINT TYPE BELT ASSEMBLY

NOTICE:

Do not disassemble the retractor.

(a) When the inclination of the retractor is 15°or less, check that the belt can be pulled from the retractor. When the inclination of the retractor is over 45°, check that the belt locks.
If the operation is not as specified, replace the belt.



SB

SB

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL REAR SEAT OUTER BELT ASSEMBLY CENTER

(a) Install the belt with the nut.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

(b) Install the rear seatback cover (with pad) RH (see page SE-14).

(c) Install the rear seatback stop button grommet (see page SE-15).

(d) Install the 4 rear seat headrest supports (see page SE-15).

(e) Install the 2 tether anchor covers (see page SE-16).

(f) Install the rear seatback lock release button (see page SE-16).

(g) Install the rear seat headrest assembly (see page SE-16).

(h) With the belt installed, check that the belt locks when it is pulled out quickly.
NOTICE:
The check should be performed with the outer belt installed.
HINT:
The seat belt does not lock when it is pulled out to a length of 955 mm (37.60 in.) or less.
If the operation is not as specified, replace the belt.

(i) Check the fastening function of the child restraint system.
NOTICE:
The check should be performed with the outer belt installed.

(1) When the belt is pulled out fully, the belt should automatically try to retract.

(2) After the belt has fully retracted, the belt should be able to be pulled out and retracted again.
If the operation is not as specified, replace the belt.

2. INSTALL REAR SEAT 3 POINT TYPE BELT ASSEMBLY RH

(a) Install the belt with the bolt on the retractor side.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
NOTICE:
Make sure that the anchor part does not run onto the protruding part of the side panel.

(b) Install the belt with the bolt on the shoulder anchor side.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

(c) With the belt installed, check that the belt locks when it is pulled out quickly.
NOTICE:
The check should be performed with the outer belt assembly installed.
If the operation is not as specified, replace the belt.

(d) Check the fastening function of the child restraint system.
NOTICE:
The check should be performed with the outer belt assembly installed.
(1) When the belt is pulled out fully, the belt should automatically try to retract.
(2) After the belt has fully retracted, the belt should be able to be pulled out and retracted again. If the operation is not as specified, replace the belt.
If the operation is not as specified, replace the belt.

3. **INSTALL ROOF SIDE GARNISH INNER RH (See page IR-14)**

4. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH**
(a) Install the deck trim side panel assembly RH (see page IR-15).
(b) Install the rear seat 3 point type belt assembly RH with the bolt on the floor anchor side.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

5. **INSTALL REAR DECK TRIM COVER (See page IR-15)**

6. **INSTALL REAR SEATBACK ASSEMBLY RH (See page SE-17)**

7. **INSTALL REAR SEATBACK ASSEMBLY LH (See page SE-17)**

8. **INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-17)**

9. **INSTALL SPARE WHEEL COVER ASSEMBLY**

10. **INSTALL DECK FLOOR BOX RH (See page IR-15)**

11. **INSTALL NO. 1 DECK BOARD**

12. **INSTALL TONNEAU COVER ASSEMBLY**

13. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**

14. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-17)**

15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

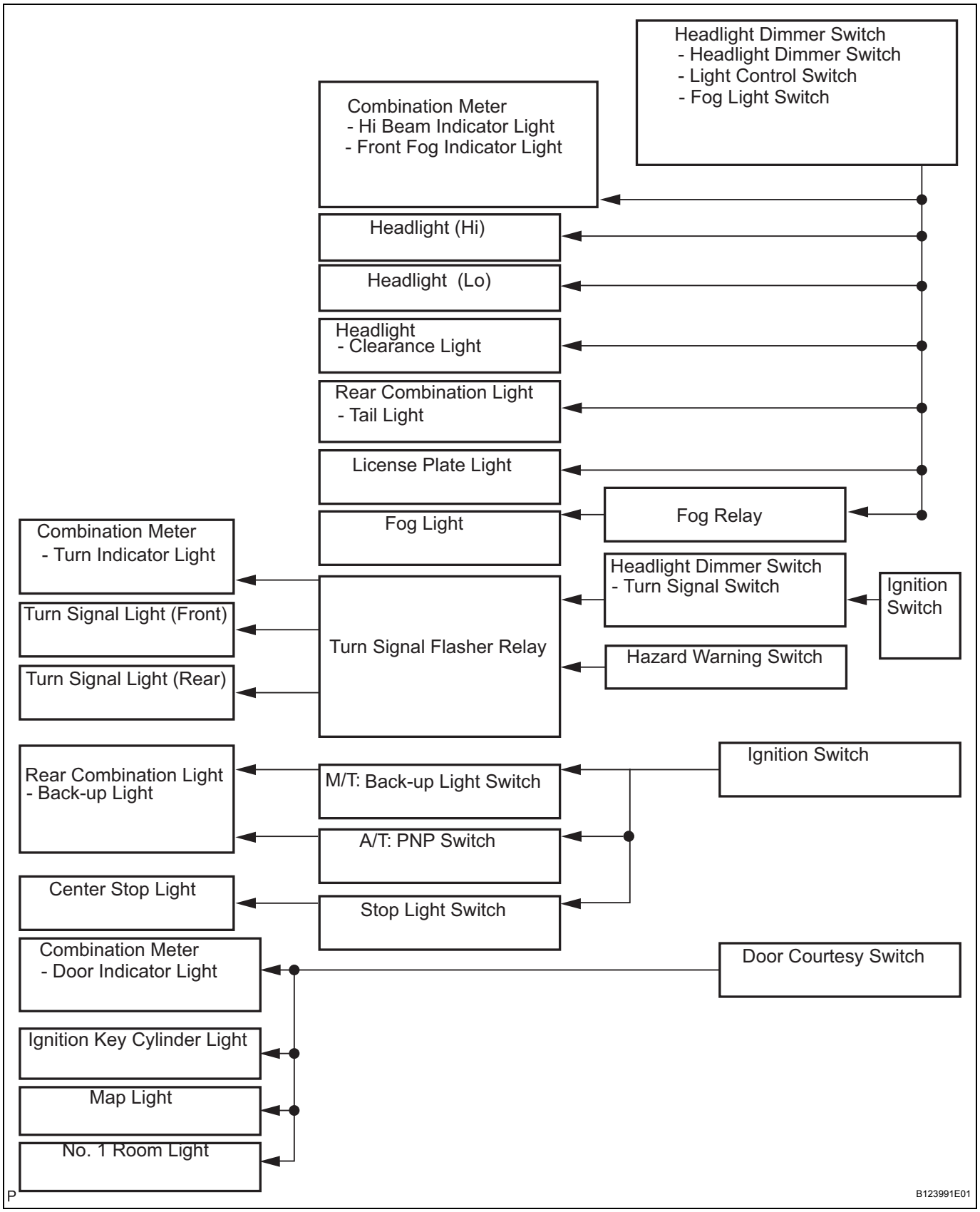
16. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

SYSTEM DIAGRAM



PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Headlight and taillight

Symptom	Suspected area	See page
"LO-Beam" does not come on (One side).	1. Bulb	-
	2. H-LP LH/H-LP LO RH fuse	-
	3. Wire harness	-
"LO-Beam" does not come on (All).	1. Headlight dimmer switch assembly	LI-31
	2. Wire harness	-
"HI-Beam" does not come on (One side).	1. Bulb	-
	2. H-LP LH/H-LP LO RH fuse	-
	3. Wire harness	-
"HI-Beam" does not come on (All).	1. Headlight dimmer switch assembly	LI-31
	2. Wire harness	-
"Flash" does not come on (All).	1. Headlight dimmer switch assembly	LI-31
	2. Wire harness	-
Headlight is dark.	1. Bulb	-
	2. Wire harness	-
Only one taillight comes on.	1. Bulb	-
	2. Wire harness	-
Both taillights do not come on (Headlights are normal).	1. TAIL fuse	-
	2. Headlight dimmer switch assembly	LI-31
	3. Wire harness	-
Both taillights do not come on (Headlights do not come on).	1. Headlight dimmer switch assembly	LI-31
	2. Wire harness	-

Front fog light system

Symptom	Suspected area	See page
Front fog lights do not come on with light control switch in the HEAD position (Headlights are normal).	1. FOG fuse	-
	2. Headlight dimmer switch assembly	LI-31
	3. Wire harness	-
Only one front fog light comes on.	1. Bulb	-
	2. Wire harness	-

Turn signal and hazard warning light system

Symptom	Suspected area	See page
"Hazard warning and Turn signal light" do not come on.	1. HAZ fuse	-
	2. Turn signal flasher relay	LI-40
	3. Wire harness	-
Hazard warning light does not come on (Turn signal is normal).	1. Hazard warning signal switch assembly	LI-31
	2. Turn signal flasher relay	LI-40
	3. Wire harness	-
Turn signal does not come on (Hazard warning light is normal).	1. Turn signal switch	LI-31
	2. Turn signal flasher relay	LI-40
	3. Wire harness	-

Symptom	Suspected area	See page
Turn signal does not come on in one direction.	1. Turn signal switch	LI-31
	2. Turn signal flasher relay	LI-40
	3. Wire harness	-
Only one bulb comes on.	1. Bulb	-
	2. Wire harness	-

Stop light system

Symptom	Suspected area	See page
Both stop lights do not come on.	1. STOP fuse	-
	2. Stop light switch assembly	LI-35
	3. Wire harness	-
Stop light always remains on.	1. Stop light switch assembly	LI-35
	2. Wire harness	-
Stop light does not come on (One side).	1. Bulb	-
	2. Wire harness	-

Back up light system

Symptom	Suspected area	See page
Both back-up lights do not come on.	1. GAUGE fuse	-
	2. Back-up light switch assembly (M/T)	LI-36
	3. Park/neutral position switch assembly (A/T)	AX-87
	4. Wire harness	-
Both back-up lights always remain ON.	1. Back-up light switch assembly (M/T)	LI-36
	2. Park/neutral position switch assembly (A/T)	AX-87
	3. Wire harness	-
Back-up light does not come on (One side).	1. Bulb	-
	2. Wire harness	-

Interior light system

Symptom	Suspected area	See page
Interior light does not come on (All).	1. DOME fuse	-
	2. Wire harness	-
Map light does not come on (No. 1 room light is normal).	1. Bulb	-
	2. Map light assembly	LI-27
	3. Wire harness	-
No. 1 room light does not come on (Map light is normal).	1. Bulb	-
	2. No. 1 room light assembly	LI-29
	3. Wire harness	-
Center cluster box illumination light does not come on.	1. Bulb	-
	2. Instrument cluster finish panel assembly center	LI-30
	3. Wire harness	-

ON-VEHICLE INSPECTION

1. CHECK ILLUMINATED ENTRY SYSTEM OPERATION

HINT:

The light that comes on upon entry is the No. 1 room light assembly.

(a) Turn the ignition switch OFF, close all the doors, and lock the driver's door.

(b) Unlock the driver's door, open one of the doors, and check that the No. 1 room light assembly comes on. Then, close the door and check that the No. 1 room light assembly goes off after approximately 15 seconds.

(c) Turn the ignition switch to the ON position, and open and close one of the doors. Check that the No. 1 room light assembly goes off immediately.

(d) Turn the ignition switch OFF.

(e) Open and close one of the doors to turn on the No. 1 room light assembly. Before the No. 1 room light assembly goes off, after approximately 15 seconds, turn the ignition switch to the ON position, and check that the No. 1 room light assembly goes off immediately.

(f) Turn the ignition switch OFF.

(g) Open and close one of the doors to turn on the No. 1 room light assembly. Before the No. 1 room light assembly goes off, after approximately 15 seconds, lock the driver's door, and check that the No. 1 room light assembly goes off immediately.

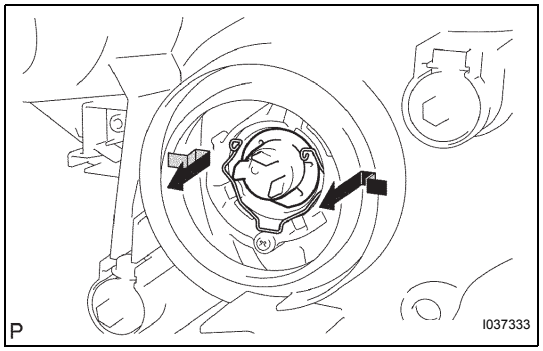
DISASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE HEADLIGHT SOCKET COVER

2. REMOVE NO. 1 HEADLIGHT BULB

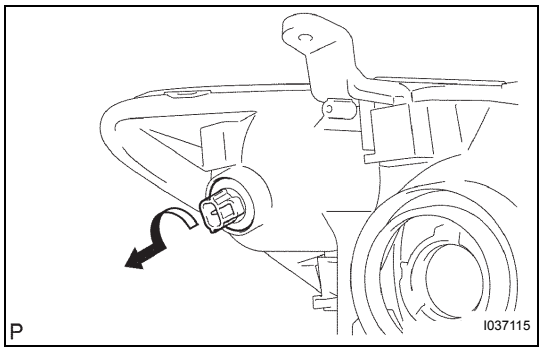
(a) Release the lock of the set spring and remove the bulb.



3. REMOVE FRONT TURN SIGNAL LIGHT BULB

(a) Remove the front turn signal light socket as shown in the illustration.

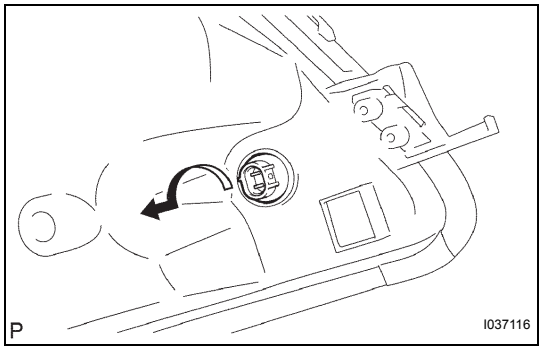
(b) Remove the light bulb from the socket.



4. REMOVE CLEARANCE LIGHT BULB

(a) Remove the clearance light socket as shown in the illustration.

(b) Remove the bulb from the socket.



LI

ADJUSTMENT

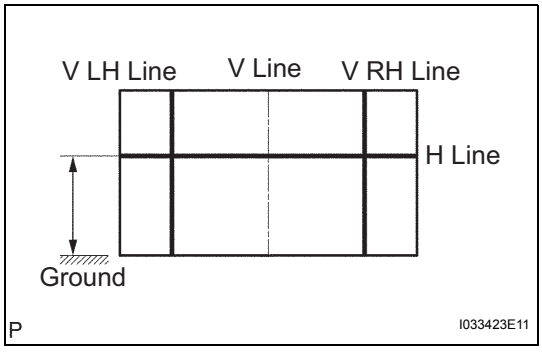
1. ADJUST HEADLIGHT AIM ONLY

HINT:

- Perform aiming adjustment with Low-beam.
- Since the Low-beam light and the High-beam light is a unit, if aiming on either side is correct, the other side should also be correct. However, check both beams just to make sure.

(a) Prepare vehicle in the following conditions.

- Check that any damage or deformation does not exist on the body around the headlights.
- Fuel tank is full.
- The tire inflation pressure is at the specified level. (See page TW-3)
- Vehicle is parked at a level surface.
- A person having an average weight (68 kg (149.14 lb.) sits in the driver's seat.
- Vehicle is bounced up and down to stabilize the suspension to the normal position.



(b) Prepare a thick white paper (Draw base lines).

HINT:

- Stand the paper perpendicular against a wall.
- The base lines differ for "Low-beam inspection" and "High-beam inspection".

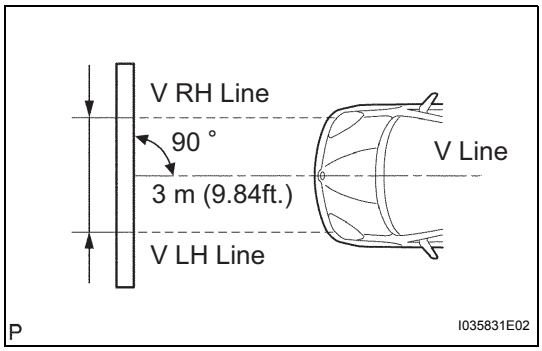
(1) V line (Vehicle center position): Draw a vertical line down the center of the paper in order to align it with the center of the vehicle.

(2) H line (Headlight height): Draw a horizontal line across the paper at the same height from the ground as the center mark for the Low-beam lights.

(3) V LH line, V RH line (Center mark position of right and left headlights): Draw vertical lines, for left & right, at the same position as the center mark for the Low-beam lights.

HINT:

Follow the same procedures when adjusting the High-beam lights.

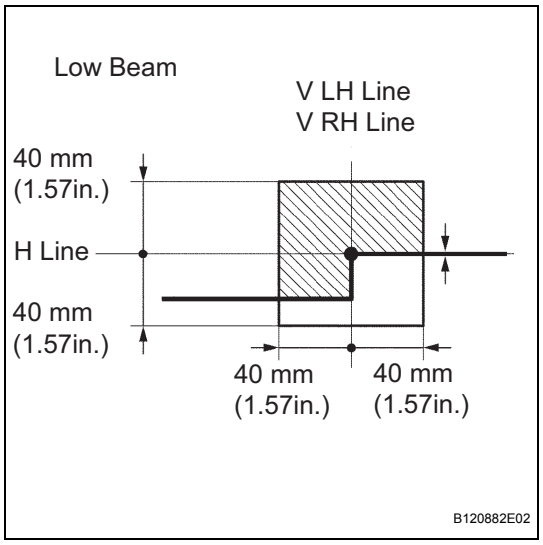


(c) Check the headlight aiming.

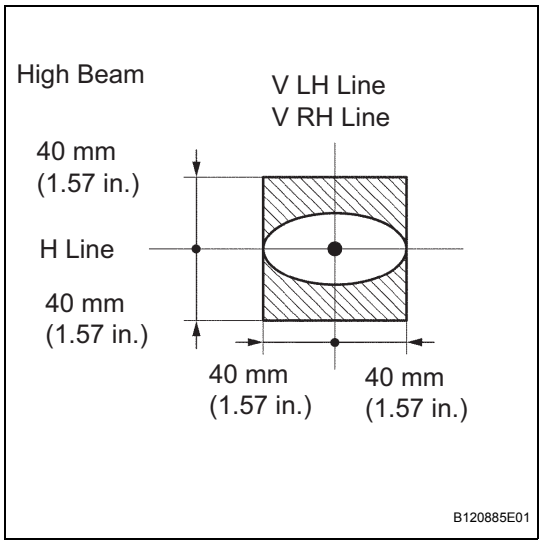
(1) Align the position of the paper and vehicle.

- Make the distance of 3 m (9.84 ft.) between the headlights and the paper, and put the paper on the wall with the H line being at the same height as the center mark.
- Align the center of the vehicle with the V line on the paper, and ensure that the paper is at a 90° angle in accordance to the V line.

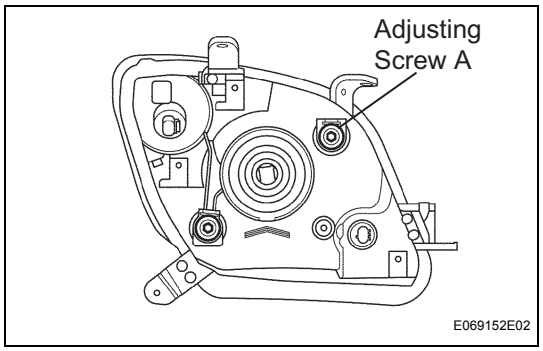
(2) Start the engine.



(3) Turn on the headlights and check that the aim is within the specified values shown in the illustration.



HINT:
When checking the aiming of the High-beam, shut off the Low-beam or disconnect the Low-beam headlight connector.



(d) Adjust the aiming in the vertical direction: Using a screwdriver, adjust the headlight aim to within the specified range by turning the adjusting screw A.
NOTICE:
- **Adjust the headlight aim by turning the screw in the tightening direction.**
- **When the screw is tightened excessively, loosen it once and re-tighten it to adjust the headlight aim.**

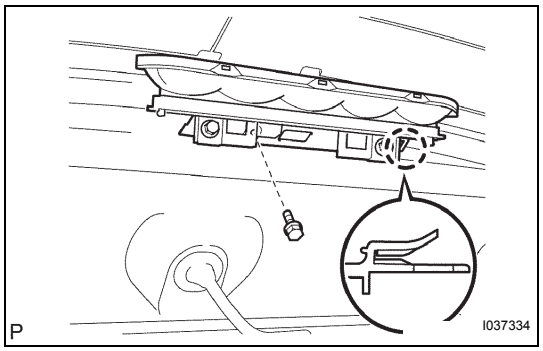
HINT:
The optical axis aim moves downward when turning the screwdriver clockwise, and it moves upward when turning the screwdriver counterclockwise.

LI

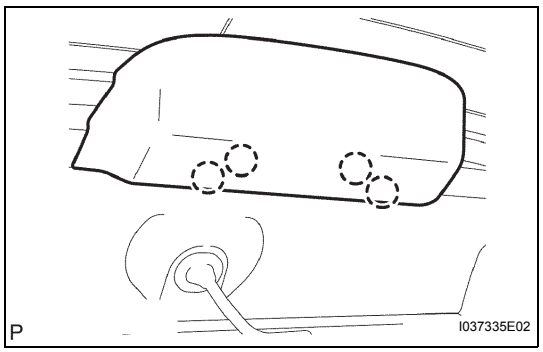
REASSEMBLY

1. **INSTALL HIGH MOUNTED STOP LIGHT BULB**
   (a) Install the light bulb to the light socket.
   (b) Install the light socket.

INSTALLATION



1. **INSTALL HIGH MOUNTED STOP LIGHT ASSEMBLY**
   (a) Attach the claw to install the stop light. Then install the bolt to the stop light.
   (b) Connect the connector.



2. **INSTALL HIGH MOUNTED STOP LIGHT COVER**
   (a) Attach the 4 claws to install the stop light.

3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

LI

LIGHTING SYSTEM

PRECAUTION

1. PRECAUTION OF HEADLIGHT BULB REPLACEMENT

(a) If the surface halogen light (headlight) is coated with oil, light service life is shortened because of the heat generated when the light is on.

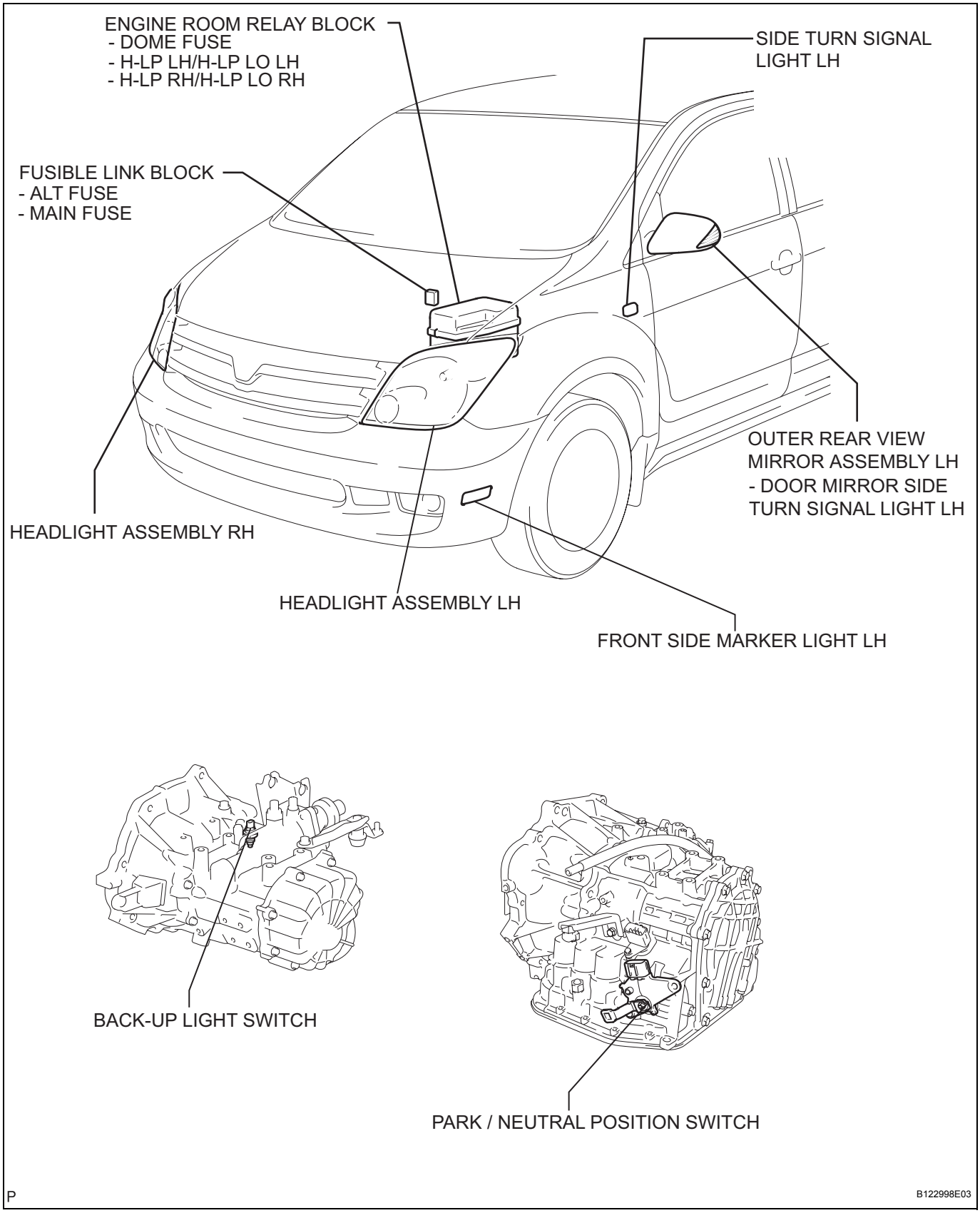
(b) Since the internal pressure of the halogen light bulb (headlight) is high, handle carefully. It may explode if dropped.

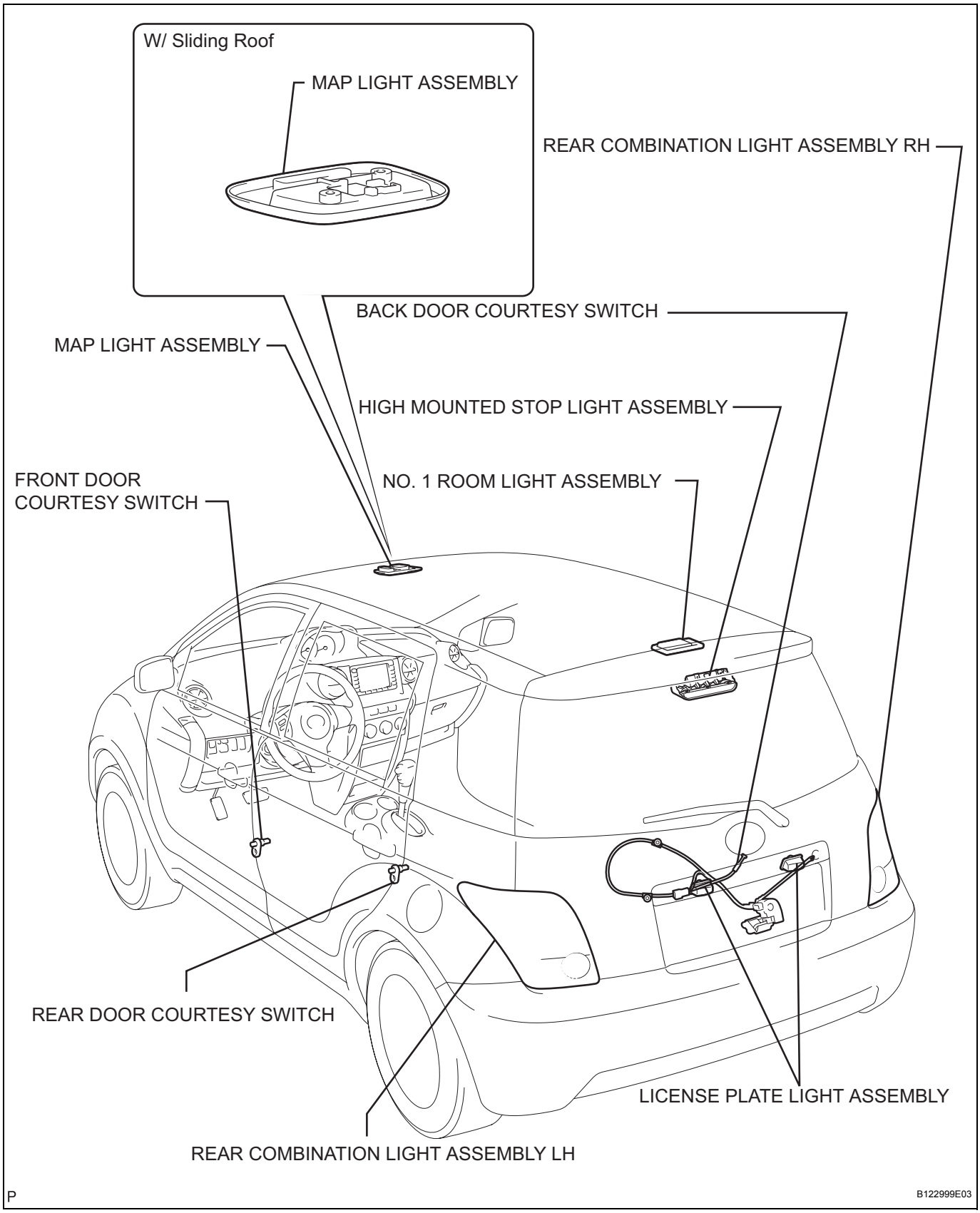
(c) Try not to handle the lens too much when changing the light because it could result in a dirty or moist lens. Always prepare a new bulb before starting the replacement.

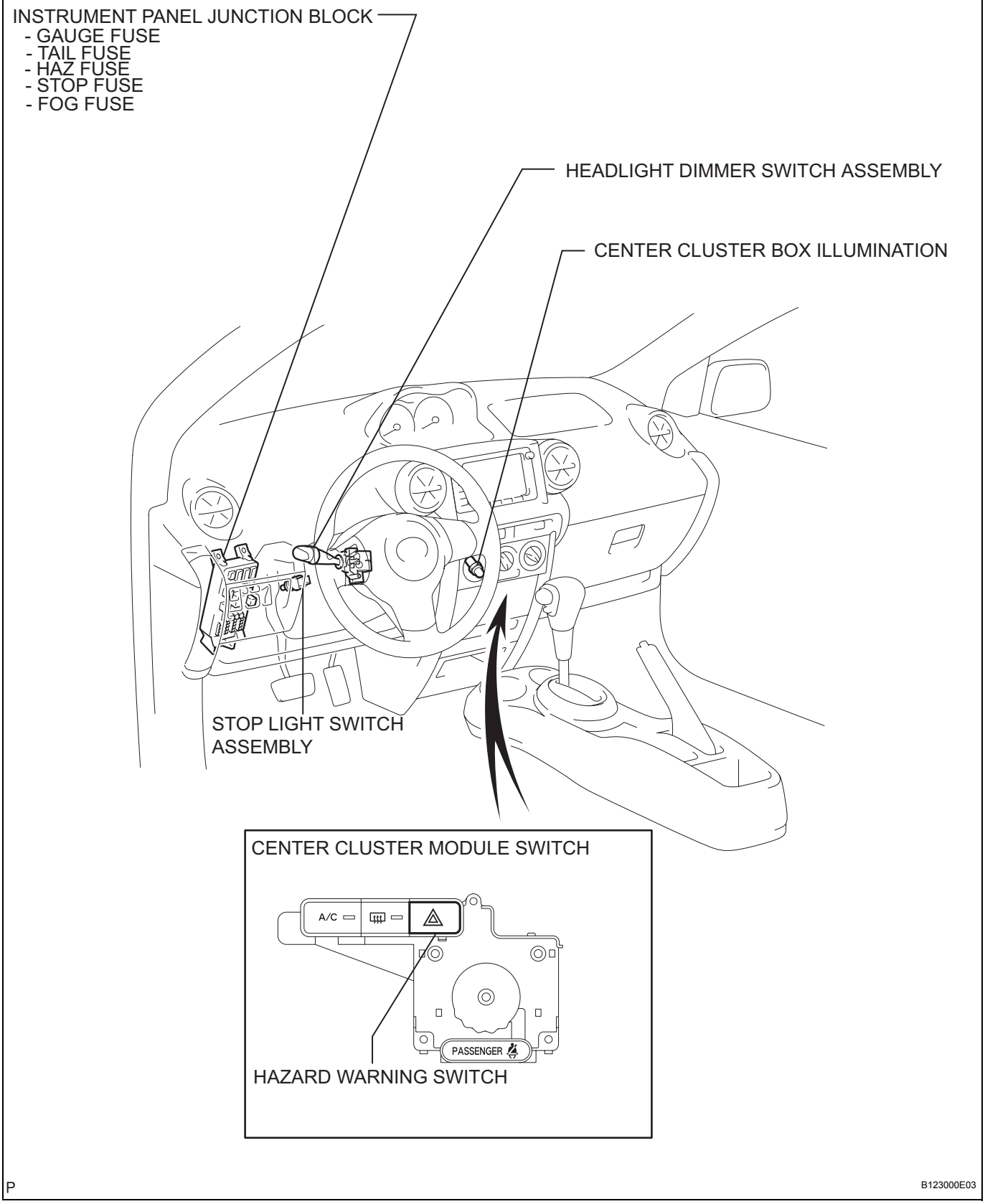
(d) Always replace the bulb with one of the same wattage.

(e) In order to avoid a cloudy lens or leakage, firmly reinstall the socket after bulb replacement.

PARTS LOCATION




W/ Sliding Roof
MAP LIGHT ASSEMBLY
REAR COMBINATION LIGHT ASSEMBLY RH
BACK DOOR COURTESY SWITCH
MAP LIGHT ASSEMBLY
HIGH MOUNTED STOP LIGHT ASSEMBLY
FRONT DOOR
COURTESY SWITCH
NO. 1 ROOM LIGHT ASSEMBLY
REAR DOOR COURTESY SWITCH
LICENSE PLATE LIGHT ASSEMBLY
REAR COMBINATION LIGHT ASSEMBLY LH
P
B122999E03



P

B123000E03

REASSEMBLY

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL CLEARANCE LIGHT BULB

(a) Install the bulb to the socket.

(b) Install the clearance light socket.

2. INSTALL FRONT TURN SIGNAL LIGHT BULB

(a) Install the bulb to the socket.

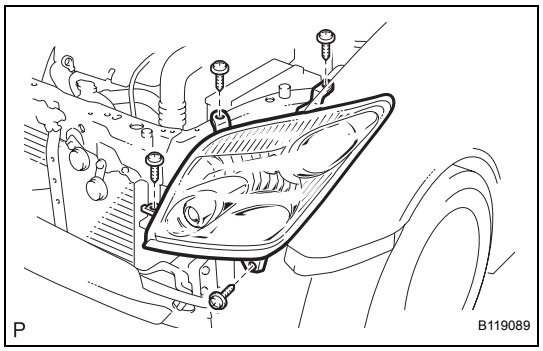
(b) Install the front turn signal light socket.

3. INSTALL NO.1 LIGHT BULB

(a) Release the lock of the set spring and install the headlight No. 1 bulb.

INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

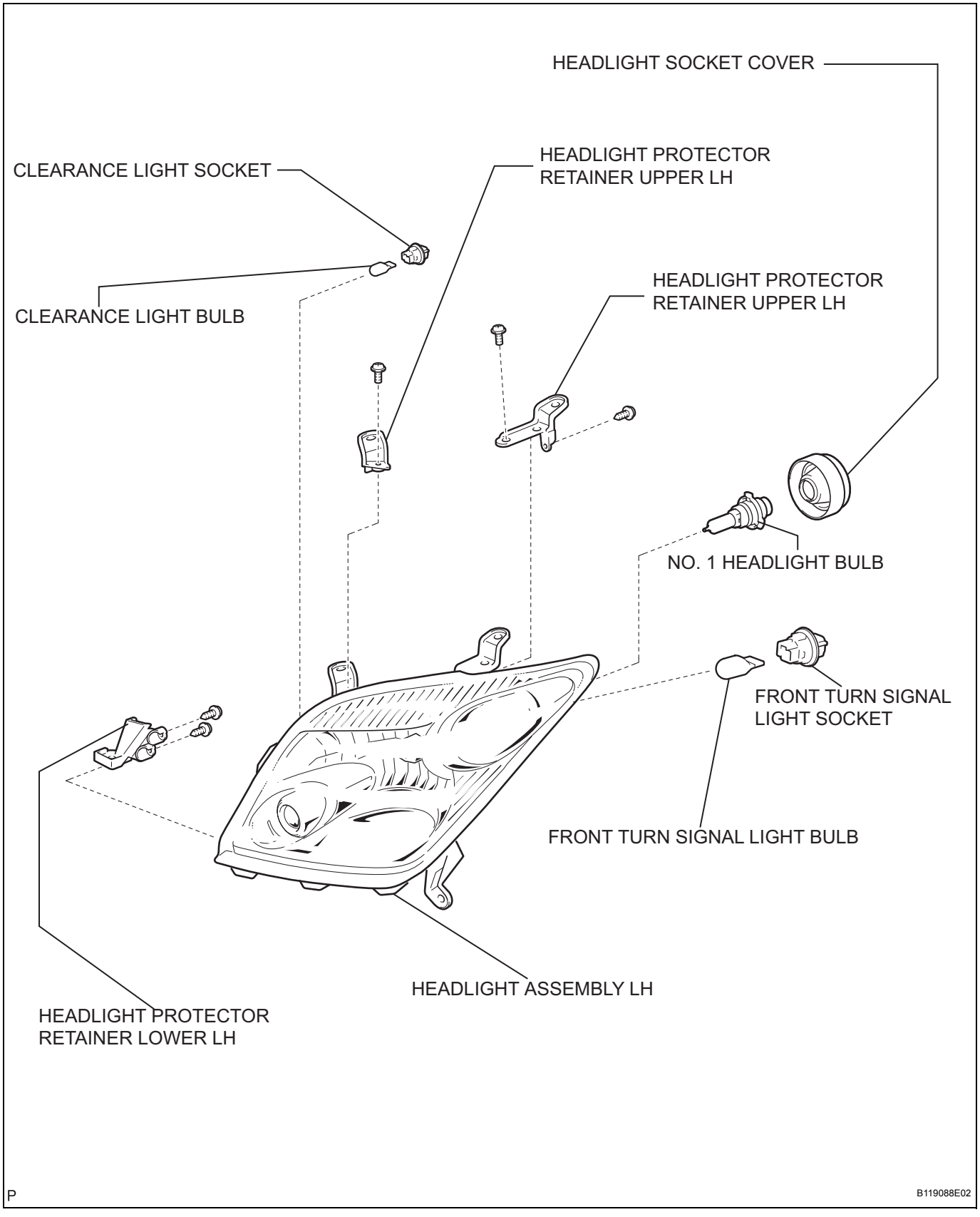


1. **INSTALL HEADLIGHT ASSEMBLY LH**
   (a) Install the headlight with the 4 screws.
   (b) Connect the connectors.
2. **INSTALL FRONT BUMPER COVER (See page ET-6)**
3. **INSTALL FRONT SPOILER PAD LH (See page ET-5)**
4. **INSTALL FRONT SPOILER PAD RH (See page ET-5)**
5. **INSTALL RADIATOR GRILLE (See page ET-14)**
6. **INSTALL HEADLIGHT ASSEMBLY (See page LI-11)**
7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
8. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

LI

HEADLIGHT ASSEMBLY

COMPONENTS

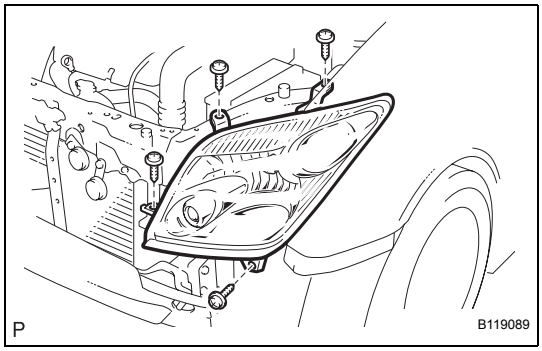


LI

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

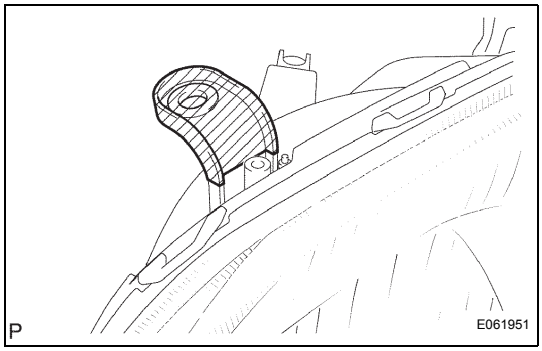
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE RADIATOR GRILLE (See page ET-13)**
3. **REMOVE FRONT SPOILER PAD LH (See page ET-4)**
4. **REMOVE FRONT SPOILER PAD RH (See page ET-4)**
5. **REMOVE FRONT BUMPER COVER (See page ET-3)**
6. **REMOVE HEADLIGHT ASSEMBLY LH**
   (a) Remove the 4 screws.
   (b) Disconnect the connectors.
   (c) Remove the headlight.



REPAIR

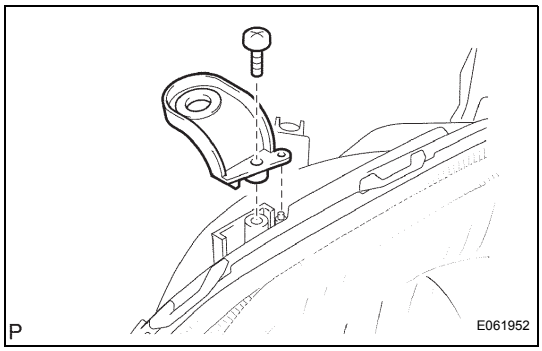
1. INSTALL HEADLIGHT PROTECTOR RETAINER UPPER RH

HINT:
To minimize damage to the headlight unit in case of a collision, the stays for the headlight unit have been constructed to break off. The stays are available as supply parts for low-cost repair.



(a) Cut off the part shaded in the illustration and smooth with sandpaper.

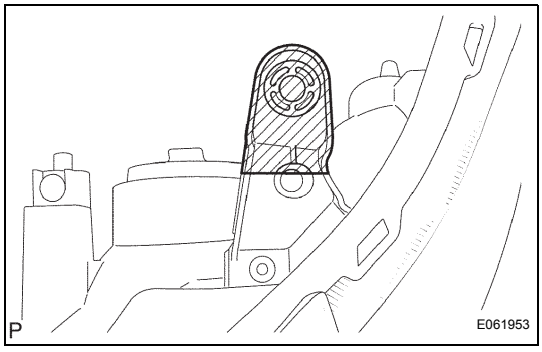
NOTICE:
After cutting off the part, place the headlight protector retainer upper LH against the bosses and gradually file any interfering part until the proper conditions for installation are met.



(b) Install the retainer with the screw.

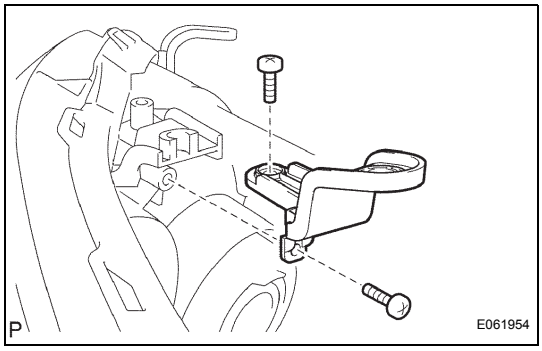
2. INSTALL HEADLIGHT PROTECTOR RETAINER UPPER LH

HINT:
To minimize damage to the headlight unit in case of a collision, the stays for the headlight unit have been constructed to break off. The stays are available as supply parts for low-cost repair.



(a) Cut off the part shaded in the illustration and smooth it with sandpaper.

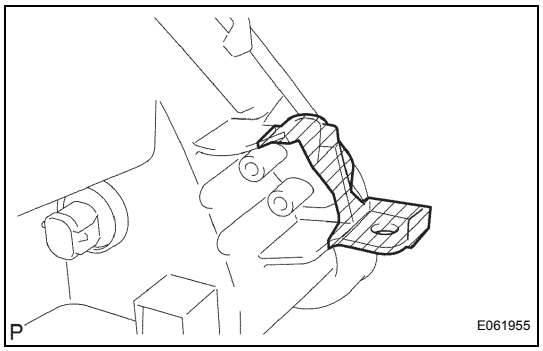
NOTICE:
After cutting off the part, place the headlight protector retainer upper LH against the bosses and gradually file any interfering part until the proper conditions for installation are met.



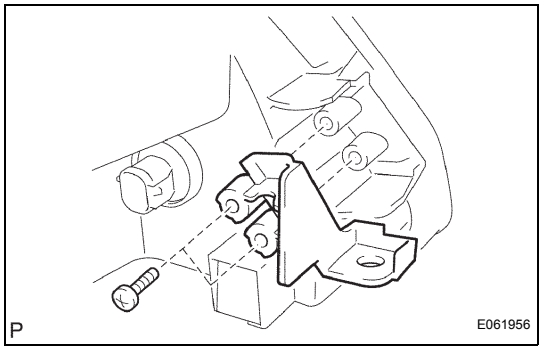
(b) Install the retainer with the 2 screws.

3. INSTALL HEADLIGHT PROTECTOR RETAINER LOWER LH

HINT:
To minimize damage to the headlight unit in case of a collision, the stays for the headlight unit have been constructed to break off. The stays are available as supply parts for low-cost repair.



(a) Cut off the part shaded in the illustration and smooth with sandpaper.
NOTICE:
After cutting off the part, place the headlight protector retainer lower LH against the bosses and gradually file any interfering part until the proper conditions for installation are met.

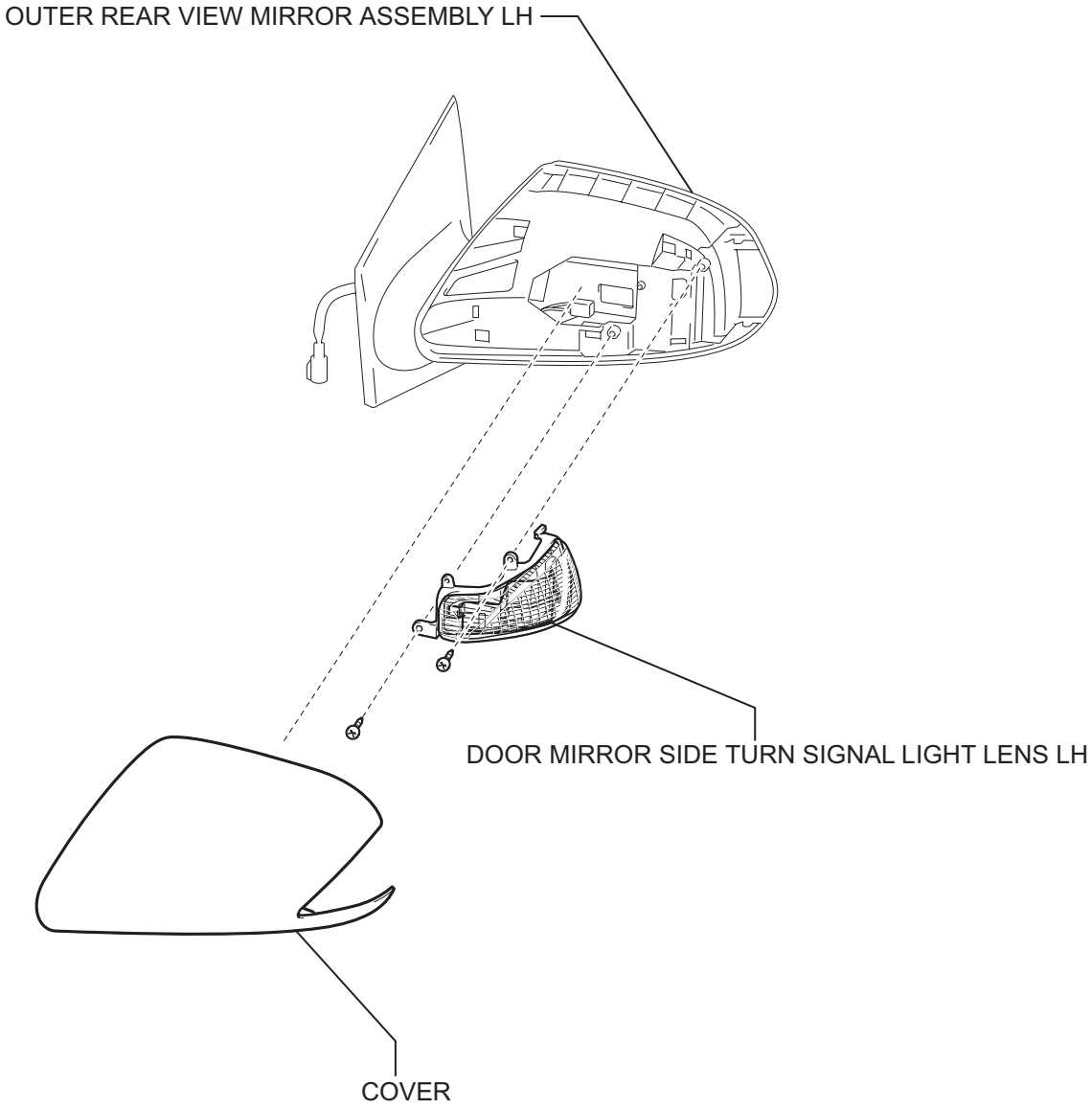


(b) Install the retainer with the 2 screws.

SIDE TURN SIGNAL LIGHT ASSEMBLY

COMPONENTS

Door Mirror Side Turn Signal Light



P

B119090E01

LI

LI

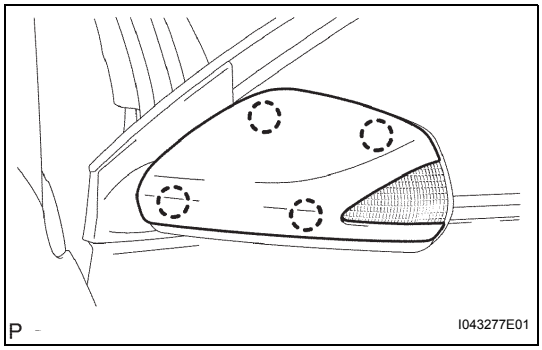
REMOVAL

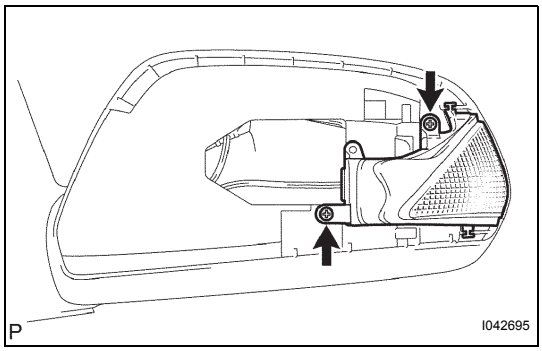
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY LH (See page MI-7)**

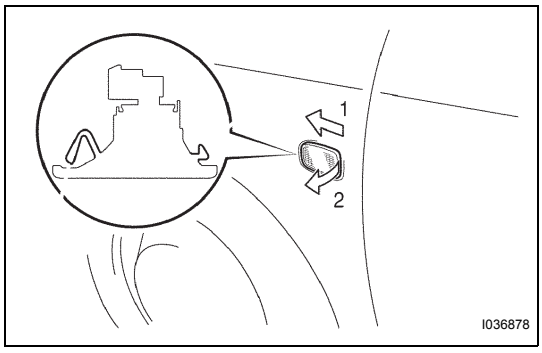
3. **REMOVE DOOR MIRROR SIDE TURN SIGNAL LIGHT LENS LH**
   (a) Detach the 4 claws and remove the cover.





   (b) Remove the 2 screws.
   (c) Disconnect the connector and remove the side turn signal light lens.

4. **REMOVE SIDE TURN SIGNAL LIGHT ASSEMBLY LH**
   (a) Pull the side turn signal light lens LH as shown in the illustration, and detach the claw.
   (b) Disconnect the connector and remove the light.



DISASSEMBLY

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE SIDE TURN SIGNAL LIGHT BULB

(a) Remove the light socket.

(b) Remove the light bulb from the light socket.

REASSEMBLY

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL SIDE TURN SIGNAL LIGHT BULB

(a) Install the light bulb to the light socket.

(b) Install the light socket.

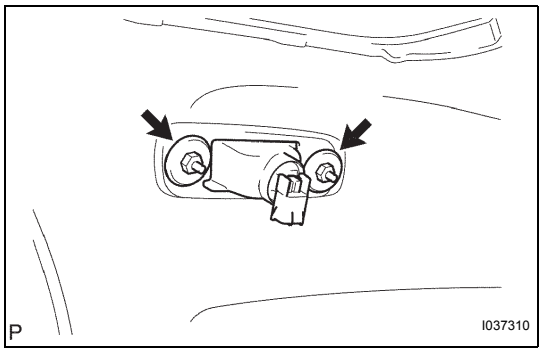
FRONT SIDE MARKER LIGHT ASSEMBLY

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

LI

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE RADIATOR GRILLE (See page ET-13)**
3. **REMOVE FRONT SPOILER PAD LH (See page ET-4)**
4. **REMOVE FRONT SPOILER PAD RH (See page ET-4)**
5. **REMOVE FRONT BUMPER COVER (See page ET-3)**
6. **REMOVE FRONT SIDE MARKER LIGHT ASSEMBLY LH**
   (a) Remove the 2 nuts and front marker light.



DISASSEMBLY

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE FRONT SIDE MARKER LIGHT BULB

(a) Remove the light socket.

(b) Remove the light bulb from the light socket.

INSTALLATION

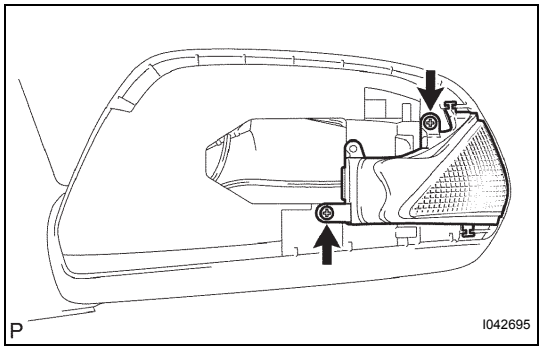
HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL SIDE TURN SIGNAL LIGHT ASSEMBLY LH

(a) Connect the connector and install the side turn signal light.

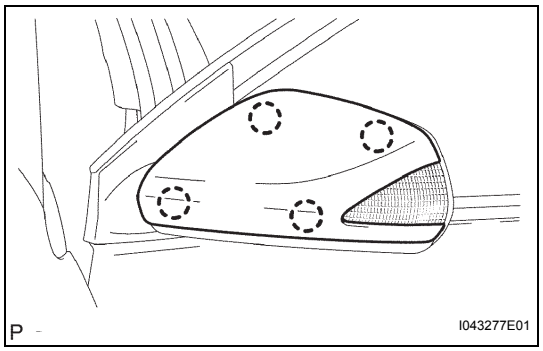
(b) Attach the side turn signal light with the 2 claws and install the light.



2. INSTALL DOOR MIRROR SIDE TURN SIGNAL LIGHT LENS LH

(a) Connect the connector and install the side turn signal light lens.

(b) Install the 2 screws.



(c) Attach the 4 claws and install the cover.

3. INSTALL OUTER REAR VIEW MIRROR ASSEMBLY LH (See page MI-9)

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. PERFORM INITIALIZATION

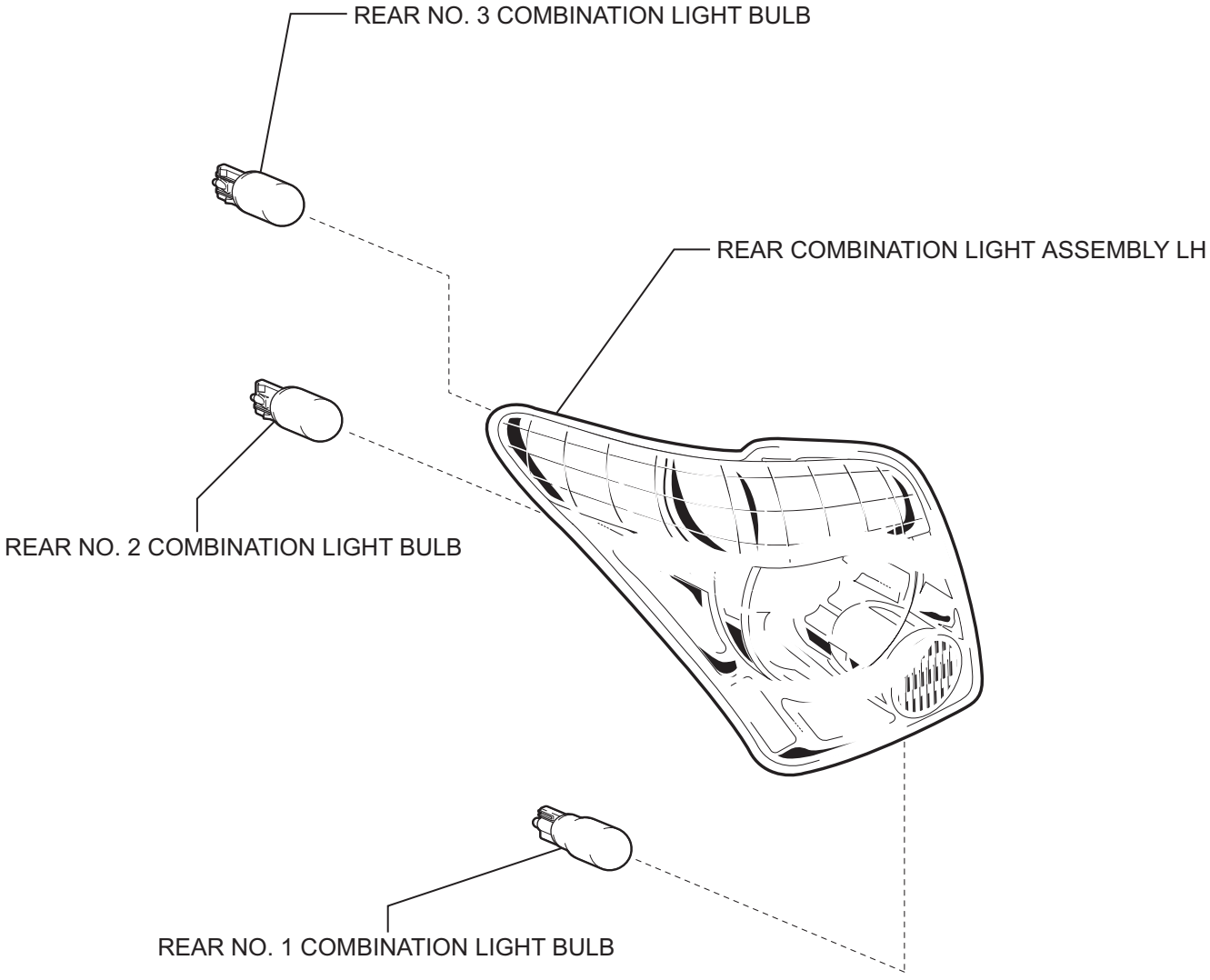
(a) Perform initialization (see pageIN-23).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

REAR COMBINATION LIGHT ASSEMBLY

COMPONENTS



P

B119092E01

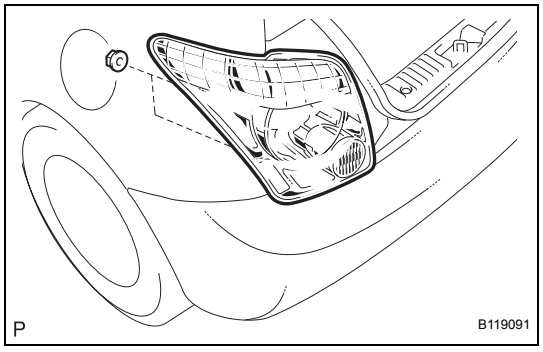
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE REAR COMBINATION LIGHT SERVICE COVER LH

3. REMOVE REAR COMBINATION LIGHT ASSEMBLY LH
(a) Disconnect the connector.
(b) Remove the 2 nuts and rear combination light.



REASSEMBLY

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL FRONT SIDE MARKER LIGHT BULB

(a) Install the light bulb to the light socket.

(b) Install the light socket.

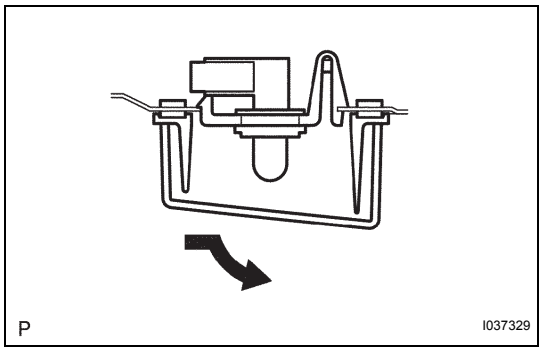
INSTALLATION

1. **INSTALL FRONT SIDE MARKER LIGHT ASSEMBLY LH**
   (a) Install the front marker light.
   (b) Install the 2 nuts.
2. **INSTALL FRONT BUMPER COVER (See page ET-6)**
3. **INSTALL FRONT SPOILER PAD LH (See page ET-5)**
4. **INSTALL FRONT SPOILER PAD RH (See page ET-5)**
5. **INSTALL RADIATOR GRILLE (See page ET-14)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

LICENSE PLATE LIGHT ASSEMBLY

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE BACK DOOR TRIM BOARD ASSEMBLY (See page ED-36)**
3. **REMOVE BACK DOOR OUTSIDE HANDLE (See page ED-37)**
4. **REMOVE BACK DOOR LOCK CYLINDER ASSEMBLY (See page ED-37)**
5. **REMOVE BACK DOOR GARNISH SUB-ASSEMBLY OUTSIDE (See page ET-35)**
6. **REMOVE LICENSE PLATE LIGHT ASSEMBLY**
   (a) Disconnect the connector.
   (b) Detach the 2 claws and remove the license plate light.



DISASSEMBLY

1. REMOVE LICENSE PLATE LIGHT BULB

(a) Remove the license plate light bulb, license plate light socket and wire as a unit.

(b) Remove the light bulb from the light socket and wire.

2. REMOVE LICENSE PLATE LIGHT LENS

DISASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE REAR NO. 1 COMBINATION LIGHT BULB
(a) Remove the light socket.
(b) Remove the light bulb from the light socket.

2. REMOVE REAR NO. 2 COMBINATION LIGHT BULB
(a) Remove the light socket.
(b) Remove the light bulb from the light socket.

3. REMOVE REAR NO. 3 COMBINATION LIGHT BULB
(a) Remove the light socket.
(b) Remove the light bulb from the light socket.

REASSEMBLY

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL REAR NO. 3 COMBINATION LIGHT BULB

(a) Install the light bulb to the light socket.

(b) Install the light socket.

2. INSTALL REAR NO. 2 COMBINATION LIGHT BULB

(a) Install the light bulb to the light socket.

(b) Install the light socket.

3. INSTALL REAR NO. 1 COMBINATION LIGHT BULB

(a) Install the light bulb to the light socket.

(b) Install the light socket.

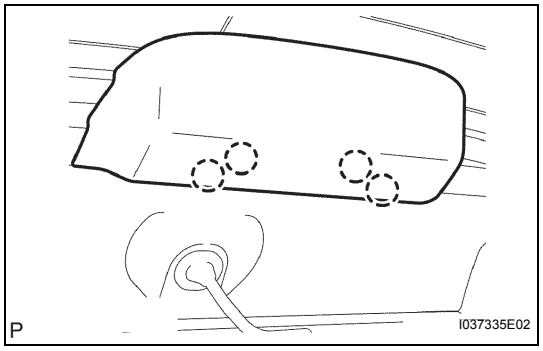
HIGH MOUNTED STOP LIGHT ASSEMBLY

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

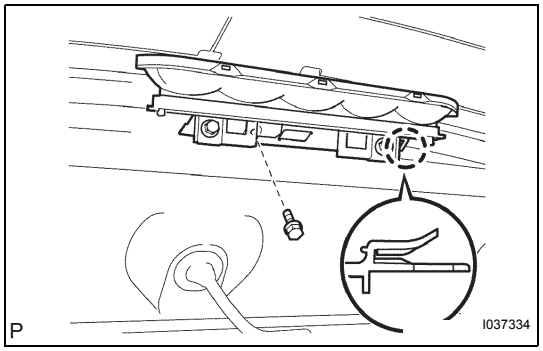
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



2. REMOVE HIGH MOUNTED STOP LIGHT COVER

(a) Detach the 4 claws and remove the stop light cover.



3. REMOVE HIGH MOUNTED STOP LIGHT ASSEMBLY

(a) Disconnect the connector.

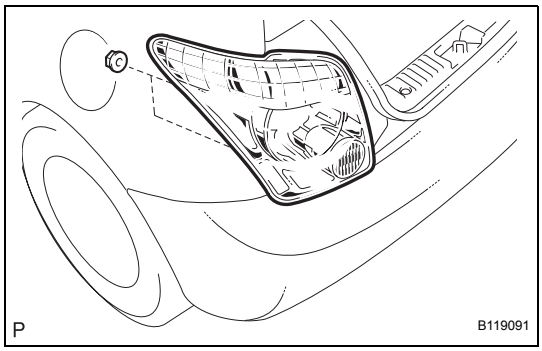
(b) Detach the claw, remove the bolt and stop light.

DISASSEMBLY

1. REMOVE HIGH MOUNTED STOP LIGHT BULB

(a) Remove the light socket.

(b) Remove the light bulb from the light socket.



INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

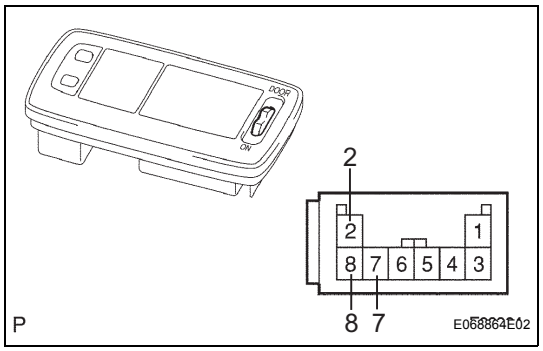
1. **INSTALL REAR COMBINATION LIGHT ASSEMBLY LH**
   (a) Install the rear combination light with the 2 nuts.
   (b) Connect the connector.
2. **INSTALL REAR COMBINATION LIGHT SERVICE COVER LH**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

MAP LIGHT ASSEMBLY

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE MAP LIGHT ASSEMBLY (w/ Sliding Roof) (See page RF-12)**
3. **REMOVE MAP LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-11)**

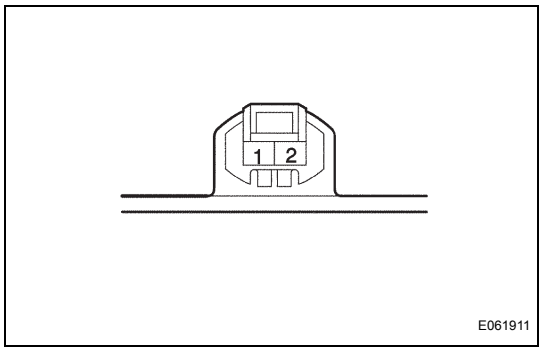
INSPECTION



1. **INSPECT MAP LIGHT ASSEMBLY (w/ Sliding Roof)**
   (a) Measure the resistance of the light.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 8	ON	Light comes on
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 7	DOOR	Light comes on
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 7 Battery negative (-) → Terminal 8	OFF	Light dose not come on

If the result is not as specified, replace the map light assembly.



2. **INSPECT MAP LIGHT ASSEMBLY (w/o Sliding Roof)**
   (a) Measure the resistance of the light.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	ON	Light comes on
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	DOOR	Light comes on
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	OFF	Light dose not come on

If the result is not as specified, replace the map light assembly.

INSTALLATION

1. **REMOVE MAP LIGHT ASSEMBLY (w/ Sliding Roof) (See page RF-12)**
2. **REMOVE MAP LIGHT ASSEMBLY (w/o Sliding Roof)**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

REASSEMBLY

1. INSTALL LICENSE PLATE LIGHT LENS

2. INSTALL LICENSE PLATE LIGHT BULB

(a) Install the light bulb to the light socket.

(b) Install the light bulb, light socket and wire as a unit.

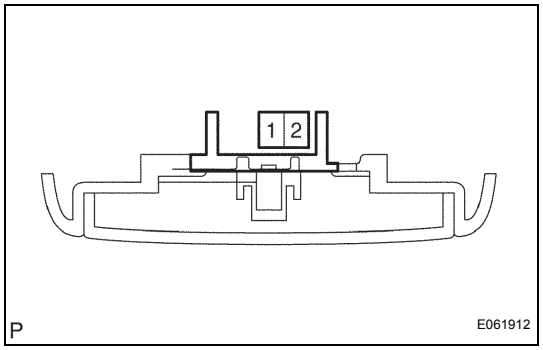
INSTALLATION

1. **INSTALL LICENSE PLATE LIGHT ASSEMBLY**
   (a) Attach the 2 claws and install the license plate light.
   (b) Connect the connector.
2. **INSTALL BACK DOOR GARNISH SUB-ASSEMBLY OUTSIDE (See page ET-35)**
3. **INSTALL BACK DOOR LOCK CYLINDER ASSEMBLY (See page ED-40)**
4. **INSTALL BACK DOOR OUTSIDE HANDLE (See page ED-39)**
5. **INSTALL BACK DOOR TRIM BOARD ASSEMBLY (See page ED-40)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

ROOM LIGHT ASSEMBLY

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 1 ROOM LIGHT ASSEMBLY (See page IR-11)**



INSPECTION

1. **INSPECT NO. 1 ROOM LIGHT ASSEMBLY**
   (a) Measure the resistance of the light.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	ON	Light comes on
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	DOOR	Light comes on
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	OFF	Light does not come on

If the result is not as specified, replace the light assembly.

INSTALLATION

1. **INSTALL NO. 1 ROOM LIGHT ASSEMBLY (See page IR-13)**
2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

INSTALLATION

1. **INSTALL HEADLIGHT DIMMER SWITCH ASSEMBLY**
   (a) Attach the claw to install the headlight dimmer switch.
   (b) Connect the connector.
2. **INSTALL STEERING COLUMN COVER (See page SR-13)**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

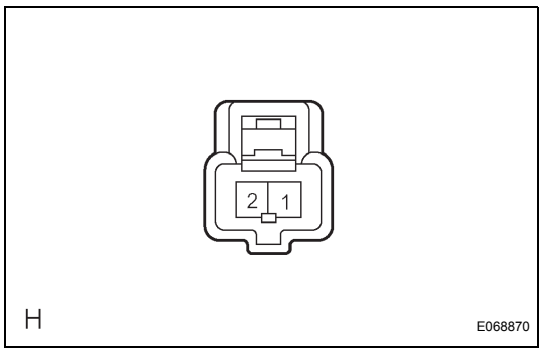
CENTER CLUSTER BOX ILLUMINATION

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
4. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER (See page IP-6)**
5. **REMOVE CENTER CLUSTER BOX ILLUMINATION**
   (a) Disconnect the connector.
   (b) Remove the light.

INSPECTION

1. **INSPECT CENTER CLUSTER BOX ILLUMINATION**
   (a) Inspect center cluster box illumination light operation.
      (1) Connect the battery positive (+) lead to the terminal 2 and the battery negative (-) lead to the terminal 1, and check that the illumination light comes on.



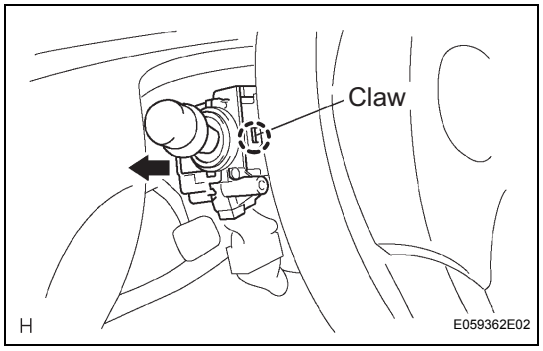
INSTALLATION

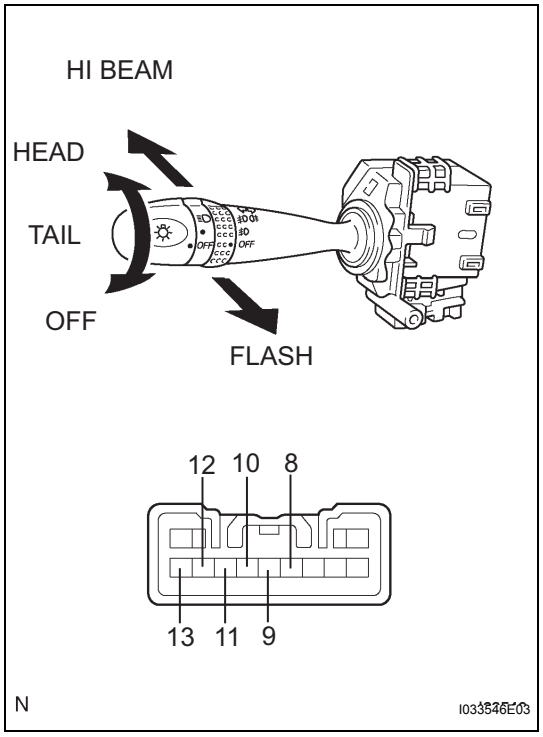
1. **INSTALL CENTER CLUSTER BOX ILLUMINATION**
   (a) Install the light.
   (b) Connect the connector.
2. **INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER (See page IP-11)**
3. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**
4. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

HEADLIGHT DIMMER SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE STEERING COLUMN COVER (See page SR-7)**
3. **REMOVE HEADLIGHT DIMMER SWITCH ASSEMBLY**
   (a) Disconnect the connector of the headlight dimmer switch.
   (b) Detach the claw and pull out the headlight dimmer switch as shown in the illustration.
   NOTICE:
   Pressing the claw too hard breaks the teeth.





INSPECTION

1. **INSPECT HEADLIGHT DIMMER SWITCH ASSEMBLY**
   (a) Inspect the light control switch.
   (1) Measure the resistance of the switch.
   Standard resistance

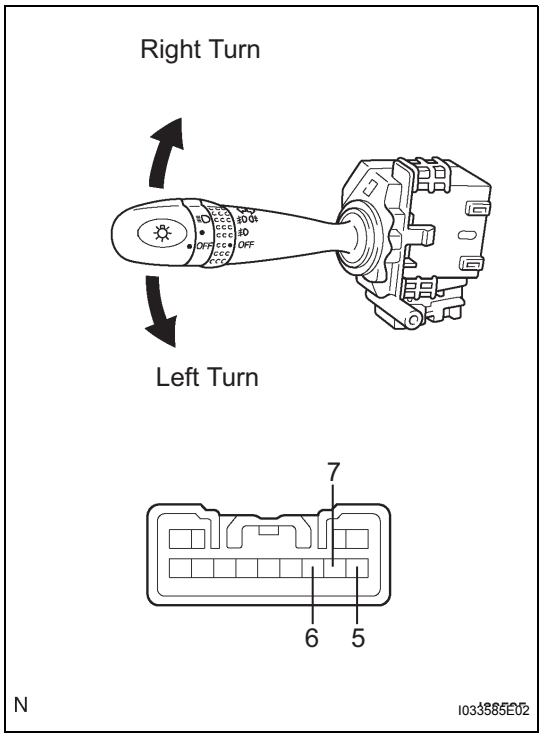
Tester Connection	Switch Position	Specified Condition
10 - 13 11 - 12	OFF	10 kΩ or higher
10 - 13	TAIL	Below 1 Ω
10 - 13	HEAD	Below 1 Ω
11 - 12	HEAD	Below 1 Ω

If the result is not as specified, replace the switch assembly.

   (b) Inspect the headlight dimmer switch.
   (1) Measure the resistance of the switch.
   Standard resistance

Tester Connection	Switch Position	Specified Condition
9 - 11	FLASH	Below 1 Ω
8 - 10	LOW BEAM	Below 1 Ω
9 - 11	HI BEAM	Below 1 Ω

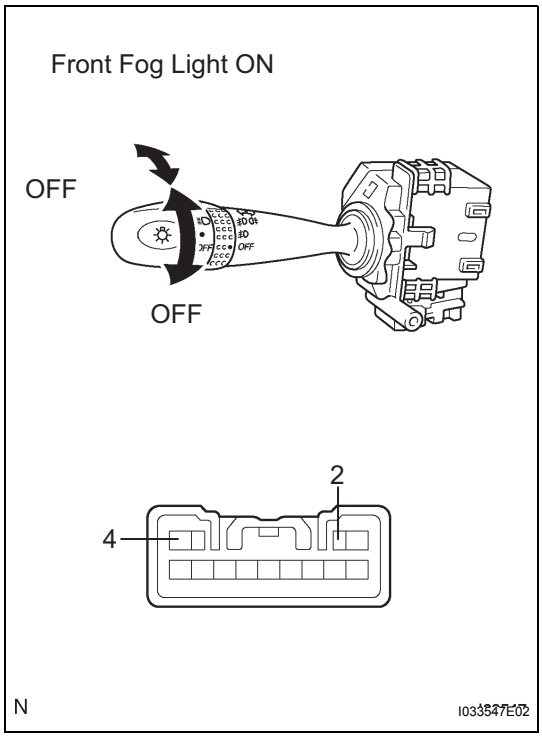
HINT:
Turn the headlight dimmer switch to the HEAD position when checking "LOW BEAM" and "HI BEAM".
If the result is not as specified, replace the switch assembly.



(c) Inspect the turn signal switch.
(1) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Position	Specified Condition
6 - 7	Right turn	Below 1 Ω
5 - 6 - 7	Neutral	10 kΩ or higher
5 - 6	Left turn	Below 1 Ω

If the result is not as specified, replace the switch assembly.



(d) Inspect the front fog light switch continuity.
(1) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Position	Specified Condition
2 - 4	OFF	10 kΩ or higher
2 - 4	Front fog	Below 1 Ω

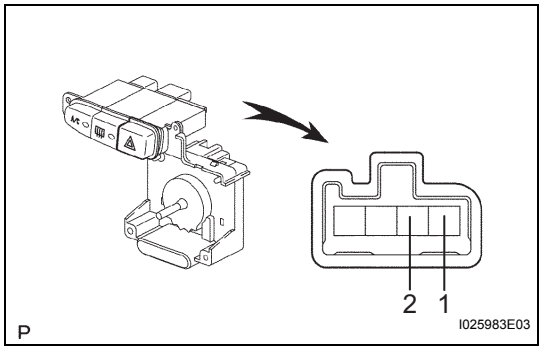
If the result is not as specified, replace the switch assembly.

HAZARD WARNING SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
4. **REMOVE HEATER CONTROL KNOB (See page IP-6)**
5. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER (See page IP-6)**
6. **REMOVE CENTER CLUSTER MODULE SWITCH (See page AC-105)**

INSPECTION



1. **INSPECT CENTER CLUSTER MODULE SWITCH (HAZARD WARNING SWITCH)**
   (a) Measure the resistance of the switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	ON	Below 1 Ω
1 - 2	OFF	10 kΩ or higher

If the result is not as specified, replace the switch assembly.

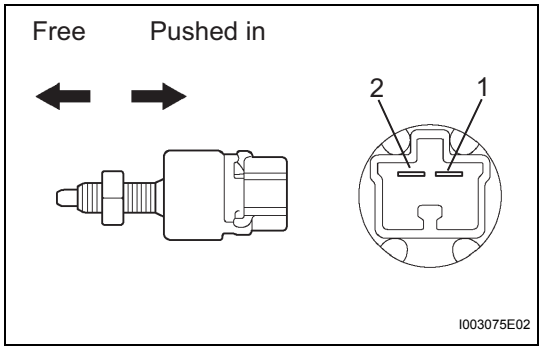
INSTALLATION

1. **INSTALL CENTER CLUSTER MODULE SWITCH (See page AC-108)**
2. **INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER (See page IP-11)**
3. **INSTALL HEATER CONTROL KNOB (See page IP-11)**
4. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-11)**
5. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

STOP LIGHT SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE STOP LIGHT SWITCH ASSEMBLY (See page BR-8)**



INSPECTION

1. **INSPECT STOP LIGHT SWITCH ASSEMBLY**
   (a) Measure the resistance of the switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin pushed in (Pedal released)	10 kΩ or higher
1 - 2	Switch pin free (Pedal depressed)	Below 1 Ω

If the result is not as specified, replace the switch assembly.

INSTALLATION

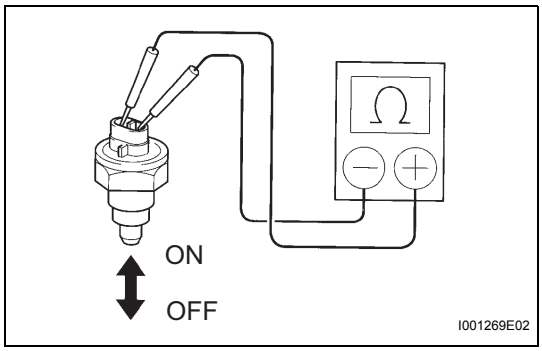
1. **INSTALL STOP LIGHT SWITCH ASSEMBLY (See page BR-10)**
2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

BACK-UP LIGHT SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE BACK-UP LIGHT SWITCH ASSEMBLY (for Manual Transaxle) (See page MX-34)**

INSPECTION



1. **INSPECT BACK-UP LIGHT SWITCH ASSEMBLY**
   (a) Measure the resistance of the switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	ON	Below 1 Ω
1 - 2	OFF	10 kΩ or higher

If the result is not as specified, replace the switch assembly.

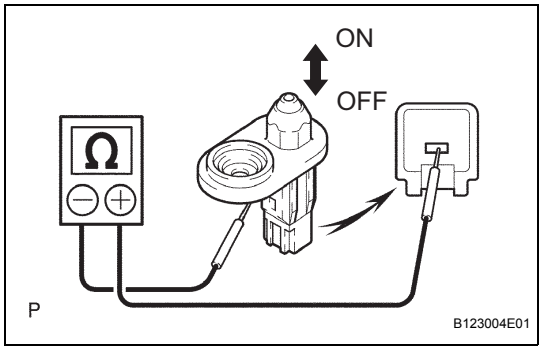
INSTALLATION

1. **INSTALL BACK-UP LIGHT SWITCH ASSEMBLY (for Manual Transaxle) (See page MX-64)**
2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FRONT DOOR COURTESY SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**
   (a) Remove the bolt and switch.
   (b) Disconnect the connector.



INSPECTION

1. **INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**
   (a) Measure the resistance of the switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	ON	Below 1 Ω
1 - Body ground	OFF	10 kΩ or higher

If the result is not as specified, replace the switch assembly.

INSTALLATION

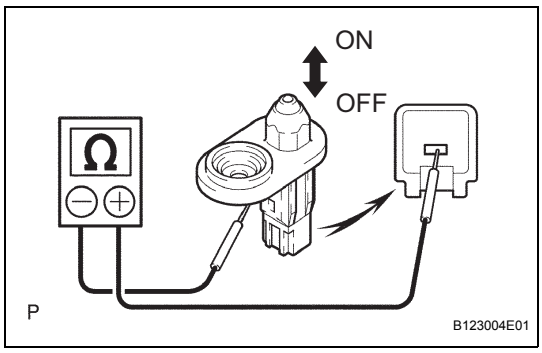
1. **INSTALL FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**
   (a) Connect the connector.
   (b) Install the switch with the bolt.
2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

REAR DOOR COURTESY SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY**
   (a) Remove the bolt and switch.
   (b) Disconnect the connector.

INSPECTION



1. **INSPECT REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY**
   (a) Measure the resistance switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	ON	Below 1 Ω
1 - Body ground	OFF	10 kΩor higher

If the result is not as specified, replace the switch assembly.

INSTALLATION

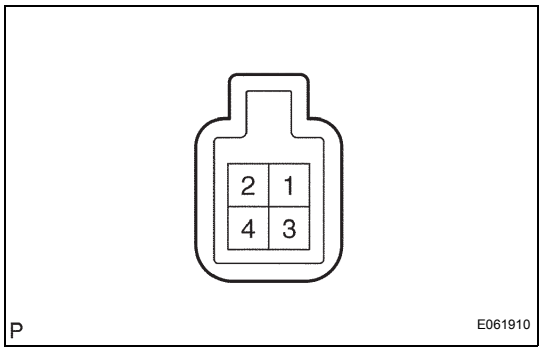
1. **INSTALL REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY**
   (a) Connect the connector.
   (b) Install the switch with the bolt.
2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

BACK DOOR COURTESY SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE BACK DOOR TRIM BOARD ASSEMBLY (See page ED-36)**
3. **REMOVE BACK DOOR LOCK ASSEMBLY (See page ED-37)**

INSPECTION



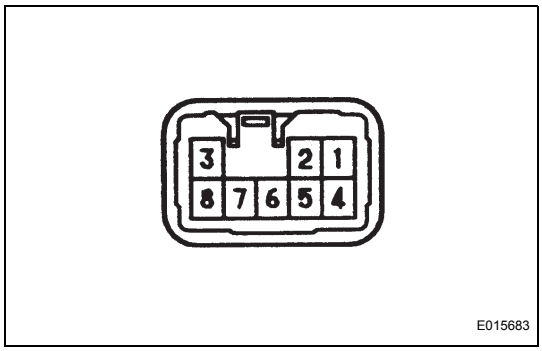
1. **INSPECT BACK DOOR LOCK ASSEMBLY**
   (a) Measure the resistance of the switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	ON (UNLOCK)	Below 1 Ω
1 - 2	OFF (LOCK)	10 kΩ or higher

If the result is not as specified, replace the switch assembly.

INSTALLATION

1. **INSTALL BACK DOOR LOCK ASSEMBLY (See page ED-40)**
2. **INSTALL BACK DOOR TRIM BOARD ASSEMBLY (See page ED-40)**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.



TURN SIGNAL FLASHER ASSEMBLY

ON-VEHICLE INSPECTION

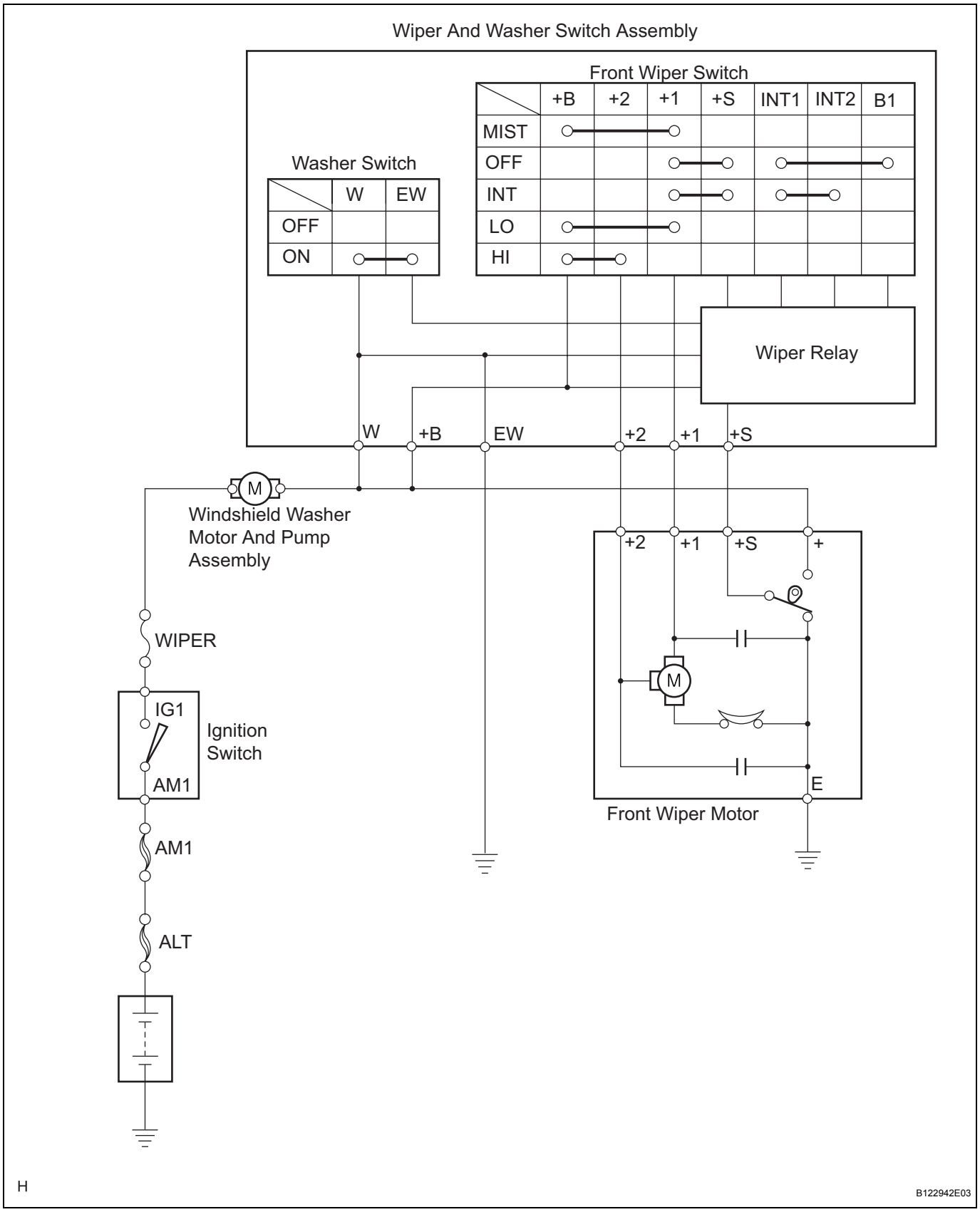
1. CHECK TURN SIGNAL FLASHER ASSEMBLY

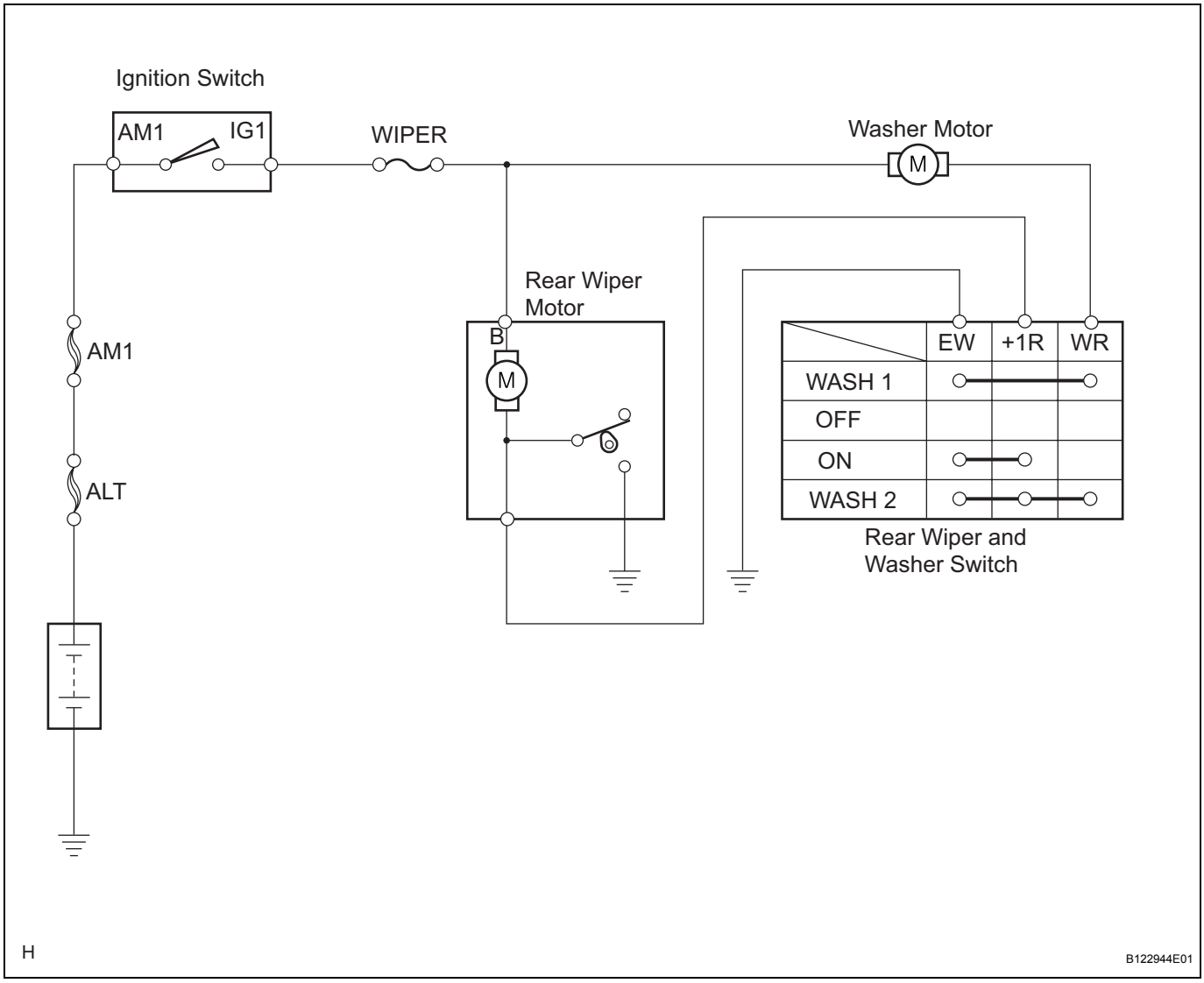
(a) Connect the connector to the turn signal flasher and inspect the wire harness side connector from the backside as shown in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
2 - Ground	Hazard switch OFF	0 V
2 - Ground	Hazard switch ON	Alternating between 0 to 9 V (60 to 120 times per minute)
2 - Ground	Turn signal switch (right turn) OFF	0 V
2 - Ground	Turn signal switch (right turn) ON	Alternating between 0 to 9 V (60 to 120 times per minute)
3 - Ground	Hazard switch OFF	0 V
3 - Ground	Hazard switch ON	Alternating between 0 to 9 V (60 to 120 times per minute)
3 - Ground	Turn signal switch (left turn) OFF	0 V
3 - Ground	Turn signal switch (left turn) ON	Alternating between 0 to 9 V (60 to 120 times per minute)
5 - Ground	Turn signal switch (left turn) OFF	Above 9 V
5 - Ground	Turn signal switch (left turn) ON	0 V
6 - Ground	Turn signal switch (right turn) OFF	Above 9 V
6 - Ground	Turn signal switch (right turn) ON	0 V
8 - Ground	Hazard switch OFF	Above 9 V
8 - Ground	Hazard switch ON	0 V

SYSTEM DIAGRAM




Ignition Switch
AM1
IG1
WIPER
Washer Motor
M
Rear Wiper
Motor
B
M
AM1
ALT
EW
+1R
WR
WASH 1
OFF
ON
WASH 2
Rear Wiper and
Washer Switch
H
B122944E01

PROBLEM SYMPTOMS TABLE

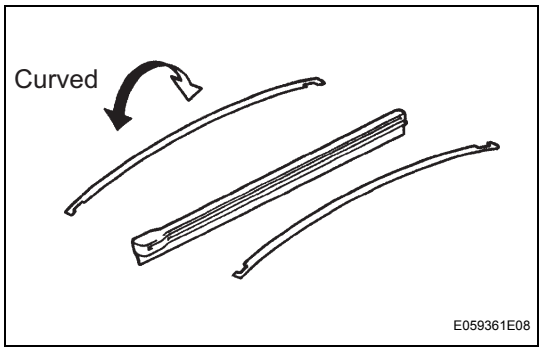
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Wiper and washer system

Symptom	Suspected area	See page
Front wipers do not operate.	1. WIPER fuse	-
	2. Windshield wiper switch assembly	WW-21
	3. Windshield wiper motor assembly	WW-8
	4. Wire harness	-
Front wipers do not operate in LO or HI.	1. Windshield wiper switch assembly	WW-21
	2. Windshield wiper motor assembly	WW-8
	3. Wire harness	-
Front wipers do not operate in INT.	1. Windshield wiper switch assembly	WW-21
	2. Windshield wiper motor assembly	WW-8
	3. Wire harness	-
Front washer motor does not operate.	1. WIPER fuse	-
	2. Windshield wiper switch assembly	WW-21
	3. Washer motor	WW-24
	4. Wire harness	-
Front wipers do not operate when washer switch is in ON position.	1. Windshield wiper switch assembly	WW-21
	2. Windshield wiper motor assembly	WW-8
	3. Wire harness	-
Rear wiper and washers do not operate.	1. WIPER fuse	-
	2. Rear wiper switch	WW-21
	3. Wire harness	-
Rear wiper does not operate.	1. Rear wiper switch assembly	WW-21
	2. Rear wiper motor	WW-16
	3. Wire harness	-
Rear washer motor does not operate.	1. WASH fuse	-
	2. Rear washer switch assembly	WW-21
	3. Washer motor	-
	4. Wire harness	-
Rear wiper does not operate when washer switch is in ON position.	1. Rear wiper switch assembly	WW-21
	2. Rear wiper motor	WW-24
	3. Wire harness	-
Washer fluid does not flow.	1. Washer hose and nozzle	-
When wiper switch is off, wiper blade does not retract or retracts in wrong position.	1. Windshield wiper motor assembly (Wiper arm and blade set position)	WW-8
Wiper blade is in contact with body.	1. Windshield wiper motor assembly (Wiper arm and blade set position)	WW-8

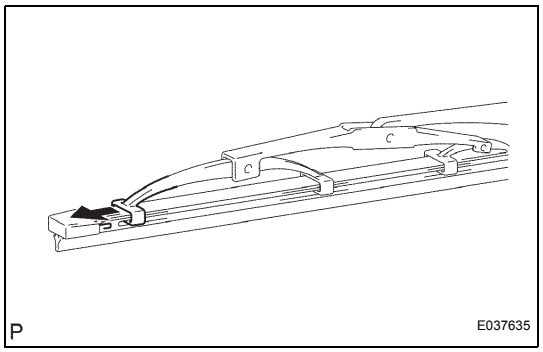
INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. INSTALL WIPER RUBBER LH

(a) Install the 2 wiper rubber backing plates on the wiper rubber.
NOTICE:
Be sure to install the wiper rubber backing plates in the correct direction.

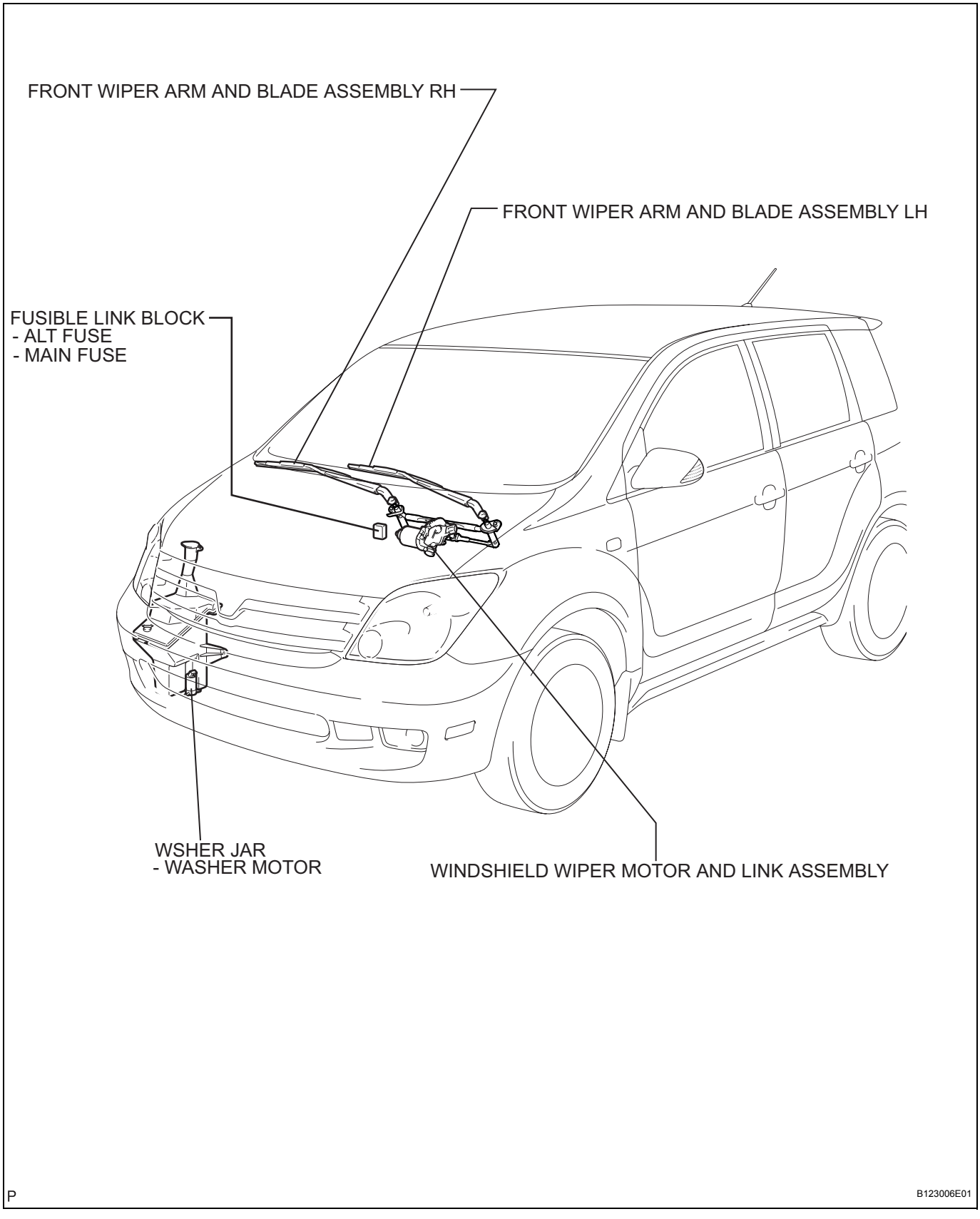


(b) Install the wiper rubber so that the head part (longer side) of the wiper rubber faces the arm axle side.
NOTICE:
- **Push in the wiper blade into the grooves of the wiper rubber to engage them completely.**
- **Put back the wiper arm of the passenger side before putting back the driver side wiper arm.**

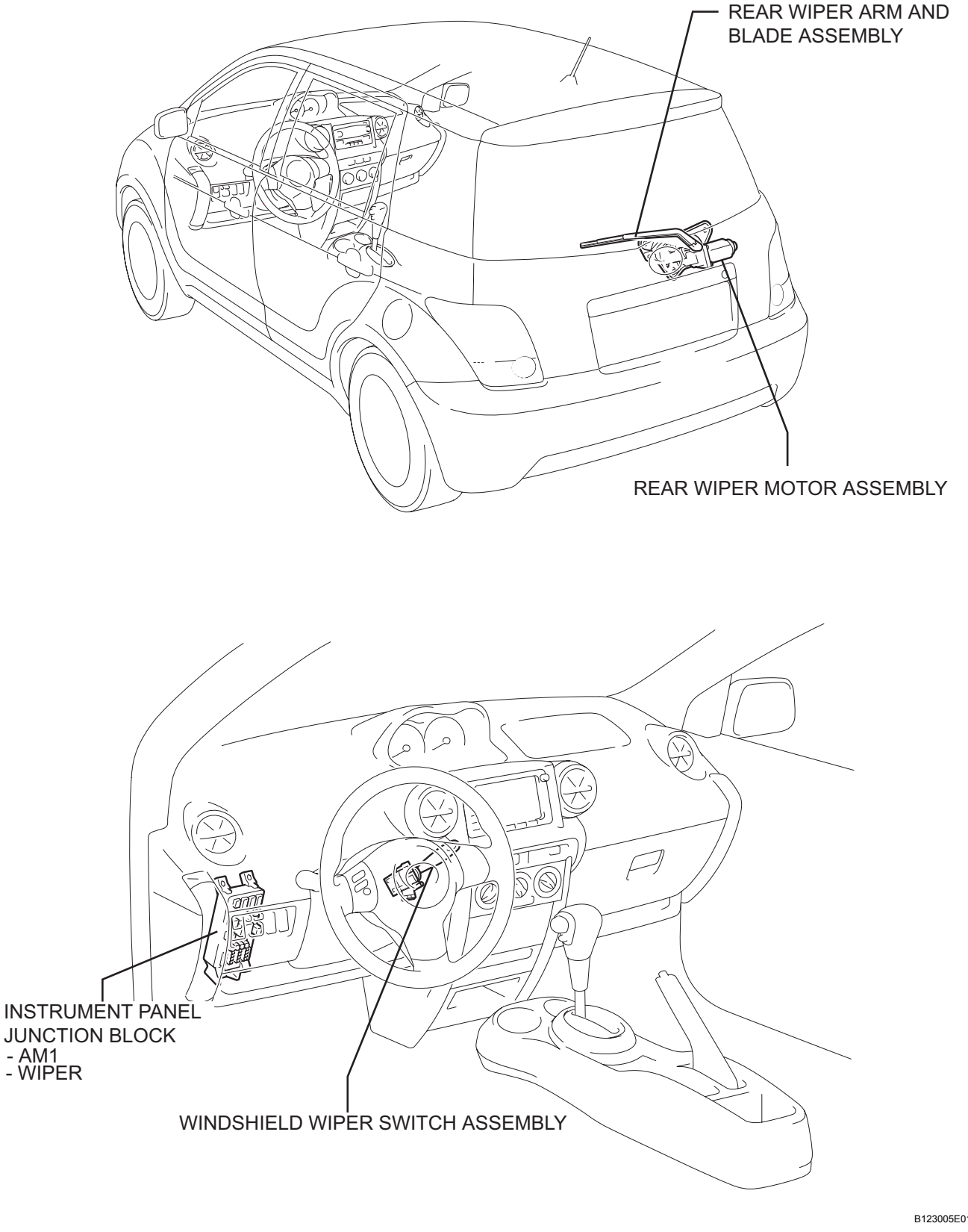
WW

WIPER AND WASHER SYSTEM

PARTS LOCATION

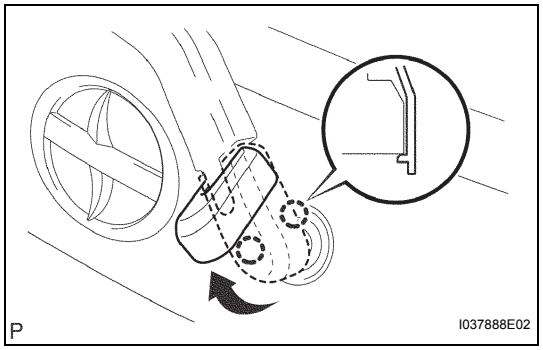


WW

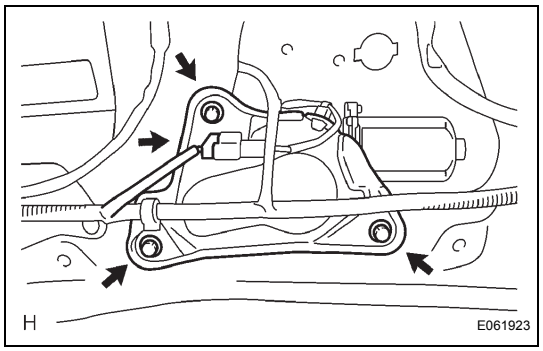

REAR WIPER ARM AND
BLADE ASSEMBLY
REAR WIPER MOTOR ASSEMBLY
INSTRUMENT PANEL
JUNCTION BLOCK
- AM1
- WIPER
WINDSHIELD WIPER SWITCH ASSEMBLY
P
B123005E01

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE BACK DOOR TRIM BOARD ASSEMBLY (See page ED-36)**
3. **REMOVE REAR WIPER ARM**
   (a) Detach the 2 claws and open the cover.
   (b) Remove the nut and rear wiper arm.

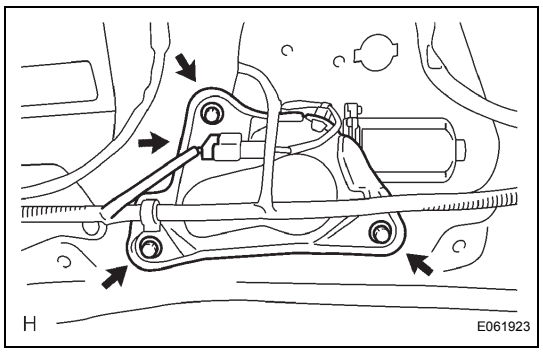


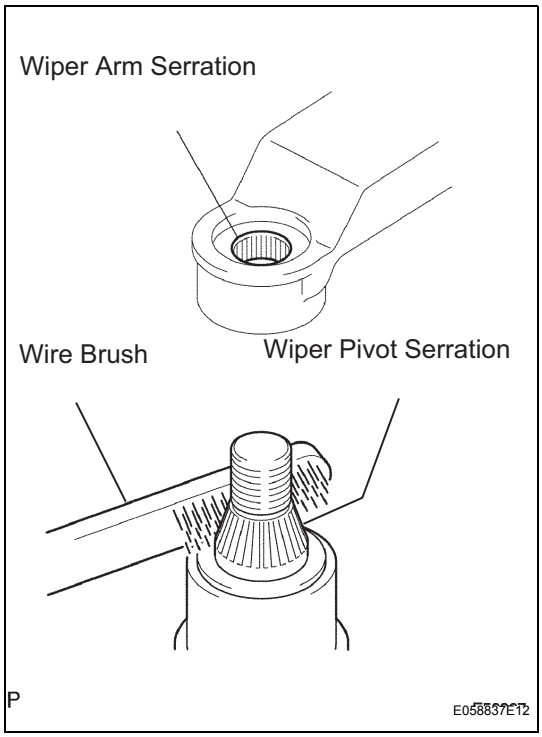
4. **REMOVE REAR WIPER MOTOR ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 3 bolts and rear wiper motor assembly.



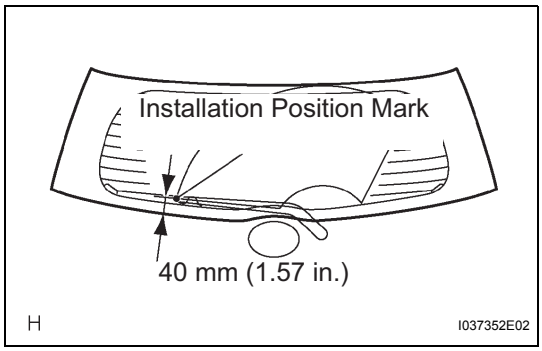
INSTALLATION

1. **INSTALL REAR WIPER MOTOR ASSEMBLY**
   (a) Install the wiper motor with the 3 bolts.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
   (b) Connect the connector.
2. **INSTALL REAR WIPER ARM**
   (a) Operate the wiper, and stop the wiper motor at the automatic stop position.





(b) Scrape off the serrated part of the wiper arm with a round file or equivalent.
(c) Clean the wiper pivot serration with a wire brush.



(d) Install the wiper arm with the nut in the position shown in the illustration.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
HINT:
Hold down the arm hinge by hand in order to fasten the nut.

3. INSTALL BACK DOOR TRIM BOARD ASSEMBLY

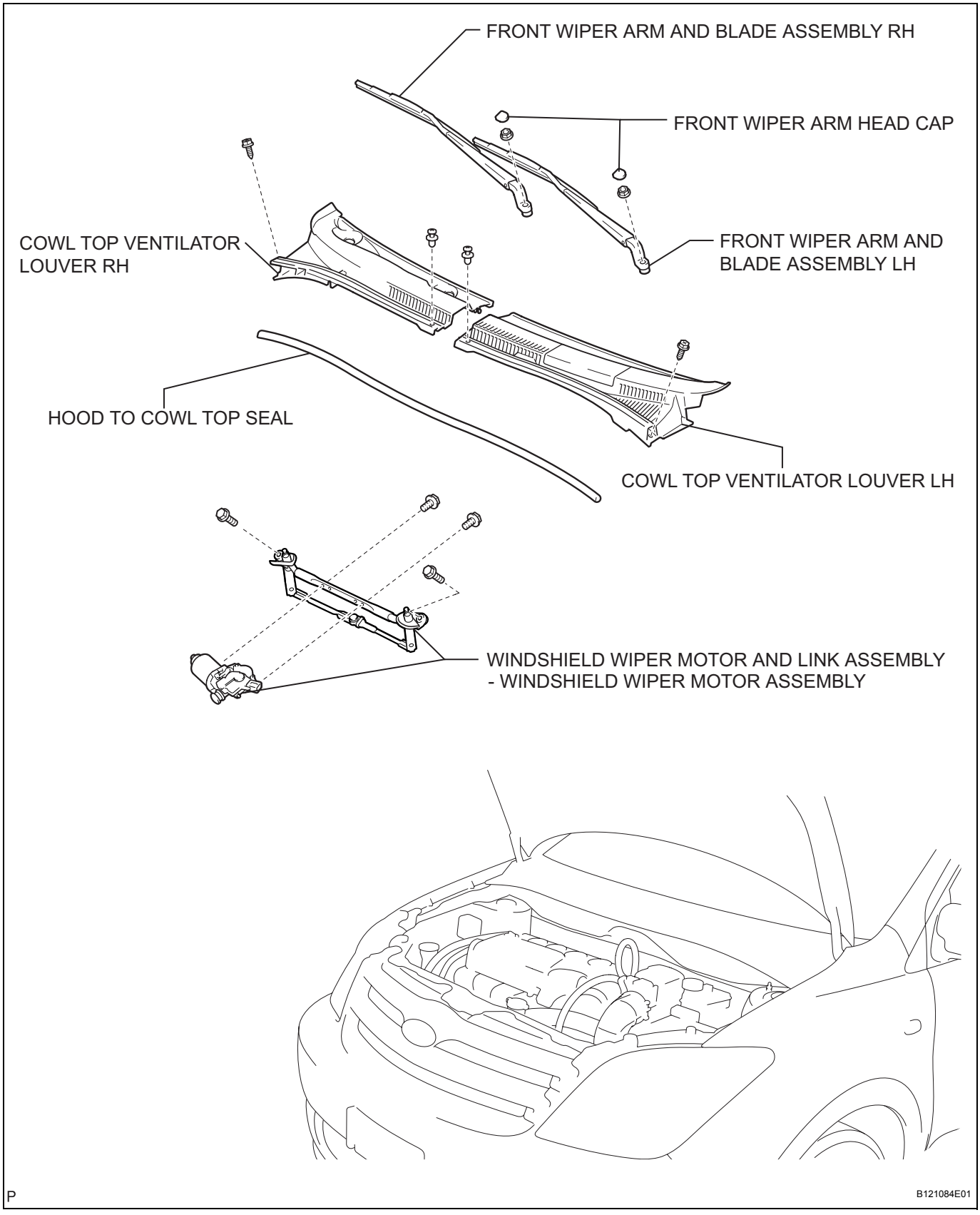
4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

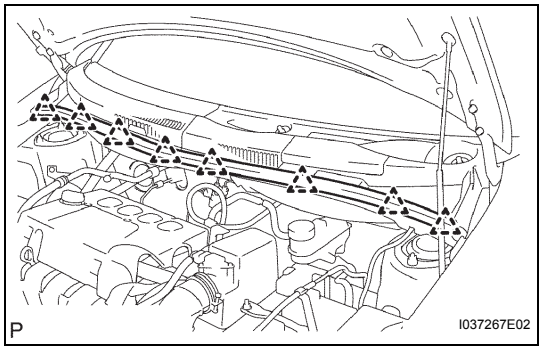
FRONT WIPER MOTOR AND LINK

COMPONENTS

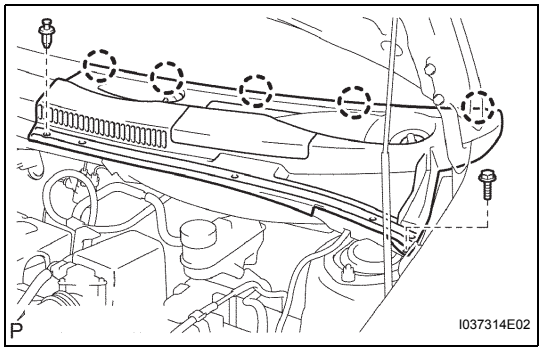


REMOVAL

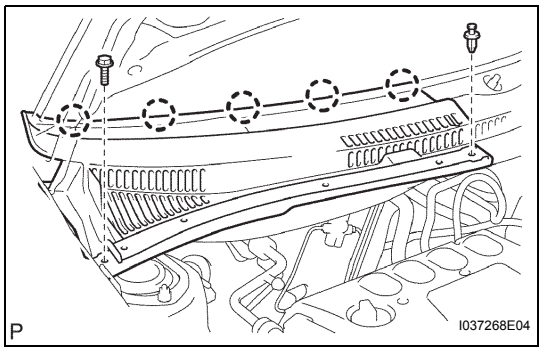
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT WIPER ARM HEAD CAP**
3. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH**
   (a) Operate the wiper and stop the wiper motor at the automatic stop position.
4. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH**
   (a) Operate the wiper and stop the wiper motor at the automatic stop position.
5. **REMOVE HOOD TO COWL TOP SEAL**
   (a) Using a clip remover, remove the 8 clips and seal.

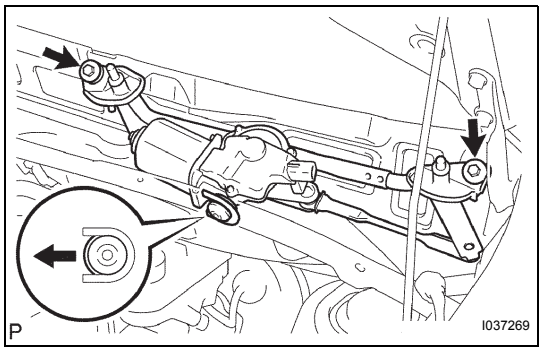


6. **REMOVE COWL TOP VENTILATOR LOUVER LH**
   (a) Remove the clip and bolt.
   (b) Detach the 5 claws and remove the ventilator louver.



7. **REMOVE COWL TOP VENTILATOR LOUVER RH**
   (a) Remove the clip and bolt.
   (b) Detach the 5 claws and remove the ventilator louver.

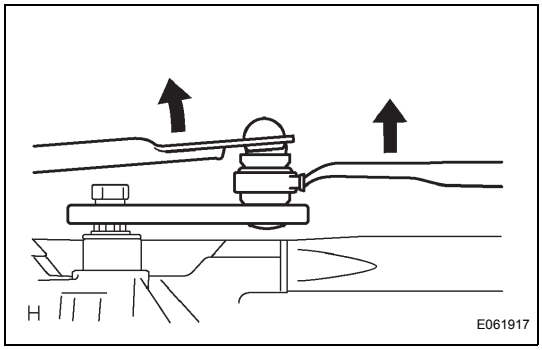




8. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

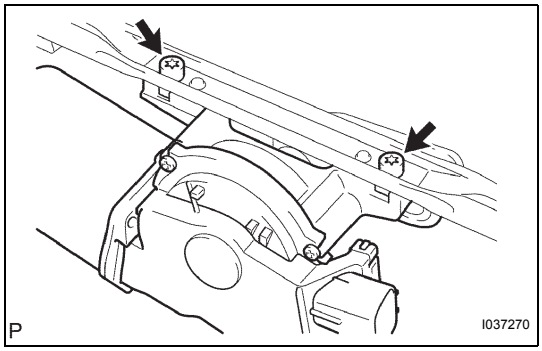
(a) Disconnect the connector of the wiper motor.
(b) Remove the 2 bolts.
(c) Slide the wiper link to the vehicle's passenger side. Remove the meshing of the rubber pin and remove the wiper motor and link.

WW



9. REMOVE WINDSHIELD WIPER MOTOR ASSEMBLY

(a) Using a screwdriver, remove the meshing of the 2 rods at the crank arm pivot of the wiper motor.
HINT:
Tape the screwdriver tip before use.



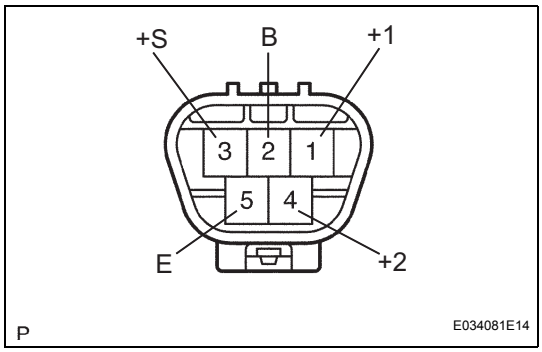
(b) Remove the 2 "torx" bolts and windshield wiper motor.

INSPECTION

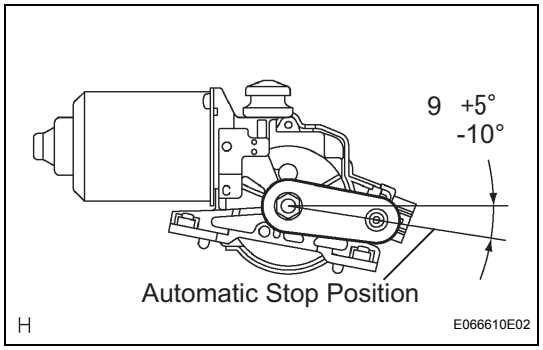
1. INSPECT WINDSHIELD WIPER MOTOR ASSEMBLY

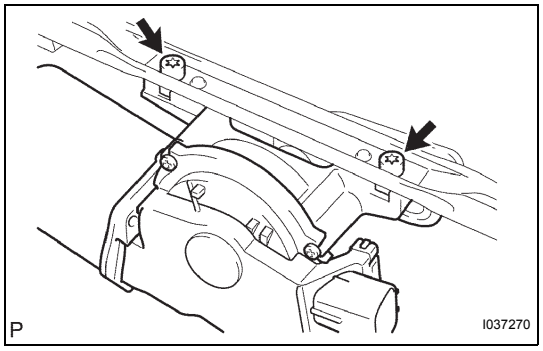
(a) Check the LO operation.
  (1) Connect the battery's positive (+) lead to terminal 1 (+1) and the negative (-) lead to terminal 5 (E), and check that the motor operates at low speed (LO).
  OK:
  Motor operates at low speed (LO).

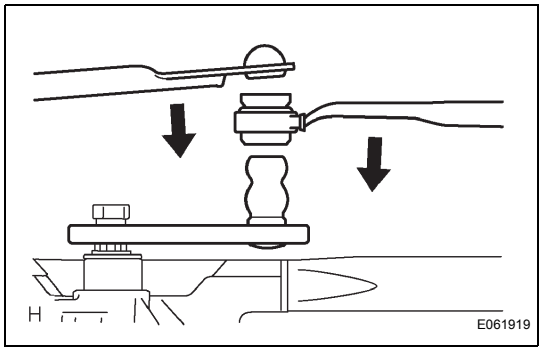
(b) Check the HI operation.
  (1) Connect the battery's positive (+) lead to terminal 4 (+2) and the negative (-) lead to terminal 5 (E), and check that the motor operates at high speed (HI).
  OK:
  Motor operates at high speed (HI).



(c) Check the automatic stop operation.
(1) Connect the battery's positive (+) lead to terminal 1 (+1) and the negative (-) lead to terminal 5 (E). With the motor rotating at low speed (LO), disconnect terminal 1 (+1) to stop the wiper motor operation at any position other than the automatic stop position.
(2) Using SST, connect terminals 1 (S) and 1 (+1). Then connect the battery's positive (+) lead to terminal 2 (B) to restart the motor operation at low speed (LO).
SST 09843-18040
(3) Check that the motor stops automatically at the automatic stop position.
OK:
Refer to illustration.
If the result is not as specified, replace the motor assembly.

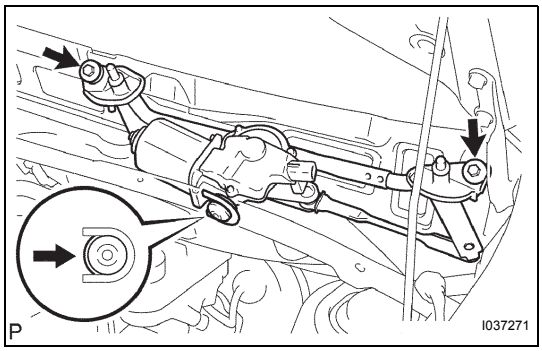






INSTALLATION

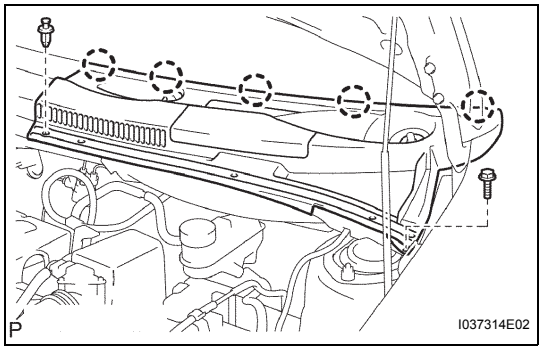
1. INSTALL WINDSHIELD WIPER MOTOR ASSEMBLY
(a) Install the wiper motor to the wiper link with the 2 "torx" screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)
(b) Apply grease to the crank arm pivot of the wiper motor.
(c) Install the 2 rods to the wiper motor.



2. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

(a) Install the wiper motor and link with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 47 in.*lbf)

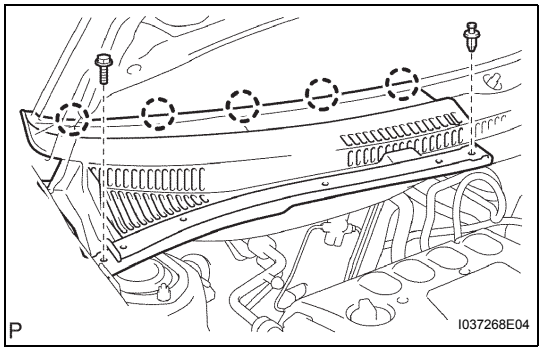
(b) Connect the connector.



3. INSTALL COWL TOP VENTILATOR LOUVER LH

(a) Attach the 5 claws to install the ventilator louver.

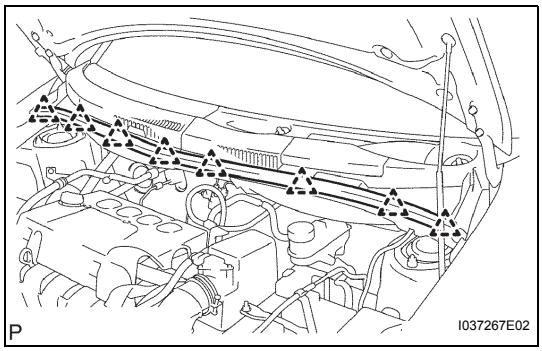
(b) Install the clip and bolt.



4. INSTALL COWL TOP VENTILATOR LOUVER RH

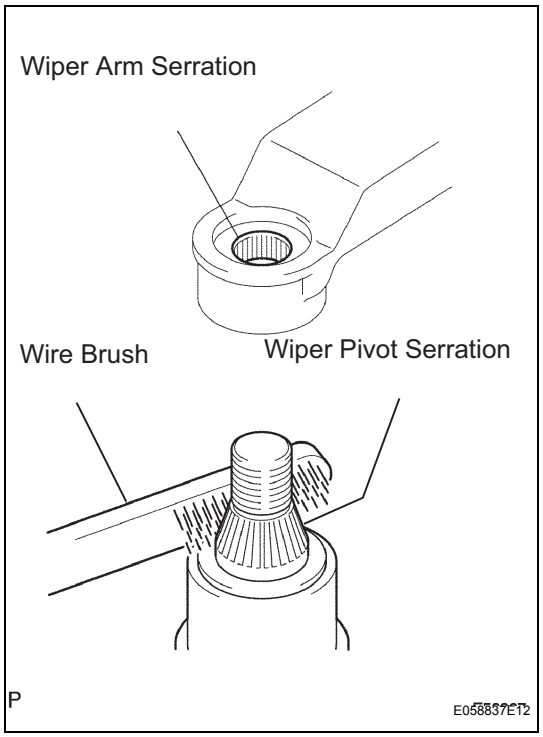
(a) Attach the 5 claws to install the ventilator louver.

(b) Install the clip and bolt.



5. INSTALL HOOD TO COWL TOP SEAL

(a) Attach the 8 clips to install the seal.

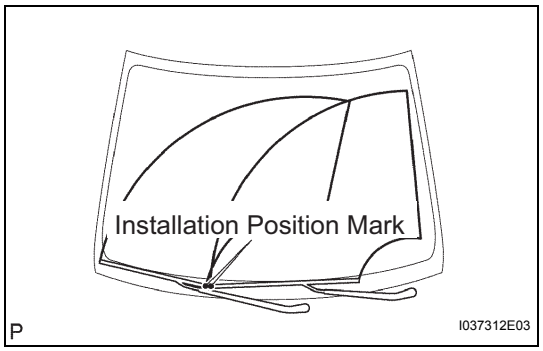


6. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH

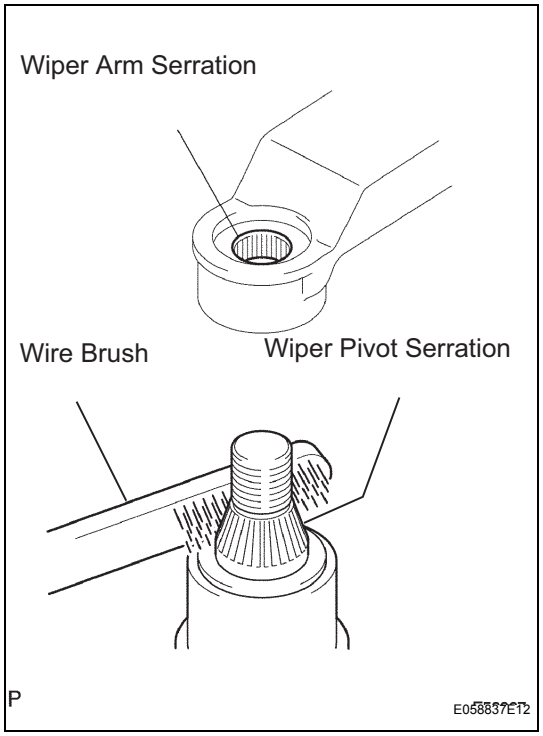
(a) Operate the wiper, and stop the windshield wiper motor at the automatic stop position.

(b) Scrape off the serrated part of the wiper arm with a round file or equivalent.

(c) Clean the wiper pivot serration with a wire brush.



(d) Install the wiper arm and blade with the nut in the position shown in the illustration.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
HINT:
Hold down the arm hinge by hand in order to fasten the nut.

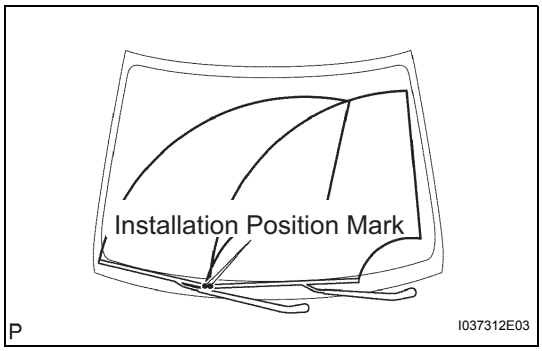


7. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH

(a) Operate the wiper, and stop the wiper motor at the automatic stop position.

(b) Scrape off the serrated part of the wiper arm with a round file or equivalent.

(c) Clean the wiper pivot serration with a wire brush.



(d) Install the wiper arm and blade with the nut in the position shown in the illustration.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
HINT:
Hold down the arm hinge by hand in order to fasten the nut.

8. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

9. PERFORM INITIALIZATION

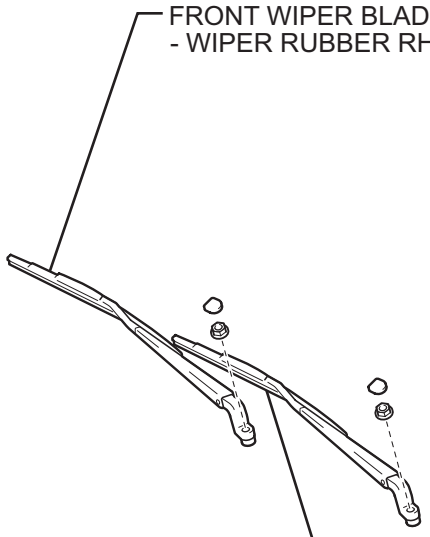
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

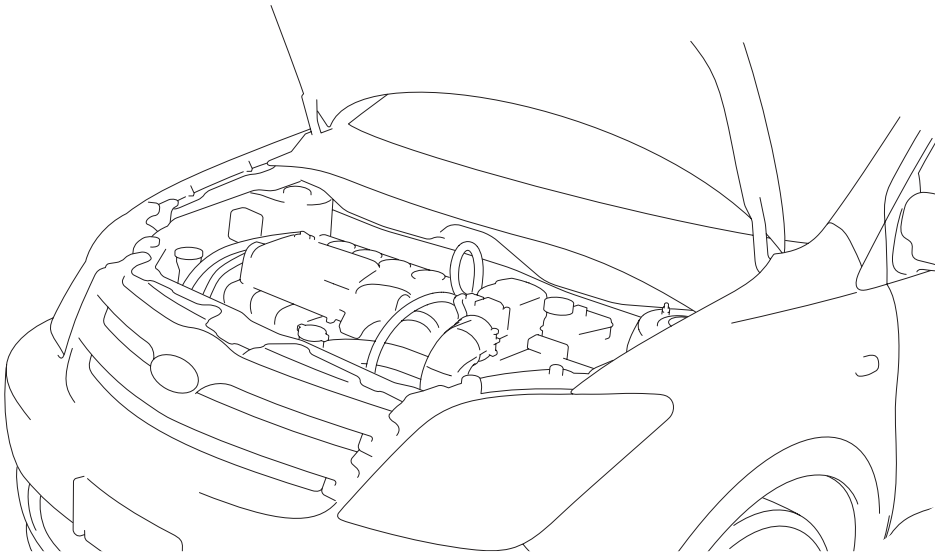
INSTALLATION

1. **INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY**
   (a) Attach the claw to install the wiper switch.
   (b) Connect the connector.
2. **INSTALL STEERING COLUMN COVER (See page SR-13)**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FRONT WIPER RUBBER

COMPONENTS





P

B122552E01

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE FRONT WIPER BLADE LH

(a) Remove the wiper blade from the wiper arm.

NOTICE:

Do not fold down the wiper arm with the wiper blade being removed from it.

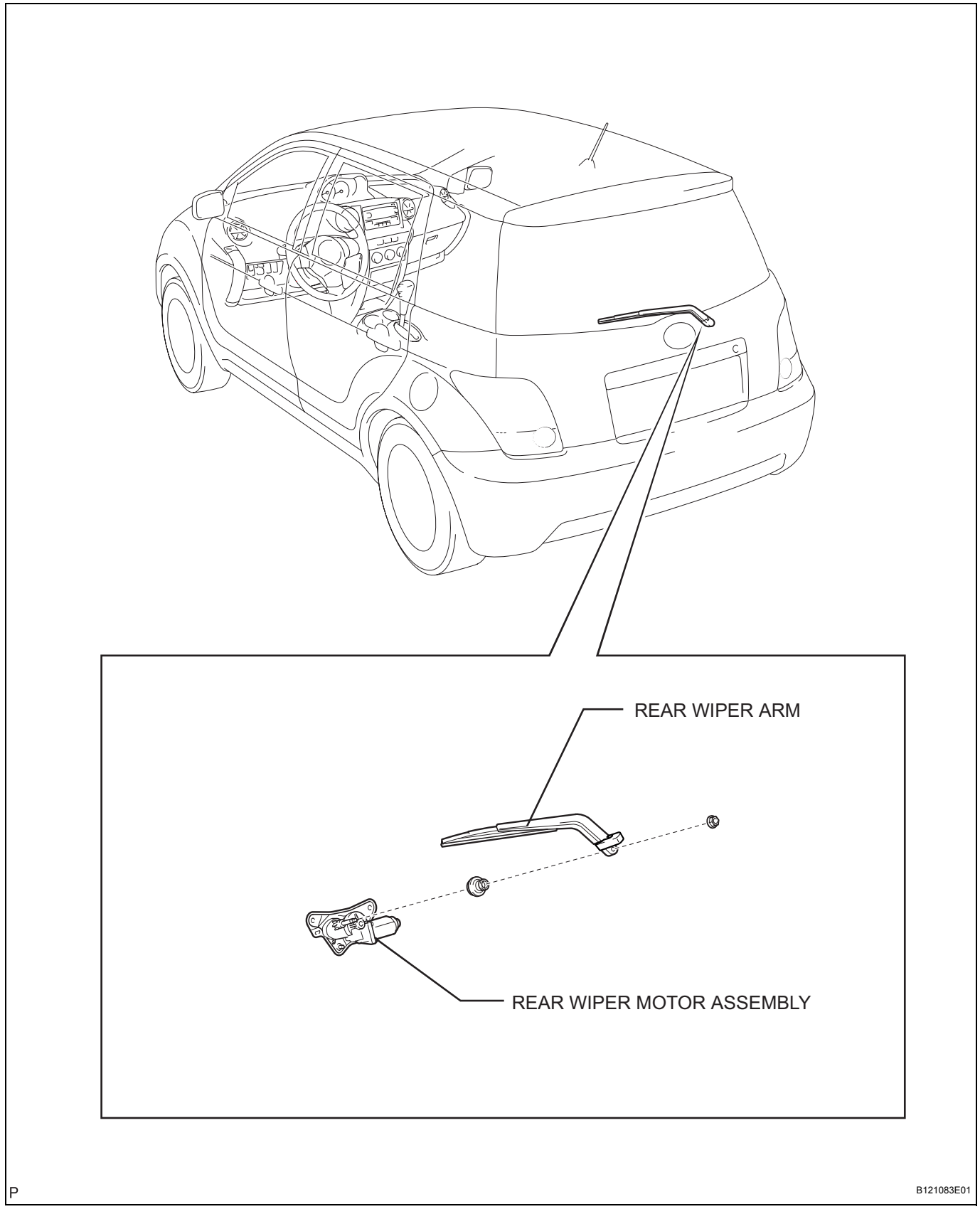
2. REMOVE WIPER RUBBER LH

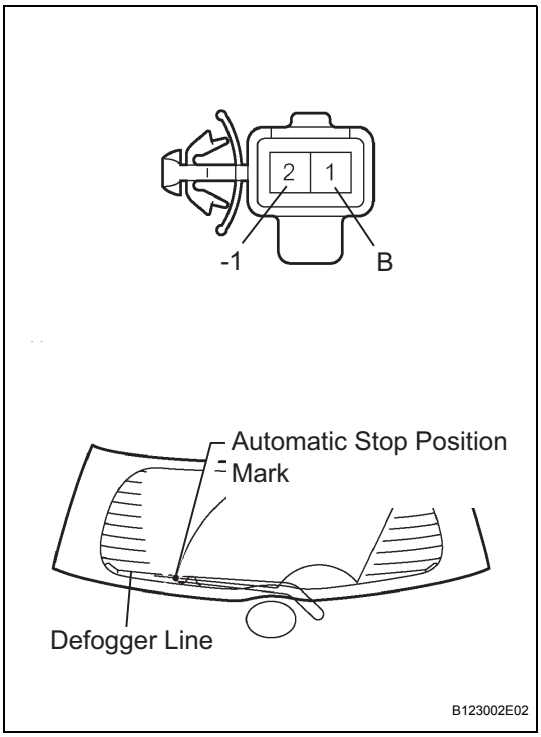
(a) Remove the wiper rubber from the wiper blade.

(b) Remove the 2 wiper rubber backing plates from the wiper rubber.

REAR WIPER MOTOR

COMPONENTS





ON-VEHICLE INSPECTION

1. CHECK REAR WIPER MOTOR ASSEMBLY

(a) Check the automatic stop position operation.

(1) Connect the battery's positive (+) lead to terminal 1 (B) and the negative (-) lead to terminal 2 (-1).

NOTICE:

The body earth should be connected.

(2) With the motor being rotated, disconnect terminal 1 (B) and terminal 2 (-1) to stop the motor operation at any position other than the automatic stop position.

(3) Connect the battery's positive (+) lead to terminal 1. Check that the motor stops automatically at the automatic stop position.

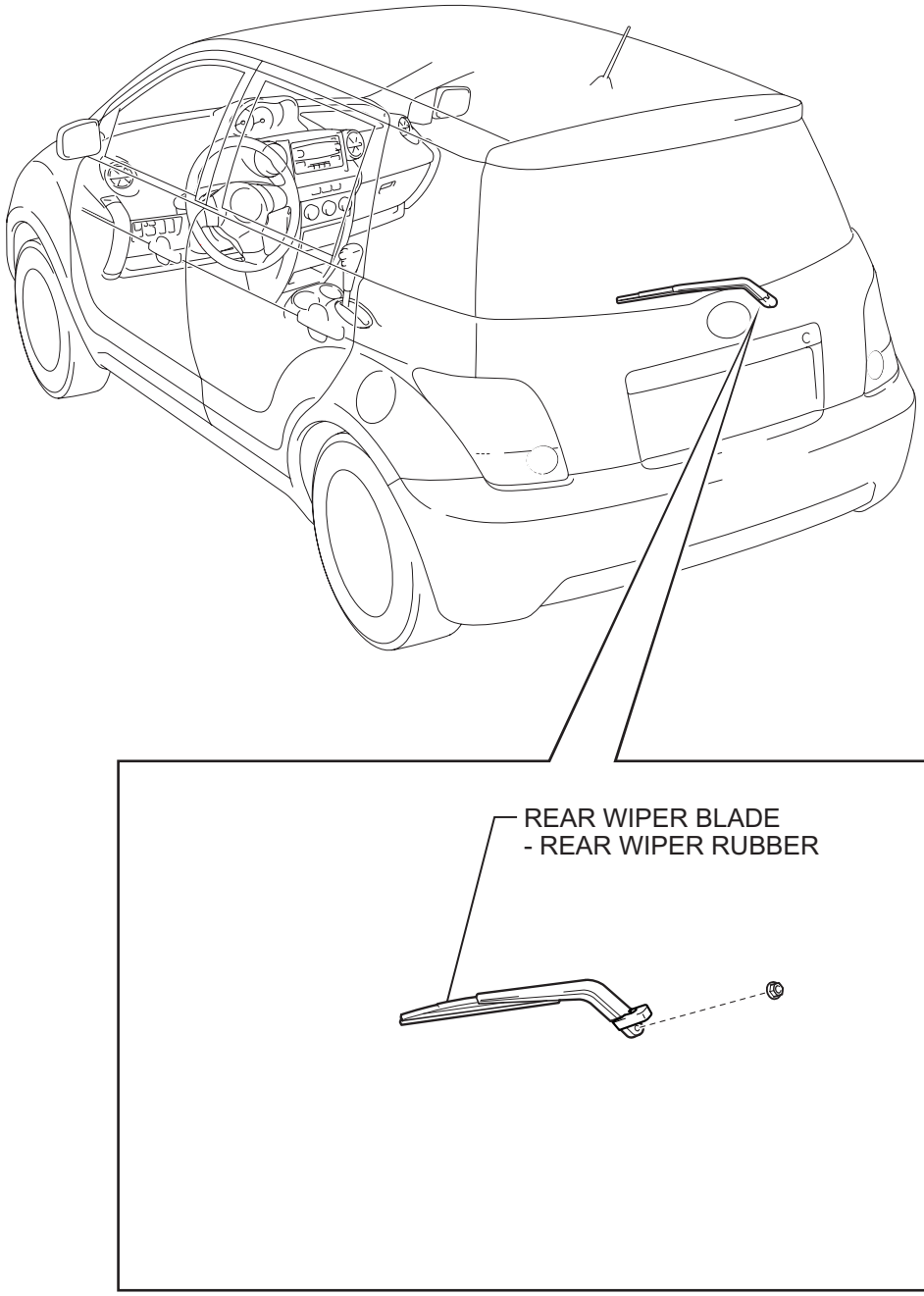
OK:

Refer to illustration.

If the result is not as specified, replace the motor assembly.

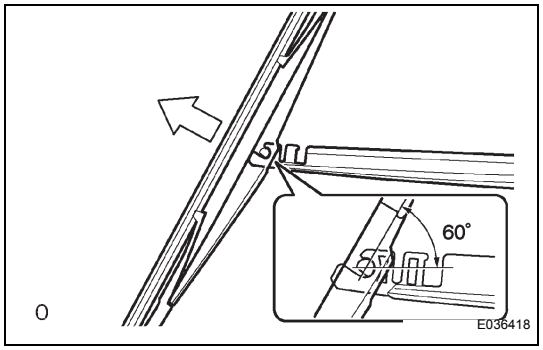
REAR WIPER RUBBER

COMPONENTS



P

B122547E02



REMOVAL

1. REMOVE REAR WIPER BLADE

(a) Raise the wiper blade to the position where the claw detaches with a click sound, as shown in the illustration.

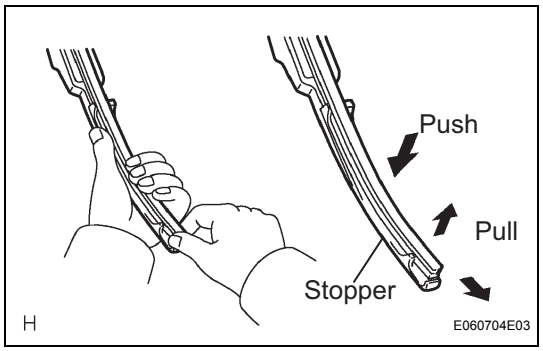
NOTICE:

Be careful not to break the claw.

(b) Pull the wiper blade straight from the wiper arm toward the left side of the vehicle.

NOTICE:

Do not fold the wiper arm with the wiper blade having been removed from it.



2. REMOVE REAR WIPER RUBBER

(a) Pull on the end of the wiper rubber protruding from the blade stopper as shown in the illustration.

NOTICE:

Do not forcibly pull out the wiper rubber as, the backing plates will be deformed or the blade claw will be damaged.

HINT:

Pushing the rubber from the ends towards the middle will allow it to be removed more easily.

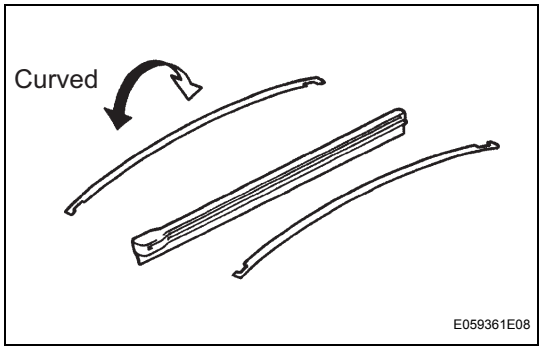
INSTALLATION

1. INSTALL REAR WIPER RUBBER

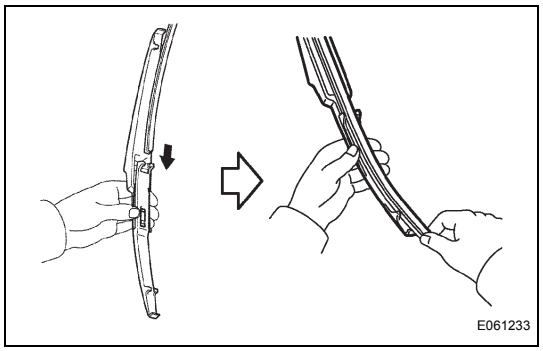
(a) Install the 2 wiper rubber backing plates to the wiper rubber.

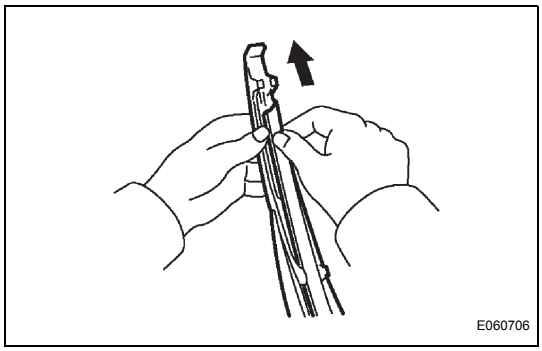
NOTICE:

Be sure to install the wiper rubber backing plates in the right direction.



(b) Insert the wiper rubber from the claw position of the middle of the wiper blade into the end position.





(c) After passing the wiper rubber through the rear end side claw, allow it to stick out from the rear end stopper and slide it through the front tip side claw.

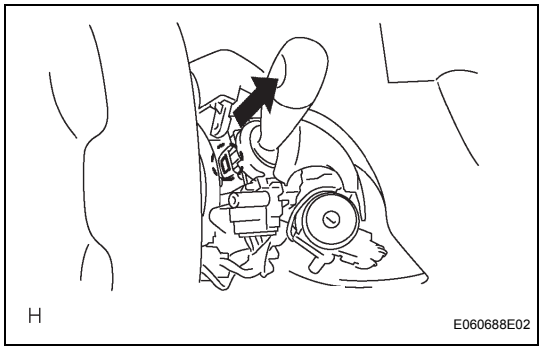
2. INSTALL REAR WIPER BLADE

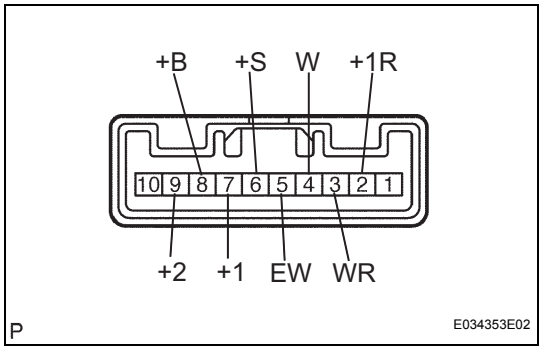
(a) Attach the wiper blade to the wiper.
HINT:
Install the wiper blade so that a click sound is heard.

WIPER SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE STEERING COLUMN COVER (See page SR-7)**
3. **REMOVE WINDSHIELD WIPER SWITCH ASSEMBLY**
   (a) Disconnect the connector.
   (b) Using a screwdriver, detach the claw and pull out the wiper switch.
   HINT:
   Tape the screwdriver tip before use.





INSPECTION

1. **INSPECT WINDSHIELD WIPER SWITCH ASSEMBLY**
   (a) Measure the resistance of the switch.
   Standard resistance:
   Front wiper switch

Tester Connection	Switch Condition	Specified Condition
7 (+1) - 8 (+B)	MIST	Below 1 Ω
6 (+S) - 7 (+)1	OFF	Below 1 Ω
6 (+S) - 7 (+1)	INT	Below 1 Ω
7 (+1) - 8 (+B)	LO	Below 1 Ω
8 (+B) - 9 (+2)	HI	Below 1 Ω

Front washer switch

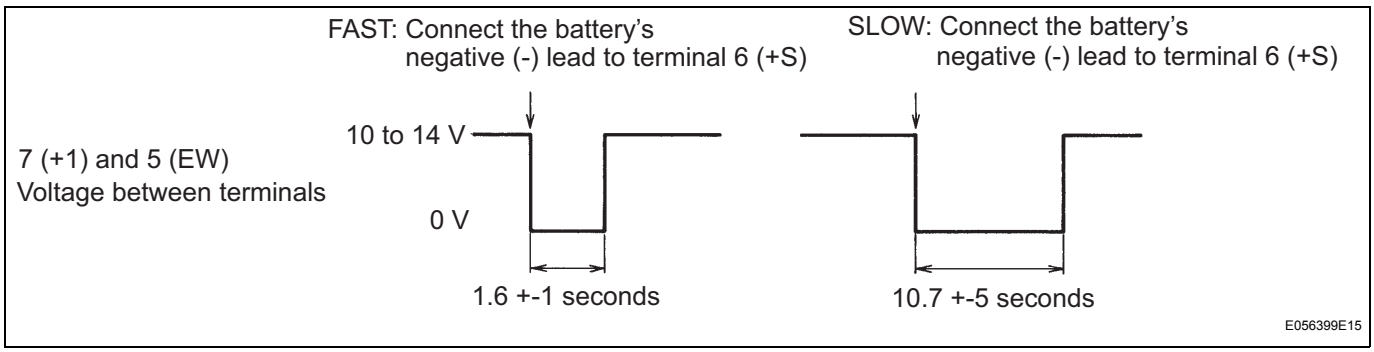
Tester Connection	Switch Condition	Specified Condition
4 (W) - 5 (EW)	OFF	10 kΩ or higher
4 (W) - 5 (EW)	ON	Below 1 Ω

Rear wiper switch

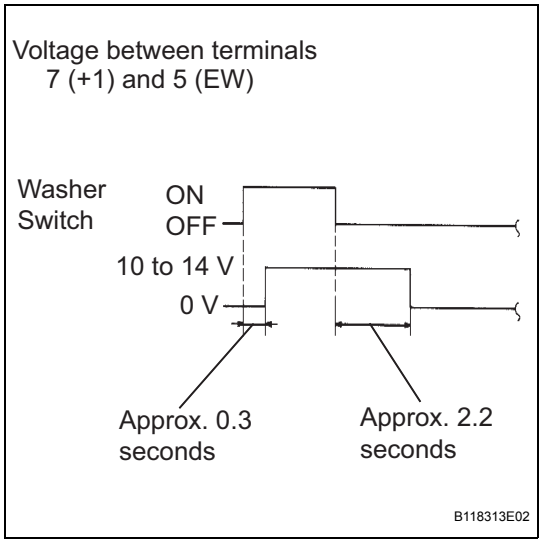
Tester Connection	Switch Condition	Specified Condition
3 (WR) - 5 (EW)	WASH	Below 1 Ω
2 - 3 - 5	OFF	10 kΩ or higher
2 (+1R) - 5 (EW)	ON	Below 1 Ω
3 (WR) - 2 (+1R) - 5 (EW)	ON + WASH	Below 1 Ω

   If the result is not as specified, replace the switch assembly.
   (b) Check the intermittent operation.
   (1) Connect the voltmeter's positive (+) lead to terminal 7 (+1) and the voltmeter's negative (-) lead to terminal 5 (EW).

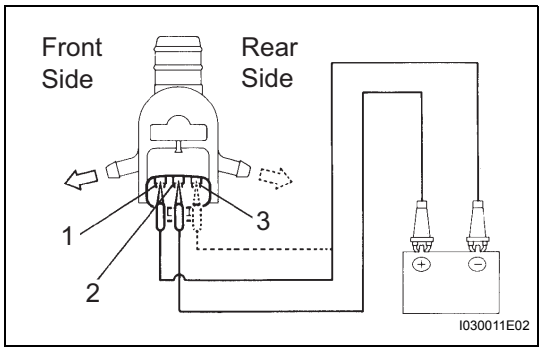
(2) Connect the battery's positive (+) lead to terminal 8 (+B) and the battery's negative (-) lead to terminals 5 (EW) and 6 (+S).
(3) Turn the wiper switch to the INT position.
(4) Connect the battery's positive (+) lead to terminal 6 (+S) for 5 seconds.
(5) Connect the battery's negative (-) lead to terminal 6 (+S). Operate the intermittent wiper relay and check the voltage between terminals 7 (+1) and 5 (EW).
OK:
Refer to illustration.



If the result is not as specified, replace the switch assembly.



(c) Check the front washer operation.
(1) Turn the wiper switch off.
(2) Connect the battery's positive (+) lead to terminal 8 (+B) and the battery's negative (-) lead to terminals 6 (+S) and 5 (EW).
(3) Connect the voltmeter's positive (+) lead to terminal 7 (+1) and the voltmeter's negative (-) lead to terminal 5 (EW).
(4) Turn the washer switch on and off, and check the voltage between terminals 7 (+1) and 5 (EW).
If the result is not as specified, replace the switch assembly.
OK:
Refer to illustration.



WASHER MOTOR

ON-VEHICLE INSPECTION

1. CHECK WASHER MOTOR

HINT:

This check should be performed with the windshield washer motor and pump installed to the washer jar.

(a) Fill the washer jar with washer fluid.

(b) Check the motor (front side).

(1) Connect the battery's positive (+) lead to terminal 2 of the washer motor and pump, and the negative (-) lead to terminal 1.

(2) Check that washer fluid flows from the washer jar.

OK:

Washer fluid flows from washer jar.

If the result is not as specified, replace the washer motor and pump assembly.

(c) Check the motor (rear side).

(1) Connect the battery's positive (+) lead to terminal 2 of the washer motor and pump, and the negative (-) lead to terminal 3.

(2) Check that washer fluid flows from the washer jar.

OK:

Washer fluid flows from washer jar.

If the result is not as specified, replace the washer motor and pump assembly.

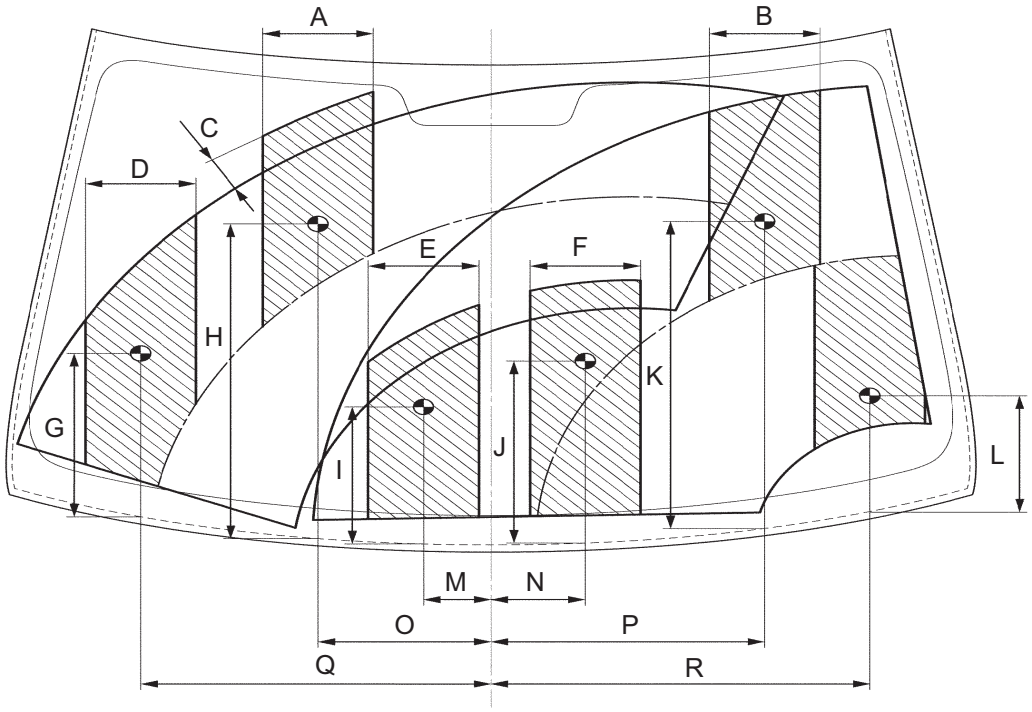
WASHER NOZZLE

ADJUSTMENT

1. CHECK WASHER NOZZLE

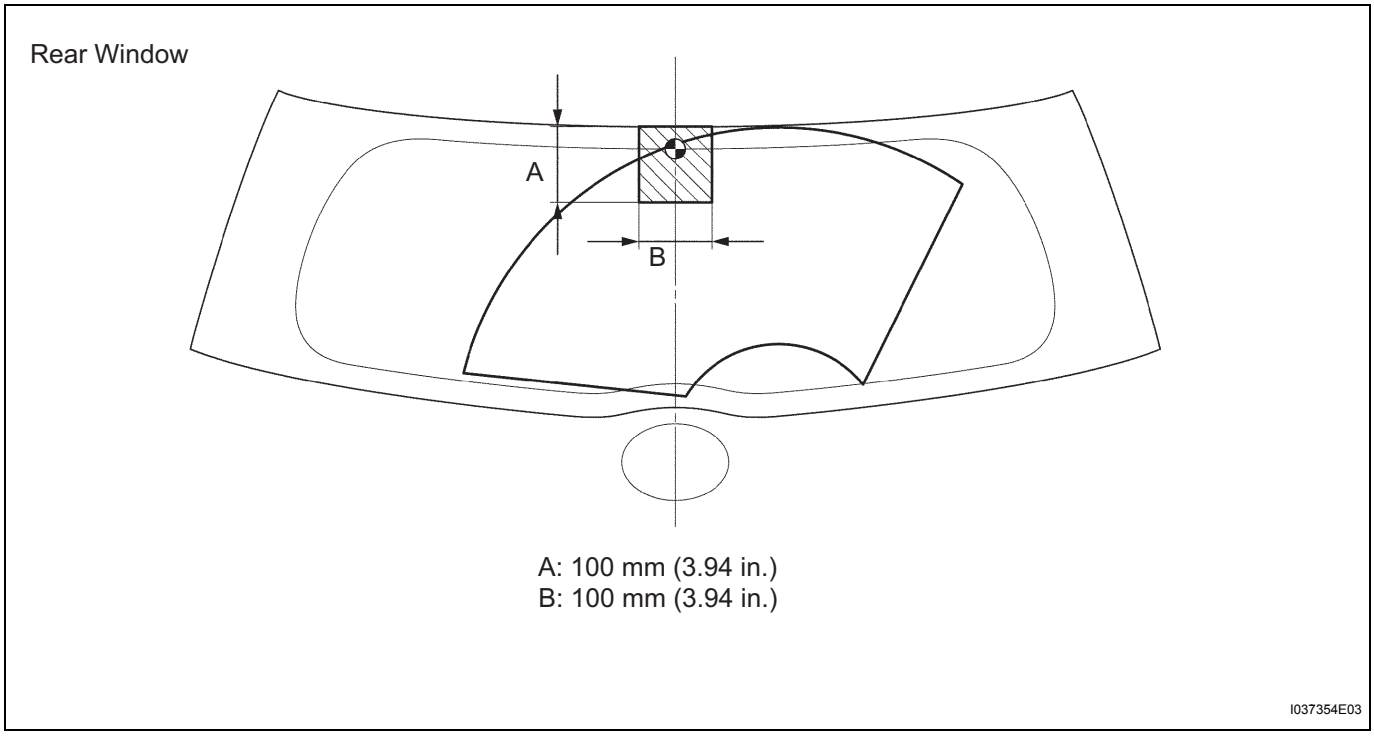
(a) With the engine running, check that the point where the washer fluid hits the windshield and the rear window is within the range indicated by the hatched line.

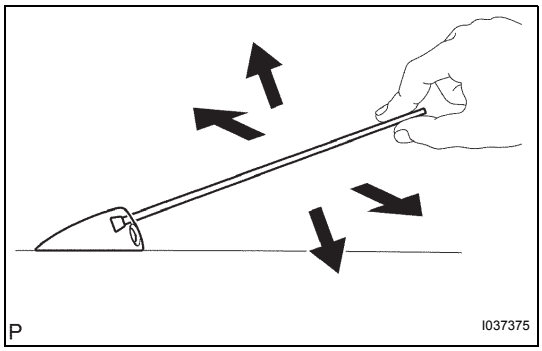
Windshield



A: 150 mm (5.91 in.)
B: 150 mm (5.91 in.)
C: 50 mm (1.97 in.)
D: 150 mm (5.91 in.)
E: 150 mm (5.91 in.)
F: 150 mm (5.91 in.)
G: 292.2 mm (11.50 in.)
H: 556.3 mm (22.02 in.)
I: 243.1 mm (9.57 in.)
J: 322.4 mm (12.69 in.)
K: 548.7 mm (21.60 in.)
L: 211.3 mm (8.7 in.)
M: 98.3 mm (3.69 in.)
N: 123.4 mm (4.86 in.)
O: 233.2 mm (9.18 in.)
P: 361.4 mm (14.22 in.)
Q: 470 mm (18.50 in.)
R: 503 mm (19.81 in.)

B122827E03





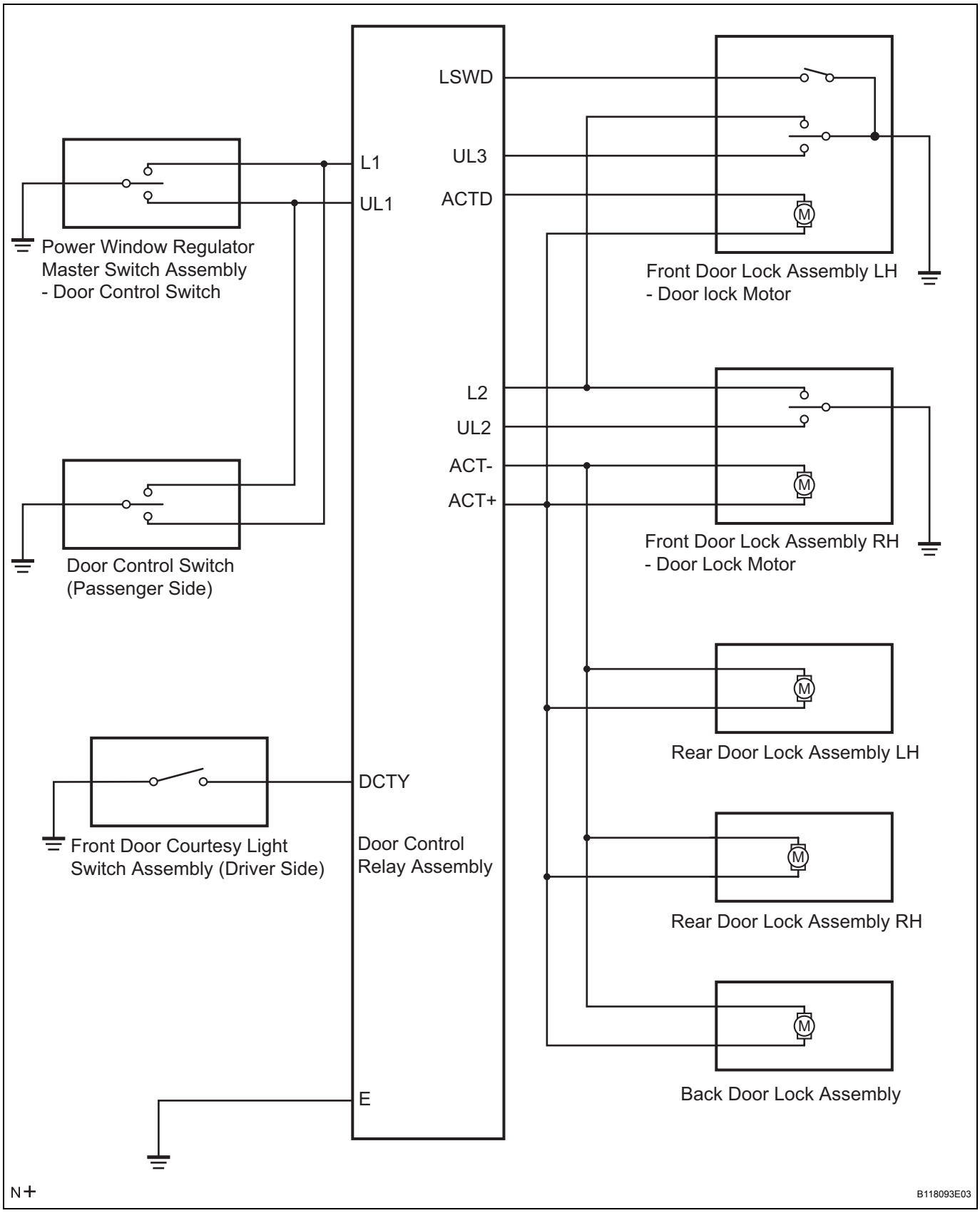
2. ADJUST WASHER NOZZLE

(a) Using a pin, adjust the direction of the washer nozzle.

NOTICE:

Use a pin that the end is not sharp.

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. POWER DOOR LOCK CONTROL SYSTEM DESCRIPTION

The power door lock system locks / unlocks all the doors simultaneously.

The master switch and the door control switch on the passenger side door send lock / unlock request signals to the door lock control relay. Then, the door lock control relay sends these requests to the lock motors in each door to lock / unlock all the doors simultaneously.

Inserting the key into the driver side or passenger side door key cylinder and performing a lock / unlock operation also sends lock / unlock request signals to the door lock control relay.

2. DESCRIPTION

The power door lock control system has the following functions:

Function	Description
Key-linked lock and unlock function	This function locks / unlocks all doors at once when key cylinder on driver side door linked with driver side door lock is turned with key
Key lock-in prevention function	When key is inserted into ignition key cylinder and you perform door lock operation with driver side door open, all doors will be unlocked
Door control switch* unlock prohibition function	Performing door lock operation with transmitter or key will prohibit unlock operation by door lock control switch
2-step unlock function	Driver side door can be unlocked by turning key cylinder once; remaining doors can be unlocked by turning key cylinder a second time

HINT:

*: Master switch and door control switch (passenger side)

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
Use these procedures to troubleshoot the power door lock control system.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

DL

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → Go to step 5

A

4	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (see page DL-6).
(b) On-vehicle inspection (see page DL-7).
(c) Inspection (see page DL-27, DL-28, DL-30 and DL-31).

5	ADJUST, REPAIR OR REPLACE

NEXT

6	CONFIRMATION TEST

NEXT

END

PROBLEM SYMPTOMS TABLE

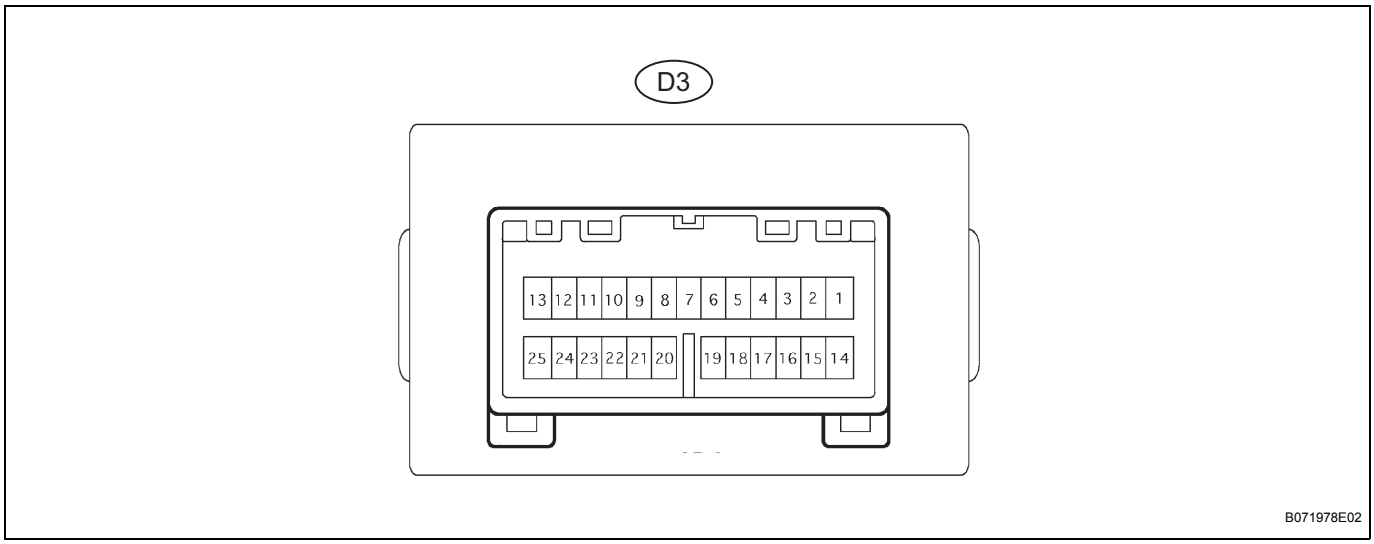
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Power Door Lock Control System

Symptom	Suspected area	See page
All doors cannot be locked / unlocked simultaneously	1. D/L fuse	DL-28
	2. GAUGE fuse	DL-28
	3. Power window regulator master switch assembly	DL-27
	4. Front door lock assembly LH	DL-28
	5. Door control switch assembly	DL-27
	6. Front door lock assembly RH	DL-29
	7. Door control relay assembly	DL-6
	8. Wire harness	DL-9

TERMINALS OF ECU

1. CHECK DOOR CONTROL RELAY ASSEMBLY



(a) Disconnect the D3 relay connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (D3-14) - Body ground	L-O - Body ground	+B (B) power supply	Always	10 to 14 V
E (D3 - 25) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
IG (D3-3) - Body ground	R-B - Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
DCTY (D3-18) - Body ground	R-W - Body ground	Driver side courtesy switch input	Driver side door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
L1 (D3-7) - Body ground	BR-W - Body ground	Door control switch (master switch and passenger side switch) lock input	Door control switch (master switch or passenger side switch) OFF → LOCK	10 kΩ or higher → Below 1 Ω
UL1 (D3-8) - Body ground	G-W - Body ground	Door control switch (master switch and passenger side switch) unlock input	Door control switch (master switch or passenger side switch) OFF → UNLOCK	10 kΩ or higher → Below 1 Ω
LSWD (D3-5) - Body ground	L-R - Body ground	Driver side door lock position switch input	Driver side door UNLOCK → LOCK	10 kΩ or higher → Below 1 Ω
L2 (D3-9) - Body ground	BR-Y - Body ground	Driver and passenger side door key linked door lock input	Driver or passenger side door key cylinder OFF → LOCK	10 kΩ or higher → Below 1 Ω
UL3 (D3-10) - Body ground	Y-B - Body ground	Driver side door key linked door unlock input	Driver side door key cylinder OFF → UNLOCK	10 kΩ or higher → Below 1 Ω
UL2 (D3-11) - Body ground	G-B - Body ground	Passenger side door key linked door unlock input	Passenger side door key cylinder OFF → UNLOCK	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the D3 relay connector.

(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACT+ (D3-1) - Body ground	L-W - Body ground	Door lock motor LOCK drive output (driver, passenger, rear LH, rear RH and back doors)	Door control switch (master switch or passenger side switch) or door key cylinder (driver or passenger) OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACTD (D3-2) - Body ground	Y-G - Body ground	Door lock motor UNLOCK drive output (driver door)	Door control switch (master switch or passenger side switch) or door key cylinder (driver or passenger) OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT- (D3-13) - Body ground	L-B - Body ground	Door lock motor UNLOCK drive output (passenger, rear LH, rear RH and back doors)		

If the result is not as specified, the relay may have a malfunction.

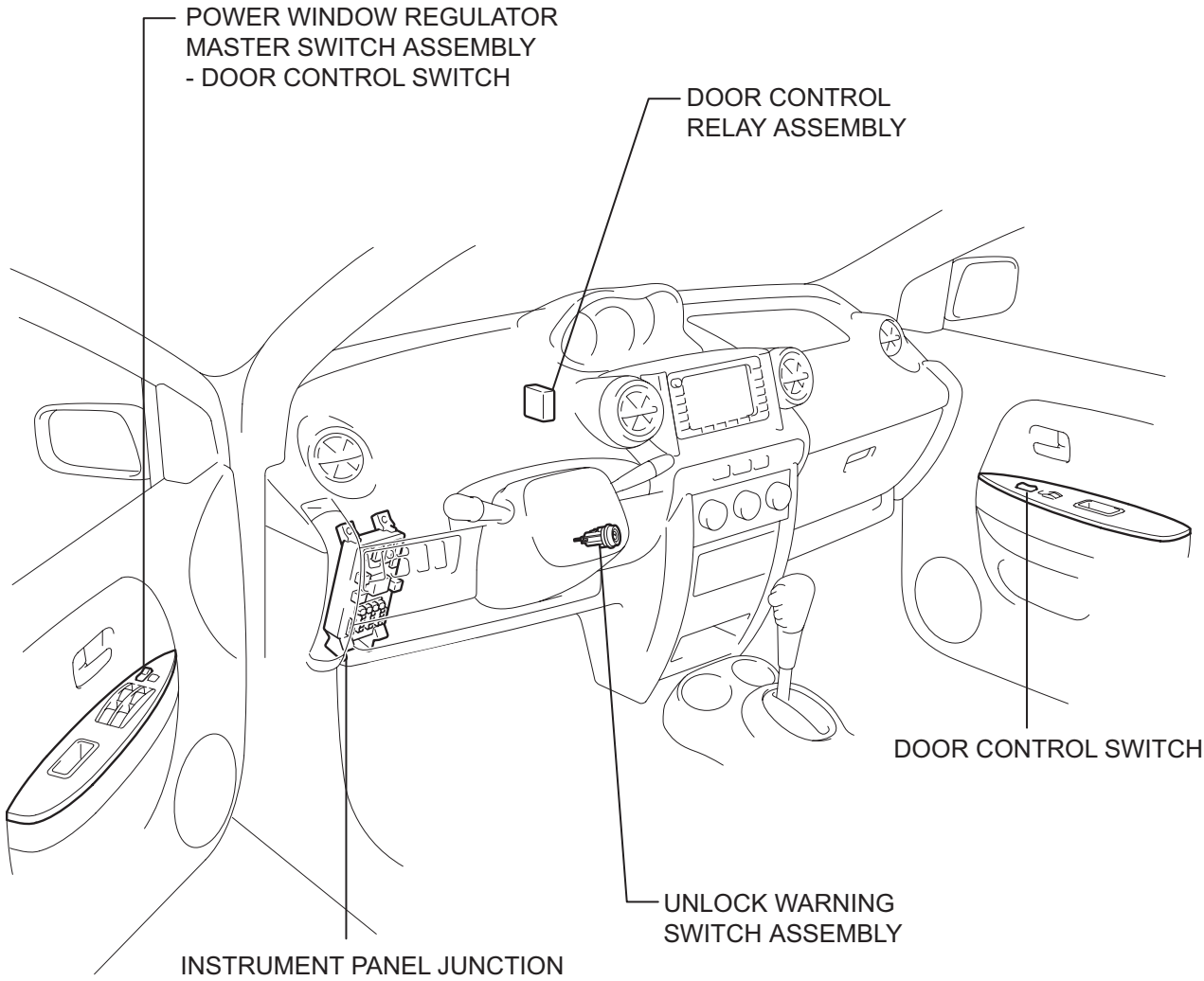
POWER DOOR LOCK CONTROL SYSTEM

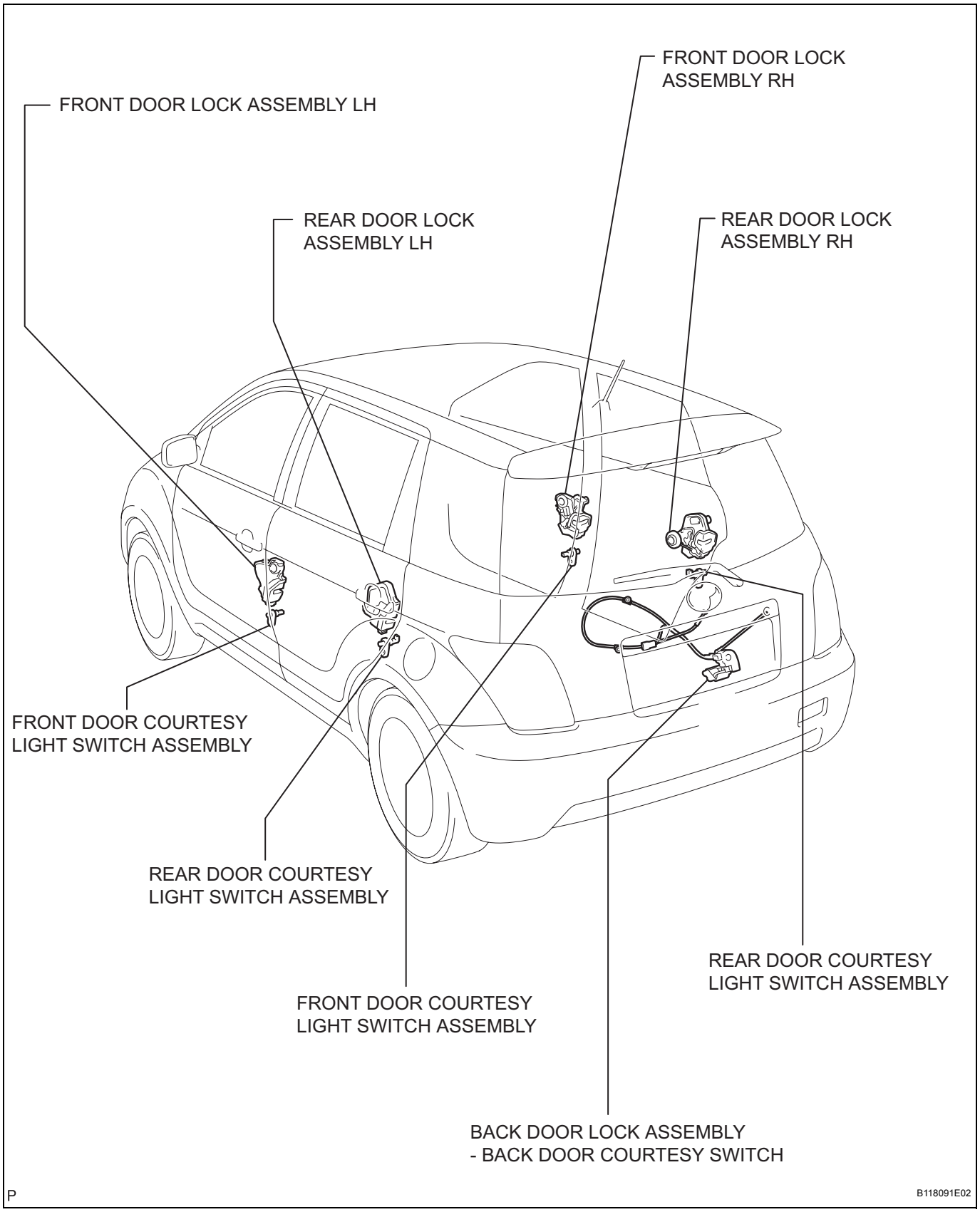
PRECAUTION

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

System Name	See procedure
Sliding Roof System	IN-23

PARTS LOCATION




FRONT DOOR LOCK ASSEMBLY RH
FRONT DOOR LOCK ASSEMBLY LH
REAR DOOR LOCK ASSEMBLY LH
REAR DOOR LOCK ASSEMBLY RH
FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY
REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY
REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY
FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY
BACK DOOR LOCK ASSEMBLY - BACK DOOR COURTESY SWITCH
P
B118091E02

DL

ON-VEHICLE INSPECTION

1. CHECK POWER DOOR LOCK OPERATION

(a) Check these basic functions.

(1) For the door control switch (manual operation): 1) pushing LOCK causes all the doors to lock and 2) pushing UNLOCK causes all the doors to unlock.

(2) For the driver side key cylinder lock function: turning the driver side door lock key cylinder to LOCK causes all the doors to lock.

(3) For the driver side key cylinder unlock function: 1) turning to UNLOCK once causes the driver side door to unlock, and 2) turning again to UNLOCK within 3 seconds causes all the doors to unlock (2-step unlock function).

(b) Check the key lock-in prevention function.

NOTICE:

In order to prevent the key from actually being locked in the vehicle, the inspection should be made with the driver side door window open.

(1) Insert the key into the ignition key cylinder.

(2) With the driver side door open, turn the driver side door lock knob to LOCK and check that all the doors unlock immediately.

(3) With the driver side door open, push LOCK on the door control switch (manual operation) and check that all the doors unlock immediately.

(4) With the driver side door open, turn the driver side door lock knob to LOCK, hold it for 2 seconds or more and then close the driver side door. Check that all the doors unlock.

(c) Check the security function.

(1) Close all doors and leave the driver side door window open so that the door control switch can be operated from outside the vehicle.

(2) Pull out the key, open the driver side door, lock it using the door lock knob and close it. Check that when the door control switch (manual operation) is turned to UNLOCK from outside the vehicle, all doors do not unlock.

(3) Pull out the key, close and lock the driver side door by key operation. Check that when the door control switch (manual operation) is turned to UNLOCK from outside the vehicle, all doors do not unlock.

(4) Pull out the key, close the driver side door and lock the door by wireless door lock operation. Check that when the door control switch (manual operation) is turned to UNLOCK from outside the vehicle, all doors do not unlock.

HINT:

Check that the security function is canceled under the following conditions.

- The ignition switch is turned ON.

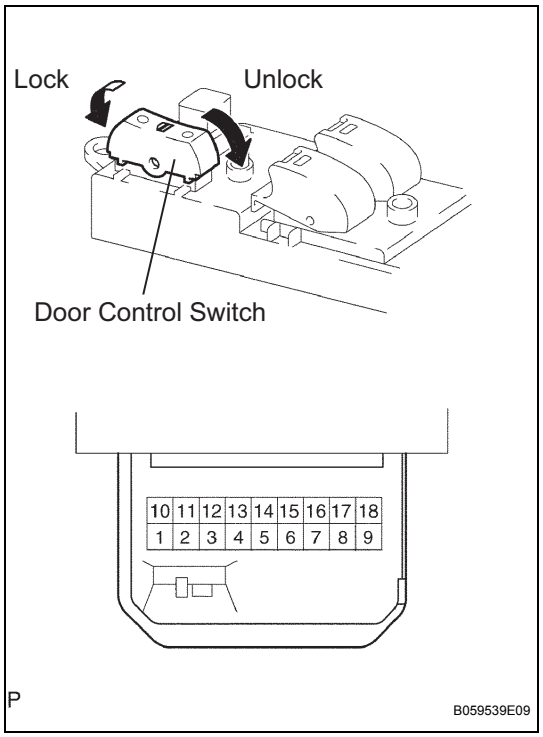
- The driver side door is unlocked using the key.
- The door control switch (manual operation) is turned to UNLOCK after the door control knob is turned to UNLOCK manually.
- The doors are unlocked by wireless operation.

2. CHECK ILLUMINATION

(a) Check the illumination function.

(1) Set the room light switch to the DOOR position.

(2) With all doors closed, check that the room light turns on when a door is opened, and turns off when it is closed.



DOOR CONTROL SWITCH

INSPECTION

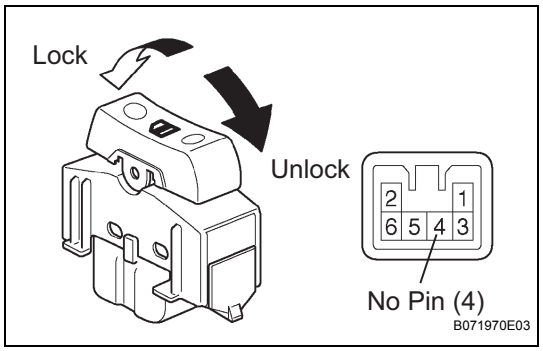
1. INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY (DOOR CONTROL SWITCH)

(a) Measure the resistance of the door control switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 5, 3 - 5	Lock	Below 1 Ω
1 - 5, 3 - 5 1 - 8, 3 - 8	OFF	10 kΩ or higher
1 - 8, 3 - 8	Unlock	Below 1 Ω

If the result is not as specified, replace the switch assembly.



2. INSPECT DOOR CONTROL SWITCH ASSEMBLY

(a) Measure the resistance of the door control switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
3 - 6	Lock	Below 1 Ω
3 - 5	Unlock	Below 1 Ω

If the result is not as specified, replace the switch assembly.

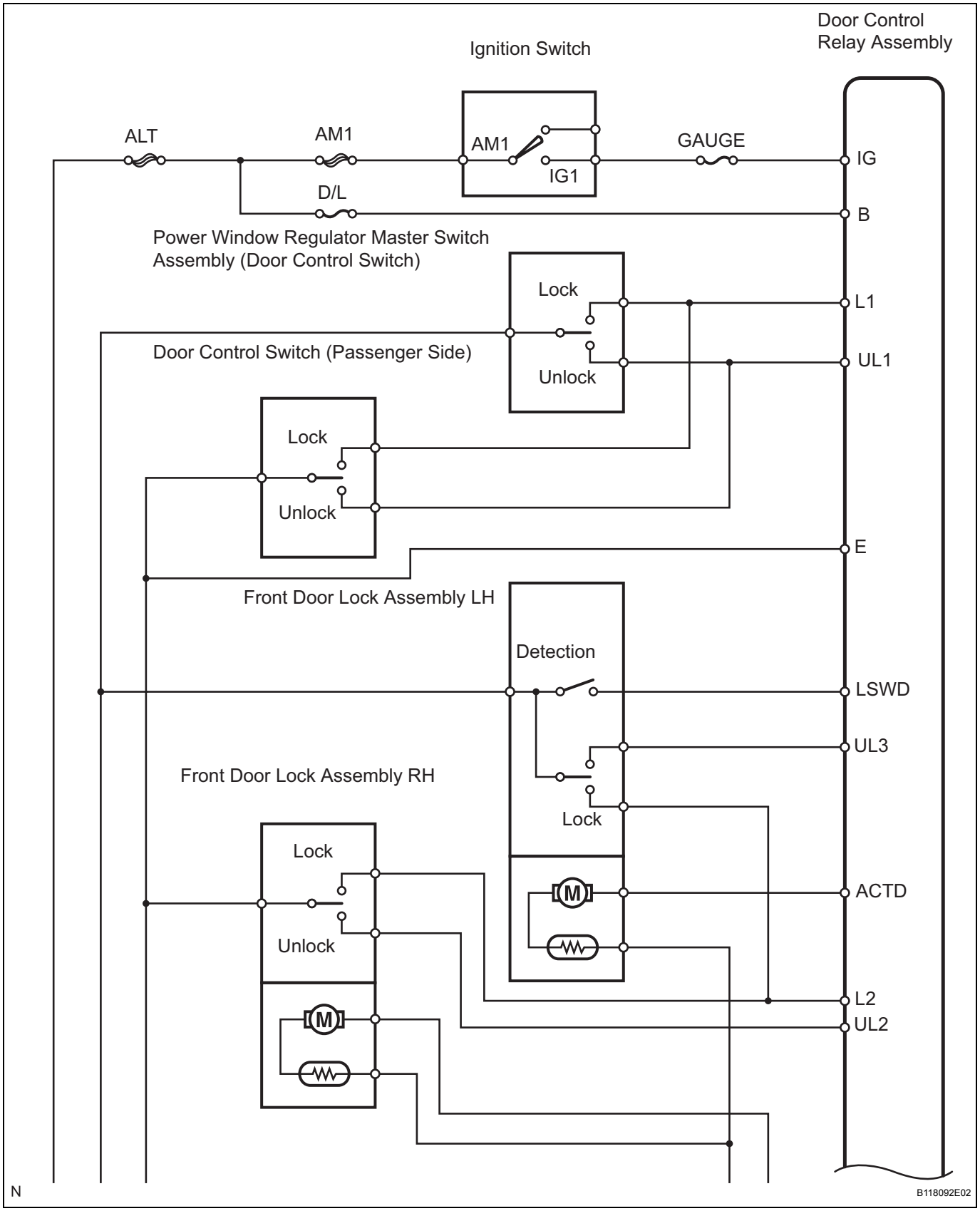
DL

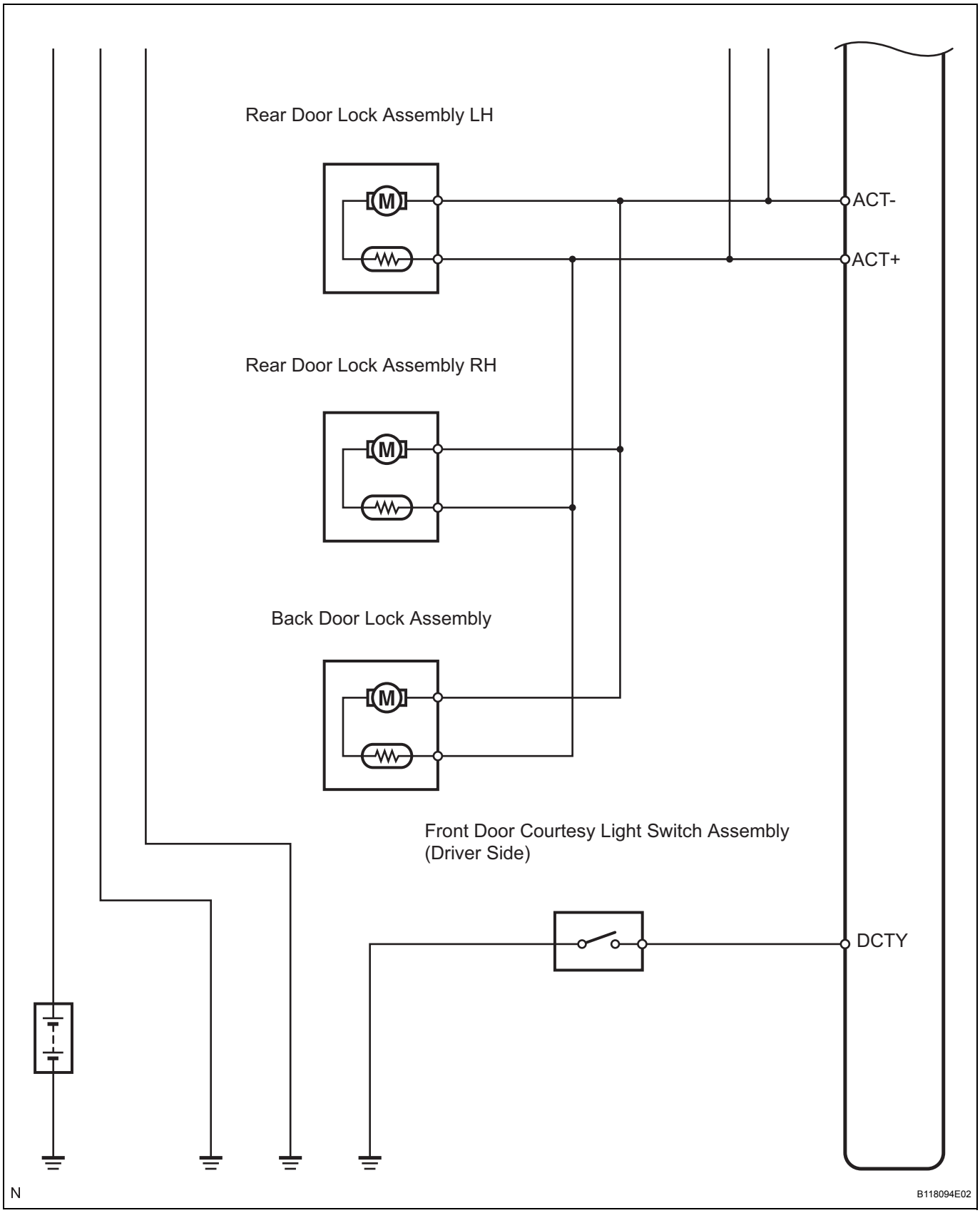
All Doors cannot be Locked / Unlocked Simultaneously

DESCRIPTION

The door control relay drives the door lock motors with switch signals from master switch, door control switch, and driver / passenger side door key cylinder.

WIRING DIAGRAM




Rear Door Lock Assembly LH
M
ACT-
ACT+
Rear Door Lock Assembly RH
M
Back Door Lock Assembly
M
Front Door Courtesy Light Switch Assembly
(Driver Side)
DCTY
N
B118094E02

INSPECTION PROCEDURE

1	CHECK DOORS LOCK / UNLOCK OPERATION

(a) All doors can be locked / unlocked at once using the following:
- Door control switch on the master switch (switch operation)
- Door control switch on the front passenger side (switch operation)
- Door key cylinder linked with door lock on the driver side (key operation)
- Door key cylinder linked with door lock on the front passenger side (key operation)

(b) Proceed to the next step according to the symptom if all the doors cannot be locked / unlocked at once.

Symptom	Proceed to
All doors cannot be locked / unlocked at once using door control switch on master switch or key cylinder on driver side	A
All doors cannot be locked / unlocked at once using door control switch on front passenger side or key cylinder on passenger side	B
Both items listed above are malfunctioning	C

B → **Go to step 3**

C → **Go to step 24**

A

2	CHECK DRIVER SIDE SWITCH AND KEY OPERATION

(a) Proceed to the next step according to the symptom listed in the table below.

Symptom	Proceed to
All doors cannot be locked / unlocked at once using door control switch on master switch	A
All doors cannot be locked / unlocked at once using door key cylinder on driver side	B
All doors cannot be locked / unlocked at once using door control switch on master switch and door key cylinder on driver side	C

A → **Go to step 4**

B → **Go to step 8**

C → **Go to step 14**

3 CHECK FRONT PASSENGER SWITCH AND KEY

(a) Proceed to the next step according to the symptom listed in the table below.

Symptom	Proceed to
All doors cannot be locked / unlocked at once using door control switch on front passenger side	A
All doors cannot be locked / unlocked at once using door key cylinder on front passenger side	B
All doors cannot be locked / unlocked at once using door control switch and door key cylinder on front passenger side	C

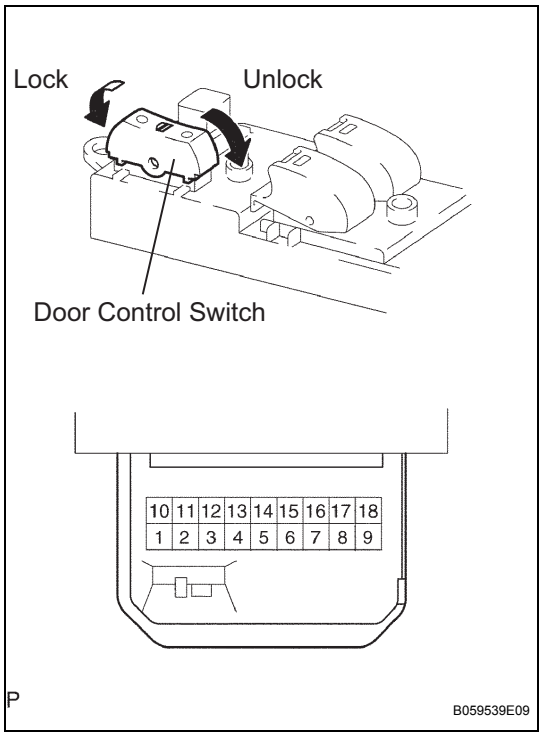
DL

A → **Go to step 6**

B → **Go to step 11**

C → **Go to step 19**

4 INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY



(a) Remove the master switch.

(b) Measure the resistance of the door control switch.

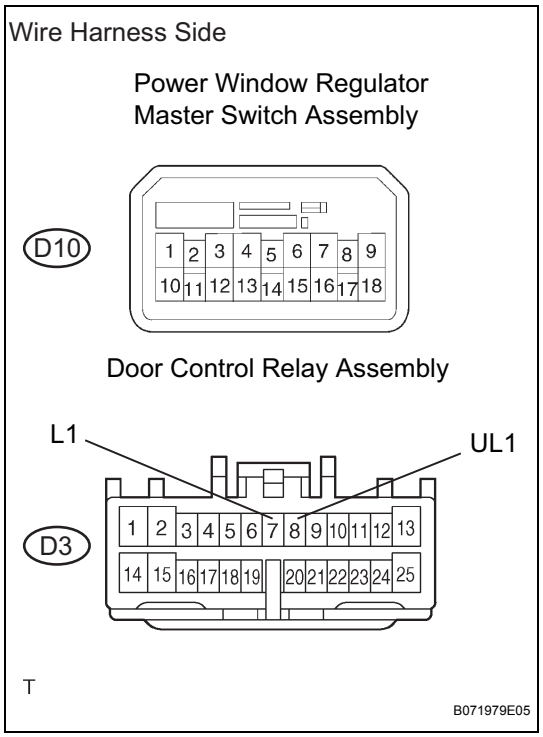
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 5, 3 - 5	Lock	Below 1 Ω
1 - 5, 3 - 5 1 - 8, 3 - 8	OFF	10 kΩ or higher
1 - 8, 3 - 8	Unlock	Below 1 Ω

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**

OK

5 CHECK WIRE HARNESS (MASTER SWITCH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D10 switch connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

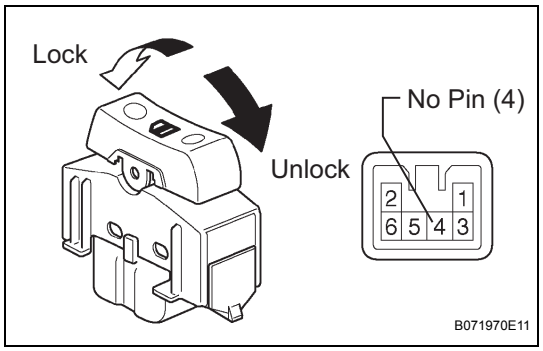
Tester Connection	Specified Condition
D10-5 - D3-7 (L1)	Below 1 Ω
D10-8 - D3-8 (UL1)	Below 1 Ω
D10-3 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE DOOR CONTROL RELAY ASSEMBLY

6 INSPECT DOOR CONTROL SWITCH ASSEMBLY



(a) Remove the door control switch.
(b) Measure the resistance of the switch.

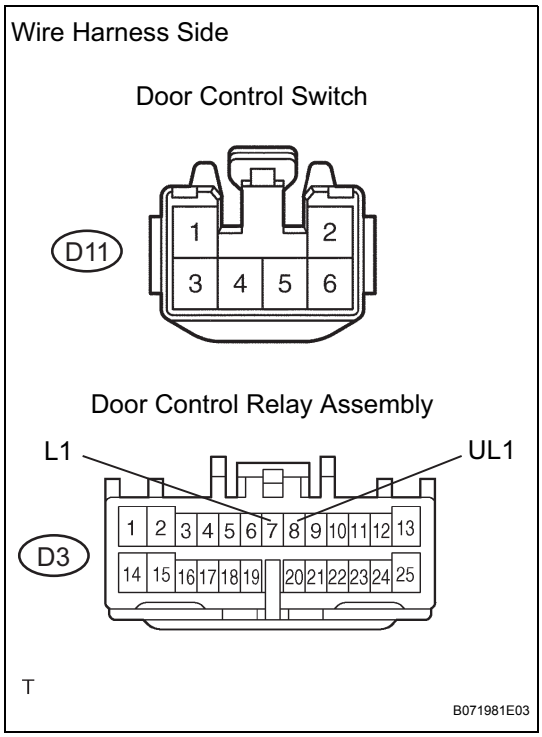
Standard resistance

Tester Connection	Switch Condition	Specified Condition
3 - 6	Lock	Below 1 Ω
3 - 5	Unlock	Below 1 Ω

NG → **REPLACE DOOR CONTROL SWITCH ASSEMBLY**

OK

7	CHECK WIRE HARNESS (DOOR CONTROL SWITCH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D11 switch connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

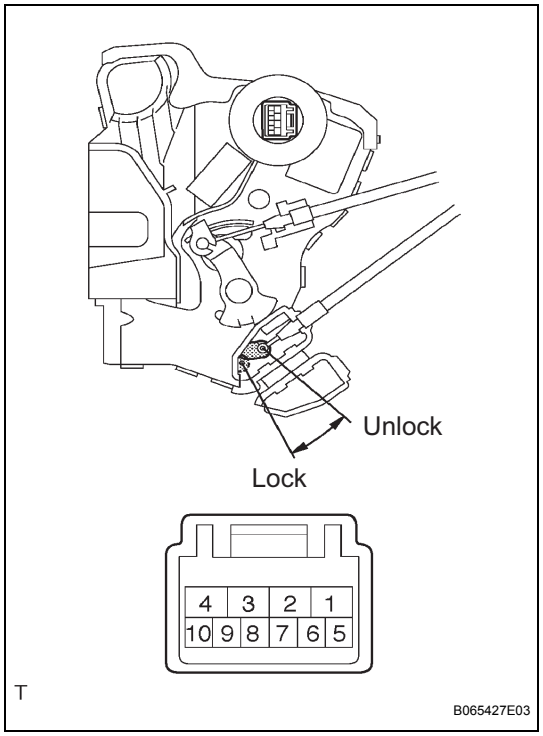
Tester Connection	Specified Condition
D11-5 - D3-8 (UL1)	Below 1 Ω
D11-6 - D3-7 (L1)	Below 1 Ω
D11-3 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE DOOR CONTROL RELAY ASSEMBLY

8 INSPECT FRONT DOOR LOCK ASSEMBLY LH (DOOR LOCK MOTOR)



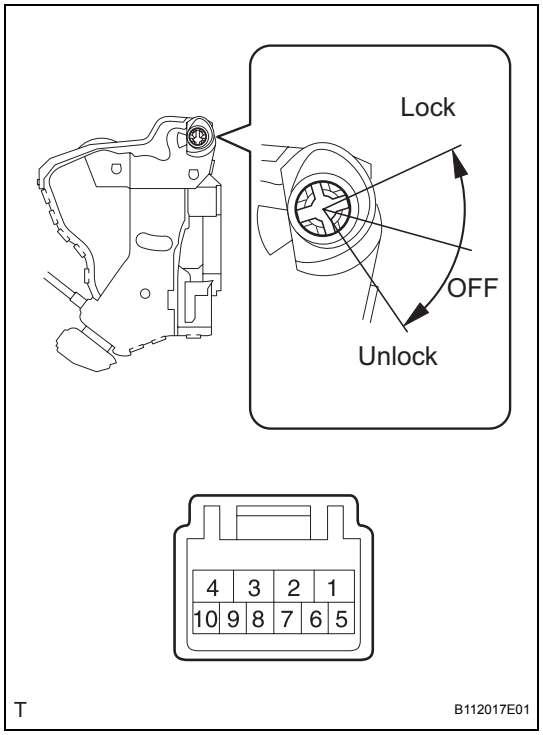
(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY LH**

OK

9 INSPECT FRONT DOOR LOCK ASSEMBLY LH (DOOR LOCK AND UNLOCK SWITCH AND DETECTION SWITCH)



(a) Measure the resistance of the door lock and unlock switch and detection switch.
Standard resistance:
Door lock and unlock switch

Tester Connection	Door Lock Condition	Specified Condition
7 - 9	Lock	Below 1 Ω
7 - 9, 7 - 10	OFF	10 kΩ or higher
7 - 10	Unlock	Below 1 Ω

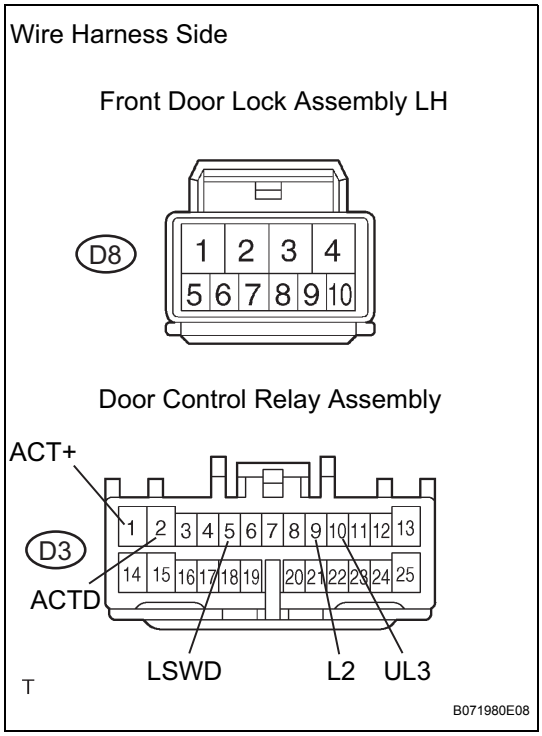
Detection switch

Tester Connection	Door Lock Condition	Specified Condition
7 - 8	Lock	10 kΩ or higher
7 - 8	Unlock	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY LH**

OK

10	CHECK WIRE HARNESS (FRONT DOOR LOCK LH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D8 lock connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

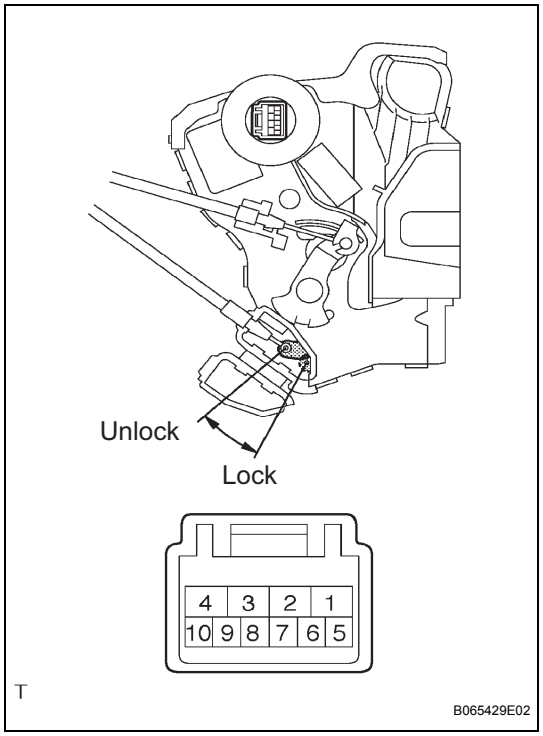
Tester Connection	Specified Condition
D8-1 - D3-2 (ACTD)	Below 1 Ω
D8-4 - D3-1 (ACT+)	Below 1 Ω
D8-8 - D3-5 (LSWD)	Below 1 Ω
D8-9 - D3-9 (L2)	Below 1 Ω
D8-10 - D3-10 (UL3)	Below 1 Ω
D8-7 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE DOOR CONTROL RELAY ASSEMBLY

11 INSPECT FRONT DOOR LOCK ASSEMBLY RH (DOOR LOCK MOTOR)



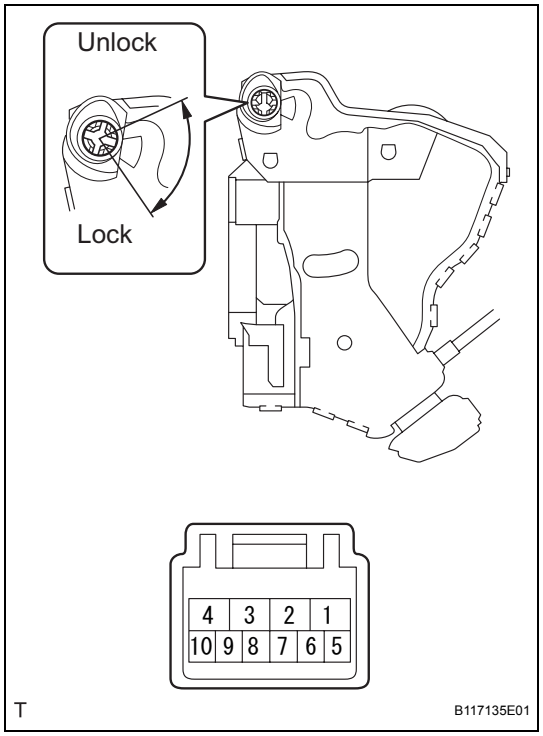
(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY RH**

OK

12 INSPECT FRONT DOOR LOCK ASSEMBLY RH (DOOR LOCK AND UNLOCK SWITCH)



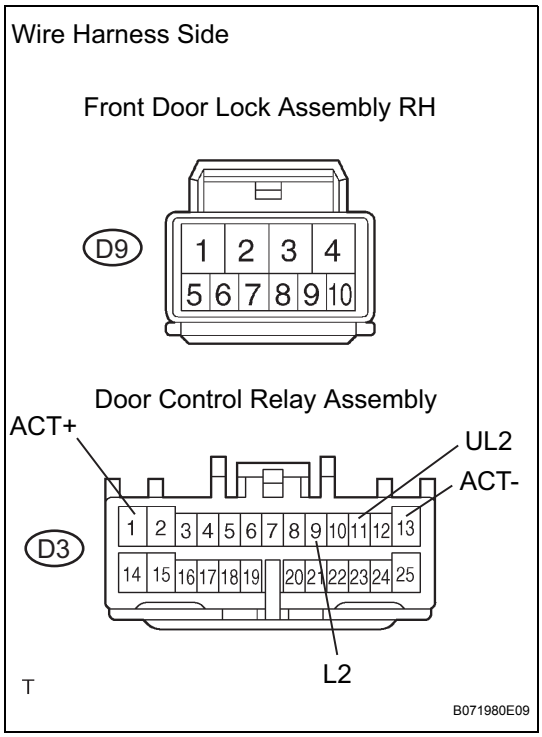
(a) Measure the resistance of the door lock and unlock switch.
Standard resistance

Tester Connection	Door Lock Condition	Specified Condition
6 - 8	Lock	Below 1 Ω
5 - 8, 6 - 8	OFF	10 kΩ or higher
5 - 8	Unlock	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY RH**

OK

13	CHECK WIRE HARNESS (FRONT DOOR LOCK RH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D9 lock connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

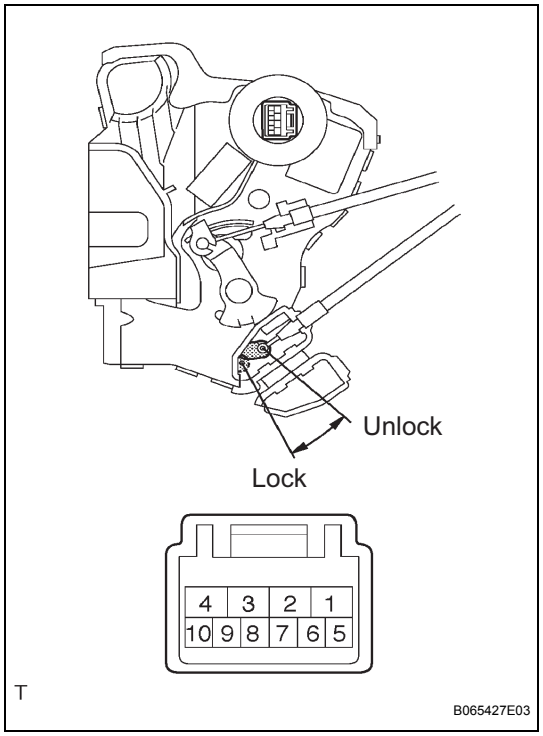
Tester Connection	Specified Condition
D9-1 - D3-13 (ACT-)	Below 1 Ω
D9-4 - D3-1 (ACT+)	Below 1 Ω
D9-5 - D3-11 (UL2)	Below 1 Ω
D9-6 - D3-9 (L2)	Below 1 Ω
D9-8 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE DOOR CONTROL RELAY ASSEMBLY

14 INSPECT FRONT DOOR LOCK ASSEMBLY LH (DOOR LOCK MOTOR)



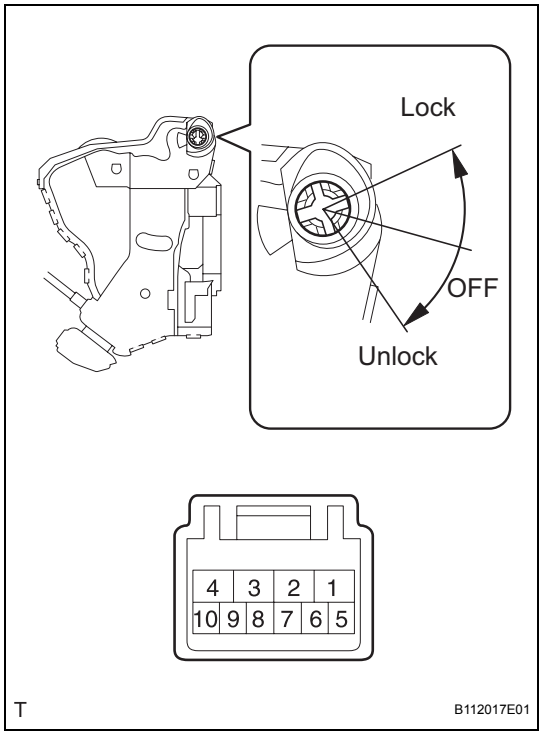
(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY LH**

OK

15 INSPECT FRONT DOOR LOCK ASSEMBLY LH (DOOR LOCK AND UNLOCK SWITCH AND DETECTION SWITCH)



(a) Measure the resistance of the door lock and unlock switch and detection switch.
Standard resistance:
Door lock and unlock switch

Tester Connection	Door Lock Condition	Specified Condition
7 - 9	Lock	Below 1 Ω
7 - 9, 7 - 10	OFF	10 kΩ or higher
7 - 10	Unlock	Below 1 Ω

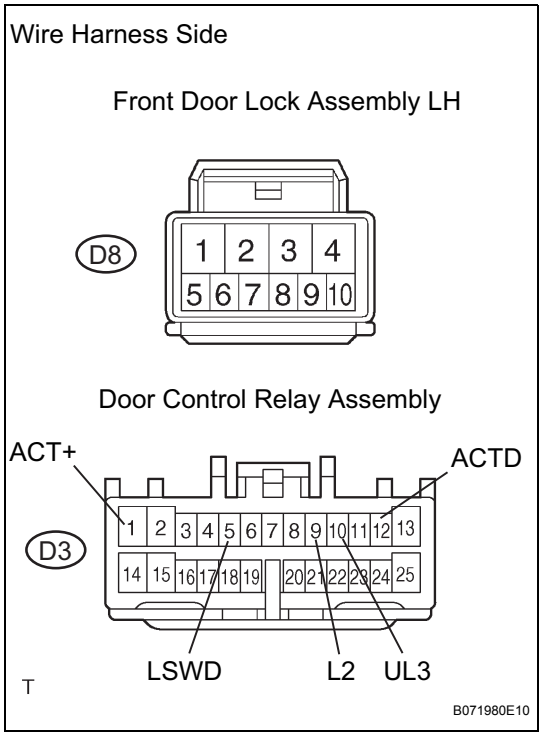
Detection switch

Tester Connection	Door Lock Condition	Specified Condition
7 - 8	Lock	10 kΩ or higher
7 - 8	Unlock	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY LH**

OK

16	CHECK WIRE HARNESS (FRONT DOOR LOCK LH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D8 lock connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.

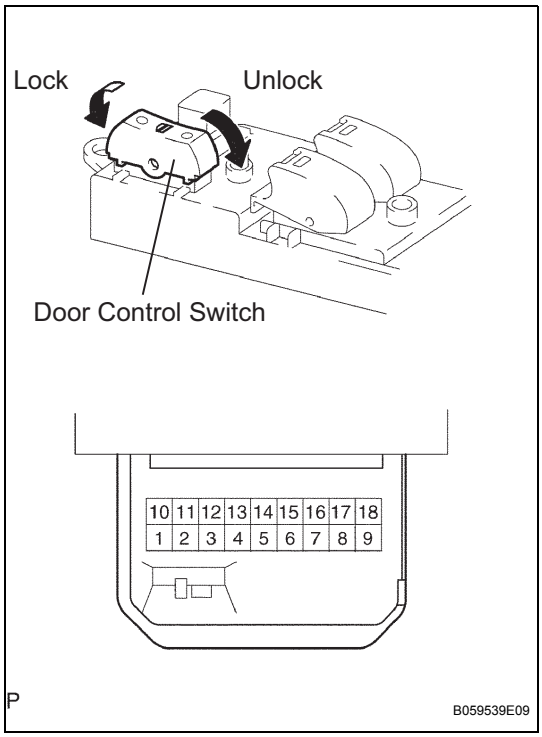
Standard resistance

Tester Connection	Specified Condition
D8-1 - D3-12 (ACTD)	Below 1 Ω
D8-4 - D3-1 (ACT+)	Below 1 Ω
D8-8 - D3-5 (LSWD)	Below 1 Ω
D8-9 - D3-9 (L2)	Below 1 Ω
D8-10 - D3-10 (UL3)	Below 1 Ω
D8-7 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

17	INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY



(a) Remove the master switch.
(b) Measure the resistance of the door control switch.

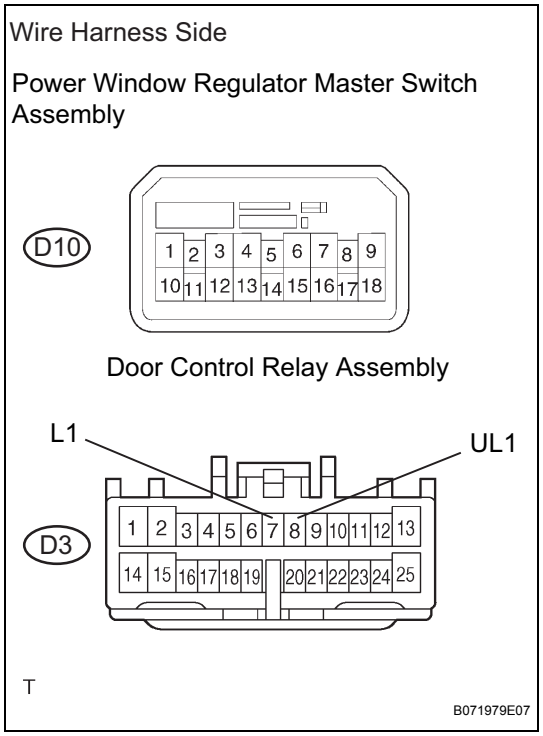
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 5, 3 - 5	Lock	Below 1 Ω
1 - 5, 3 - 5 1 - 8, 3 - 8	OFF	10 kΩ or higher
1 - 8, 3 - 8	Unlock	Below 1 Ω

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**

OK

18	CHECK WIRE HARNESS (MASTER SWITCH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D10 switch connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
D10-5 - D3-7 (L1)	Below 1 Ω
D10-8 - D3-8 (UL1)	Below 1 Ω
D10-3 - Body ground	Below 1 Ω

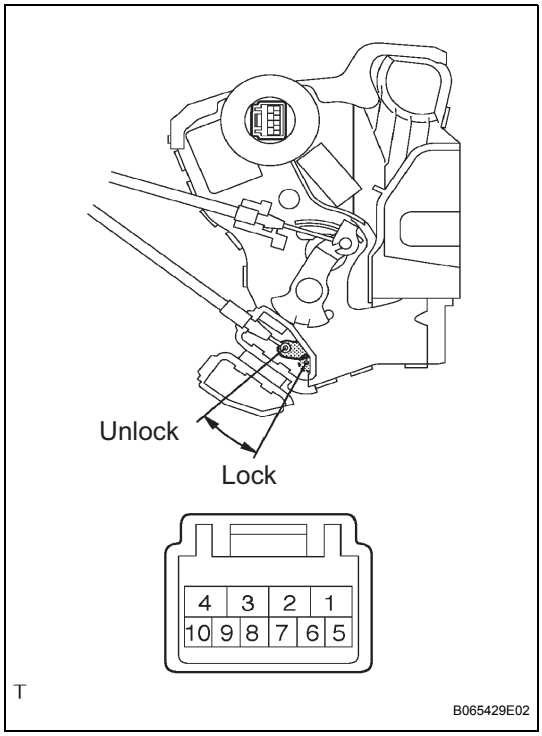
NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE DOOR CONTROL RELAY ASSEMBLY

DL

19 INSPECT FRONT DOOR LOCK ASSEMBLY RH (DOOR LOCK MOTOR)



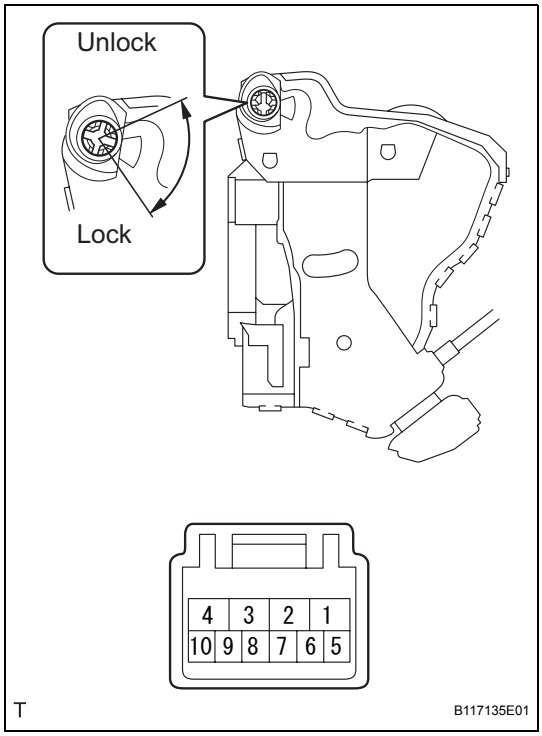
(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY RH**

OK

20 INSPECT FRONT DOOR LOCK ASSEMBLY RH (DOOR LOCK AND UNLOCK SWITCH)



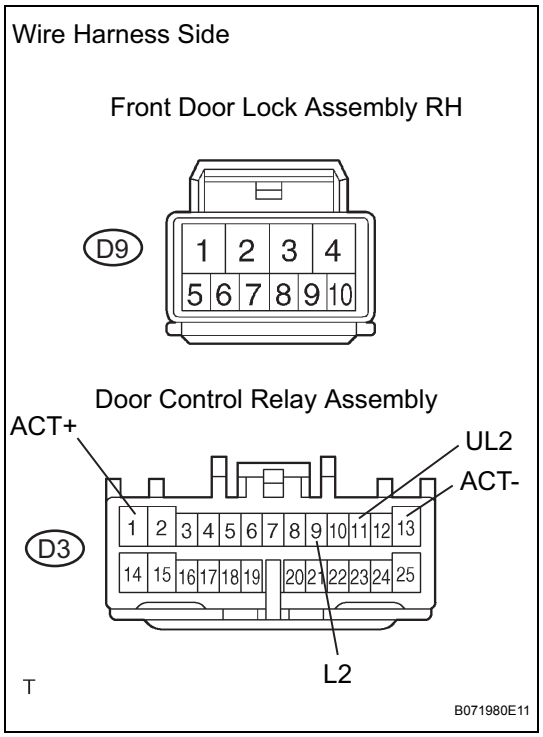
(a) Measure the resistance of the door lock and unlock switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
6 - 8	Lock	Below 1 Ω
5 - 8 6 - 8	OFF	10 kΩ or higher
5 - 8	Unlock	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY RH**

OK

21 CHECK WIRE HARNESS (FRONT DOOR LOCK RH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D9 lock connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.

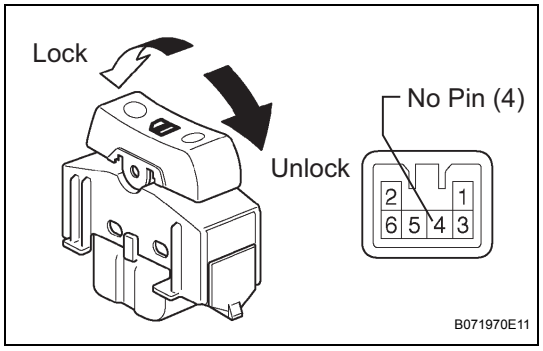
Standard resistance

Tester Connection	Specified Condition
D9-1 - D3-13 (ACT-)	Below 1 Ω
D9-4 - D3-1 (ACT+)	Below 1 Ω
D9-5 - D3-11 (UL2)	Below 1 Ω
D9-6 - D3-9 (L2)	Below 1 Ω
D9-8 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

22 INSPECT DOOR CONTROL SWITCH ASSEMBLY



(a) Remove the door control switch.
(b) Measure the resistance of the switch.

Standard resistance

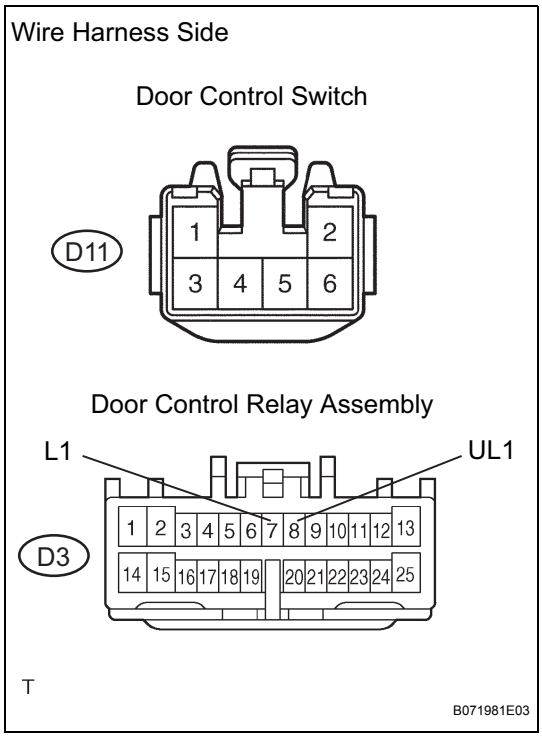
Tester Connection	Switch Condition	Specified Condition
3 - 6	Lock	Below 1 Ω
3 - 5	Unlock	Below 1 Ω

NG → **REPLACE DOOR CONTROL SWITCH ASSEMBLY**

OK

DL

23	CHECK WIRE HARNESS (DOOR CONTROL SWITCH - DOOR CONTROL RELAY AND BODY GROUND)



(a) Disconnect the D11 switch connector.
(b) Disconnect the D3 relay connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
D11-5 - D3-8 (UL1)	Below 1 Ω
D11-6 - D3-7 (L1)	Below 1 Ω
D11-3 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE DOOR CONTROL RELAY ASSEMBLY

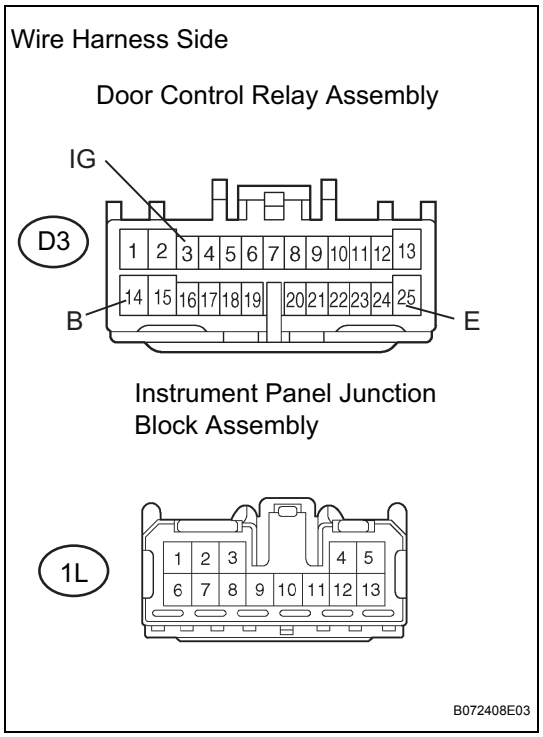
24	INSPECT FUSE (D/L, GAUGE)

(a) Remove the D/L and GAUGE fuses from the instrument panel junction block.
(b) Measure the resistance.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

25	**CHECK WIRE HARNESS (DOOR CONTROL RELAY - JUNCTION BLOCK AND BODY GROUND)**



(a) Disconnect the D3 relay connector.
(b) Disconnect the 1L block connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

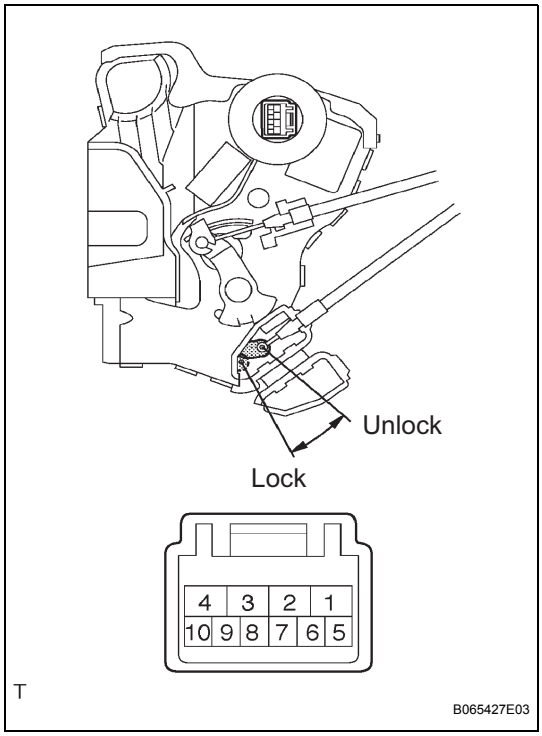
Tester Connection	Specified Condition
D3-3 (IG) - 1L-3	Below 1 Ω
D3-14 (B) - 1L-10	
D3-25 (E) - Body ground	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE DOOR CONTROL RELAY ASSEMBLY

DL



FRONT DOOR LOCK

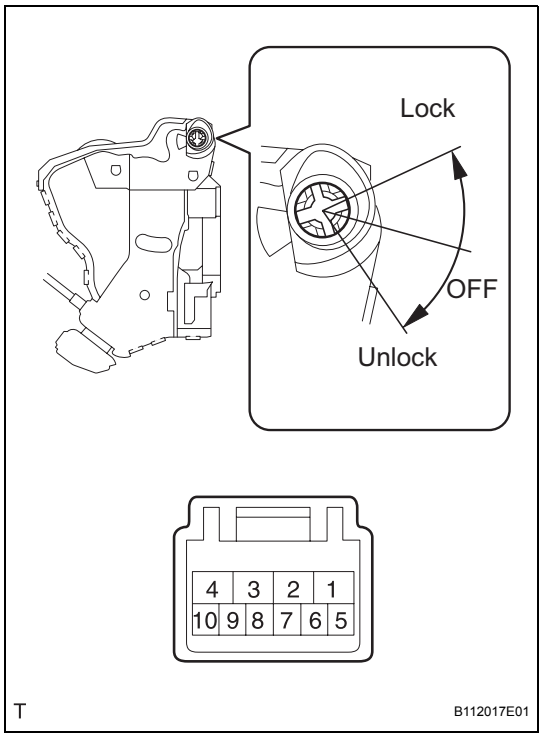
INSPECTION

1. INSPECT FRONT DOOR LOCK ASSEMBLY LH

(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

If the result is not as specified, replace the lock assembly.



(b) Measure the resistance of the door lock and unlock switch.
Standard resistance

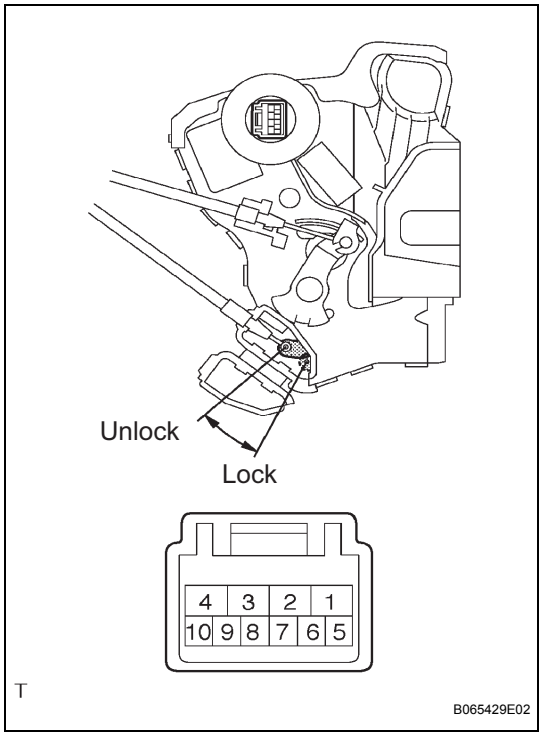
Tester Connection	Door Lock Condition	Specified Condition
7 - 9	Lock	Below 1 Ω
7 - 9, 7 - 10	OFF	10 kΩ or higher
7 - 10	Unlock	Below 1 Ω

If the result is not as specified, replace the lock assembly.

(c) Measure the resistance of the detection switch.
Standard resistance

Tester Connection	Door Lock Condition	Specified Condition
7 - 8	Lock	10 kΩ or higher
7 - 8	Unlock	Below 1 Ω

If the result is not as specified, replace the lock assembly.



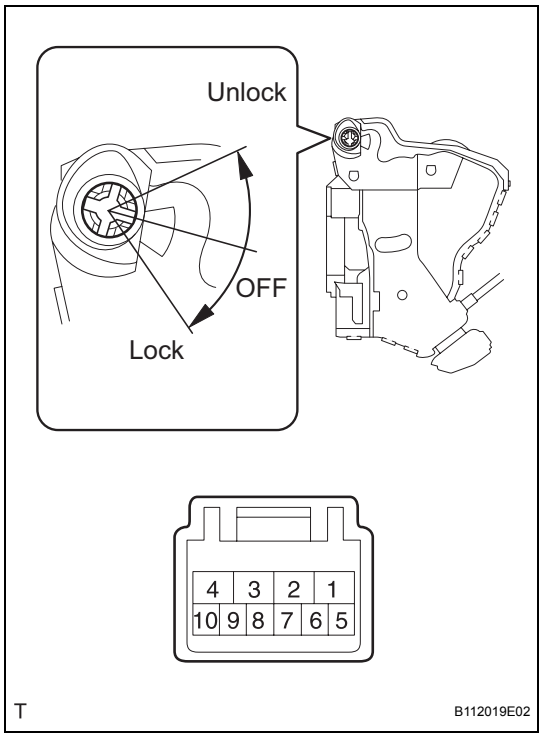
2. INSPECT FRONT DOOR LOCK ASSEMBLY RH

(a) Apply battery voltage to the door lock and check operation of the door lock motor.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

If the result is not as specified, replace the lock assembly.



(b) Measure the resistance of the door lock and unlock switch.

Standard resistance

Tester Connection	Door Lock Condition	Specified Condition
6 - 8	Lock	Below 1 Ω
5 - 8, 6- 8	OFF	10 kΩ or higher
5 - 8	Unlock	Below 1 Ω

If the result is not as specified, replace the lock assembly.

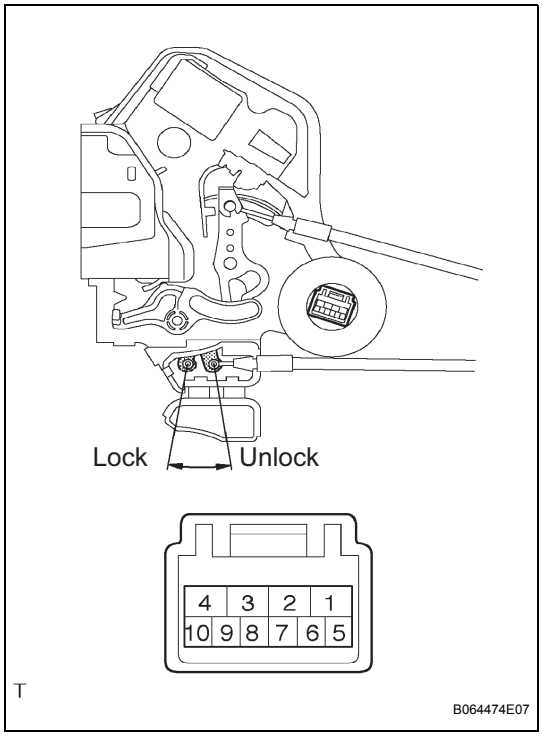
(c) Measure the resistance of the detection switch.

Standard resistance

Tester Connection	Door Lock Condition	Specified Condition
7 - 8	Lock	10 kΩ or higher
7 - 8	Unlock	Below 1 Ω

If the result is not as specified, replace the lock assembly.

DL



REAR DOOR LOCK

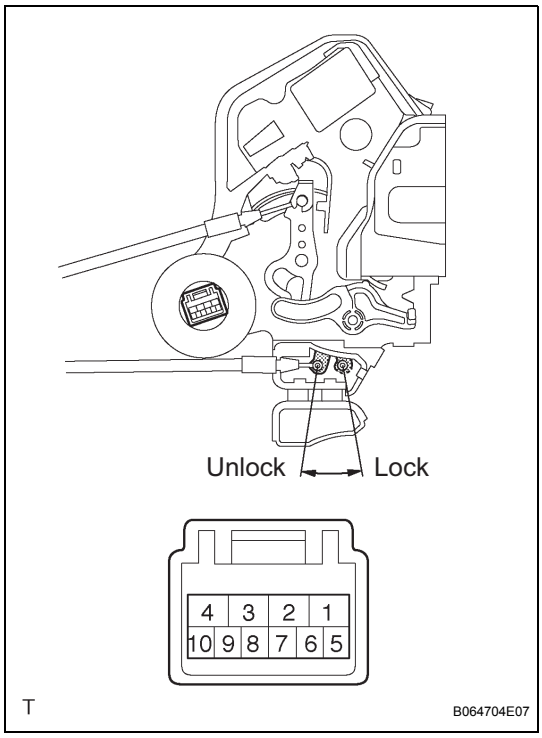
INSPECTION

1. INSPECT REAR DOOR LOCK ASSEMBLY LH

(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

If the result is not as specified, replace the lock assembly.

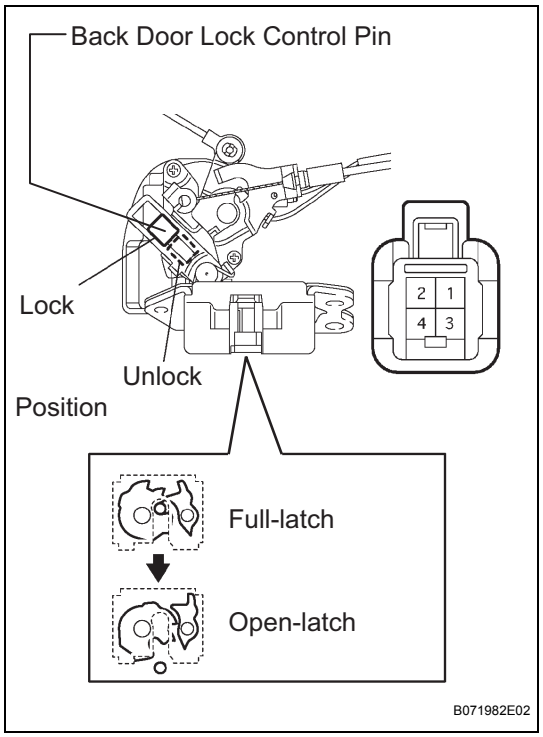


2. INSPECT REAR DOOR LOCK ASSEMBLY RH

(a) Apply battery voltage to the door lock and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

If the result is not as specified, replace the lock assembly.



BACK DOOR LOCK

INSPECTION

1. INSPECT BACK DOOR LOCK ASSEMBLY

(a) Apply battery voltage to the door lock and check operation of the latch.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 3	Lock
Battery positive (+) → Terminal 3 Battery negative (-) → Terminal 4	Unlock

If the result is not as specified, replace the door lock assembly.

(b) Measure the back door courtesy switch resistance.

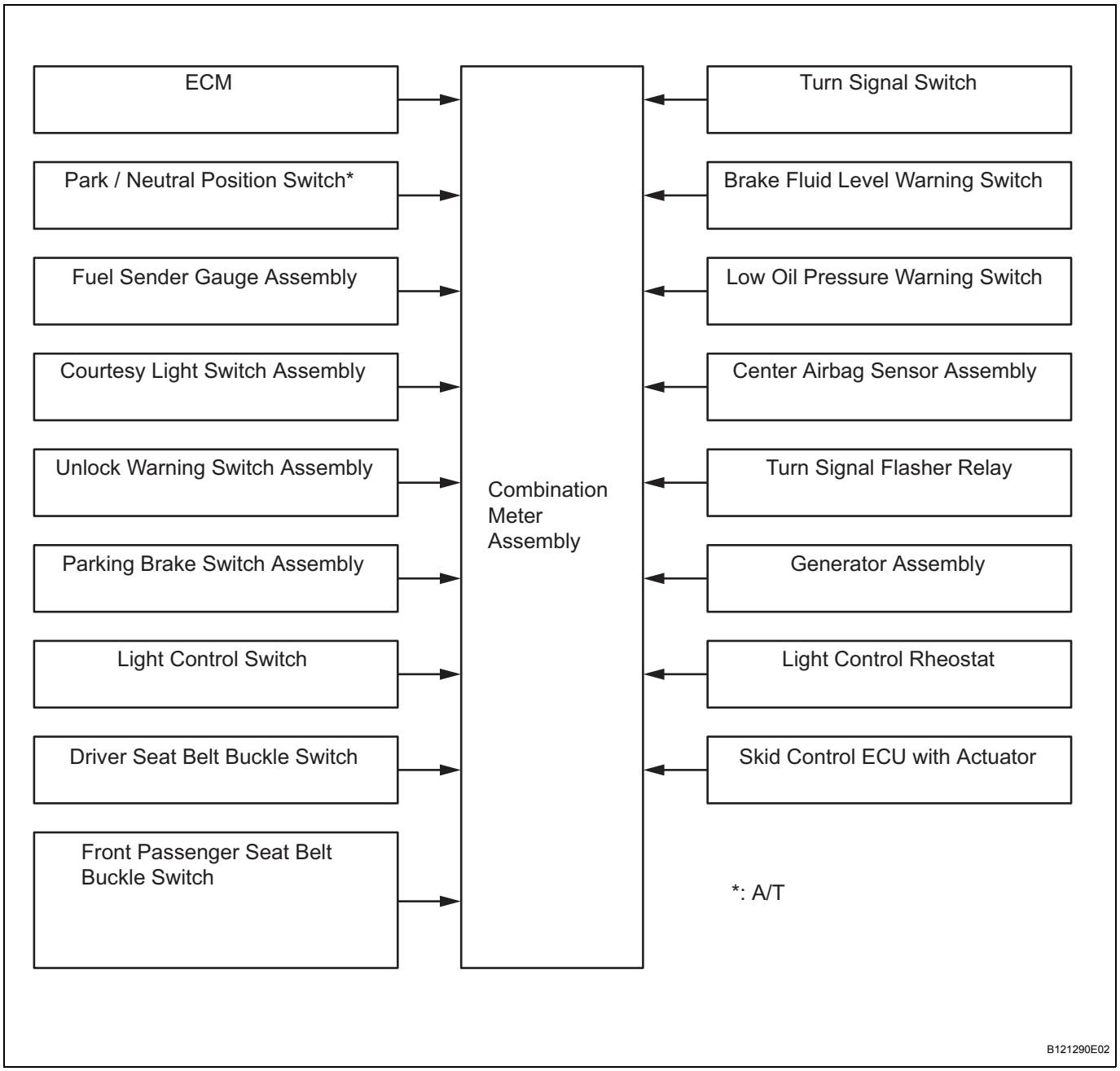
Standard resistance

Tester Connection	Door Lock Latch Condition	Specified Condition
1 - 2	Full-latch	10 kΩ or higher
1 - 2	Open-latch	Below 1 Ω

If the result is not as specified, replace the door lock assembly.

DL

SYSTEM DIAGRAM



ME

SYSTEM DESCRIPTION

1. METER GAUGE AND WARNING/INDICATOR LIGHT

Gauge

Item	Signal Description
Speedometer	Calculates vehicle speed based on signal from vehicle speed sensor
Tachometer	Calculates engine speed based on signal from ECM
ODO/TRIP Meter	Calculates distance vehicle is driven or distance since trip meter knob is pressed
Fuel	Indicates remaining amount of fuel based on signal from fuel sender gauge

Warning / Indicator Lights

Item	Signal Description
TURN	Blinks when receiving signal that turn signal switch or hazard warning signal switch is ON
BEAM	Illuminates when headlight dimmer switch is set to HI BEAM or FLASH position
CHARGE	Illuminates when receiving malfunction signal from generator
OIL PRESSURE	Illuminates when receiving "oil pressure is abnormally low (pressure switch is ON)" signal
MIL	Illuminates when receiving malfunction signal from ECM
DOOR	Illuminates when receiving each door courtesy light switch signal
SEAT BELT (Driver)	Blinks when driver's seat belt buckle switch is ON (unfastened)
SEAT BELT (Front passenger)	• Located on center cluster module switch • Blinks when front passenger's seat belt buckle switch is ON (unfastened)
BRAKE	Illuminates when receiving signal that parking brake switch is ON, brake fluid warning switch is ON, or vacuum warning switch is ON
SRS	Illuminates when receiving malfunction signal from center airbag sensor assembly
FUEL	Illuminates when receiving fuel empty signal from fuel sender gauge
MAINT REQD	• Illuminates when oil is changed and vehicle is driven about 8,000 km (5,000 miles) • Blinks when oil is changed and vehicle is driven about 12,000 km (7,500 miles)
P	Illuminates when receiving P signal from PNP switch
R	Illuminates when receiving R signal from PNP switch
N	Illuminates when receiving N signal from PNP switch
D	Illuminates when receiving D signal from PNP switch
2	Illuminates when receiving 2 signal from PNP switch
L	Illuminates when receiving L signal from PNP switch
VSC	Illuminates when receiving "traction control system is malfunctioning" or "vehicle stability control system is malfunctioning" signal from skid control ECU with actuator
SLIP	Blinks when receiving "traction control system is properly operating" or "vehicle stability control system is properly operating" signal from skid control ECU with actuator
Engine Coolant Temperature	• Illuminates red when signal from ECM indicates that engine coolant temperature is high • Illuminates blue when signal from ECM indicates that engine coolant temperature is low
TRAC OFF	Illuminates when receiving TRAC OFF signal from skid control ECU with actuator
ABS	Illuminates when receiving malfunction signal from skid control ECU with actuator
O/D OFF*	Illuminates when O/D off

HINT:
*: A/T

Buzzer

Item	Signal Description
Key Reminder	Buzzer sounds when ignition switch is OFF, key is inserted and driver side door is open
Light Reminder	Buzzer sounds when ignition switch is OFF, light control switch is set to TAIL or HEAD position, and driver side door is open
Seat Belt Warning	Buzzer sounds when seat belt is unfastened during driving

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the combination meter.
- *: Use the intelligent tester.

1 **VEHICLE BROUGHT TO WORKSHOP**

NEXT

ME

2 **INSPECT BATTERY VOLTAGE**

Standard voltage:
11 to 14 V

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

NEXT

3 **PROBLEM SYMPTOMS TABLE**

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → **Go to step 5**

A

4 **OVERALL ANALYSIS AND TROUBLESHOOTING***

(a) Terminal of ECU (see page ME-10)
(b) DATA LIST/ACTIVE TEST (see page ME-18)
(c) On-vehicle inspection (see page ME-19)

NEXT

5 **ADJUST, REPAIR OR REPLACE**

NEXT

END

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected area in the order they are listed. Replace parts as necessary.
- Inspect the related fuses and relays before confirming the suspected area in the table below.

Malfunction system

Symptom	Suspected area	See page
Entire combination meter does not operate	1. Refer to troubleshooting	ME-24
Operating light control rheostat does not change light brightness	1. Light control rheostat	ME-55
	2. Wire harness	ME-55
	3. Combination meter assembly	ME-61

Meter gauges

Symptom	Suspected area	See page
Malfunction in speedometer	1. Refer to troubleshooting	ME-26
Malfunction in tachometer	1. Refer to troubleshooting	ME-30
Malfunction in fuel receiver gauge	1. Refer to troubleshooting	ME-33
Malfunction in water temperature receiver gauge	1. Refer to troubleshooting	ME-36

Warning light

Symptom	Suspected area	See page
MIL does not come on	1. ECM	ES-9
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Discharge warning light does not come on	1. ECM	ES-9
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Brake warning light does not come on	1. Brake actuator assembly	BC-4
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Malfunction in engine coolant temperature warning light	1. Combination meter assembly	ME-61
	2. Engine coolant temperature sensor	ES-341
	3. SFI system	ES-9
	4. Wire harness	ME-36
ABS warning light does not come on	1. Brake actuator assembly	BC-162
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
SRS warning light does not come on	1. Center airbag sensor assembly	RS-23
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Open door warning light does not come on	1. Refer to troubleshooting	LI-7
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Fuel level warning light does not come on	1. Refer to troubleshooting	ME-33
	2. Wire harness or connector	ME-33
	3. Combination meter assembly	ME-61

Indicator light

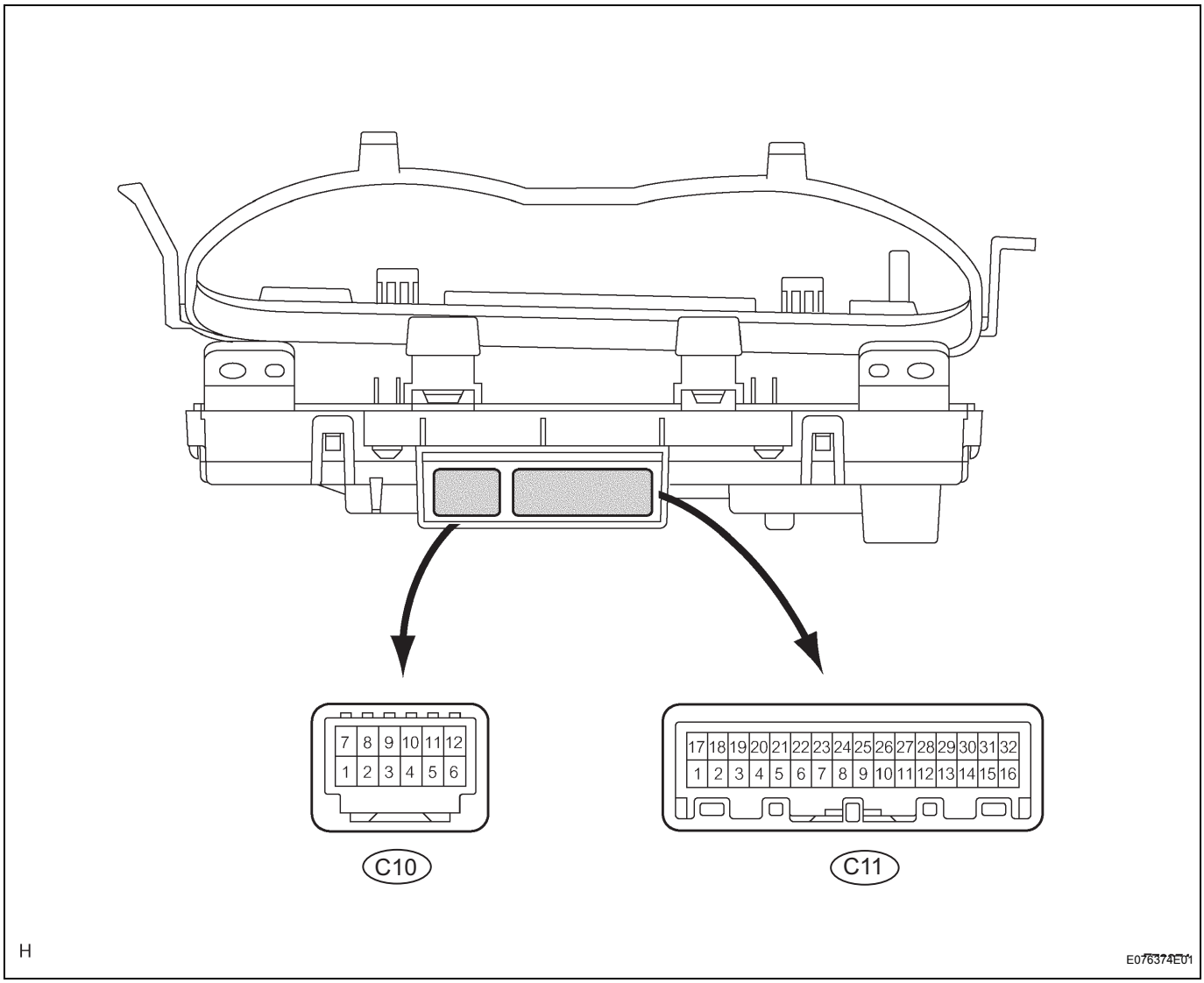
Symptom	Suspected area	See page
Turn indicator light does not come on	1. Turn signal and hazard warning system	LI-31
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
High beam indicator light does not come on	1. Headlight dimmer switch	LI-31
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Washer level indicator light does not come on	1. Washer level warning switch	ME-19
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
MAINT REQD indicator light is blinking or continuously illuminated	1. Resetting procedure	ME-19
	2. Combination meter assembly	ME-61
O/D OFF indicator light does not come on	1. Refer to troubleshooting	AX-80
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Water temperature indicator light does not come on	1. Refer to troubleshooting	ME-19
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61

Buzzer

Symptom	Suspected area	See page
All buzzers (key reminder, seat belt, taillight) do not operate	1. Refer to troubleshooting	ME-39
	2. Combination meter assembly	ME-61
Key reminder warning buzzer does not sound	1. Refer to troubleshooting	ME-39
	2. Un-lock warning switch assembly	ME-39
	3. Wire harness or connector	-
	4. Combination meter assembly	ME-61
Taillight reminder warning buzzer does not sound	1. Refer to troubleshooting	ME-39
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61
Seat belt warning buzzer does not sound	1. Refer to troubleshooting	ME-39
	2. Wire harness or connector	-
	3. Combination meter assembly	ME-61

TERMINALS OF ECU

1. CHECK COMBINATION METER ASSEMBLY



(a) Disconnect the C10 and C11 meter connectors.
(b) Measure the voltage and resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IGN1 (C10-1) - Body ground	R-B - Body ground	Ignition switch signal	Ignition switch OFF → ON	Below 1 V → 10 to 14 V
S GND (C10-3) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (C10-7) - Body ground	L-B - Body ground	Battery	Always	10 to 14 V
IGN2 (C11-13) - Body ground	B-R - Body ground	Ignition switch signal	Ignition switch OFF → ON	Below 1 V → 10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness.
(c) Reconnect the C10 and C11 meter connectors.
(d) Measure the resistance of the connectors.

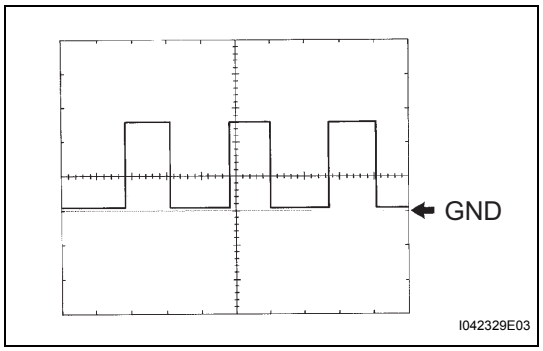
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BEAM- (C10-2) - Body ground	R-Y - Body ground	Hi-beam indicator signal	Headlight dimmer switch (Hi-beam) Lo → Hi	Below 1 V → 10 to 14 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TURN R (C10-4) - Body ground	G-Y - Body ground	Turn signal RH indicator signal	Ignition switch ON, turn signal RH indicator OFF → ON	Below 1 V → 10 to 14 V
TURN L (C10-5) - Body ground	P-B - Body ground	Turn signal LH indicator signal	Ignition switch ON, turn signal LH indicator OFF → ON	Below 1 V → 10 to 14 V
P-BELT OUT (C10-6) - Body ground	G-W - Body ground	Seat belt warning light signal (Passenger's seat)	Seat belt warning light for passenger's seat OFF → Blinks	Below 1 V → 10 to 14 V
BEAM+ (C10-8) - Body ground	R-L - Body ground	Hi-beam indicator signal	Headlight dimmer switch (Hi-beam) Lo → Hi	Below 1 V → 10 to 14 V
KEY ILL OUT (C10-9) - Body ground	BR-Y - Body ground	Key illumination signal	Key illumination ON → OFF	Below 1 V → 10 to 14 V
SP (C10-10) - Body ground	W-R - Body ground	Vehicle speed signal (Input)	Ignition switch ON, slowly turn wheel	Pulse generation (See waveform 1)
TM (C10-11) - Body ground	B - Body ground	Tachometer signal (Input)	Engine idling	Pulse generation (See waveform 2)
ILL+ (C10-12) - Body ground	G - Body ground	Illumination signal	Taillight OFF → ON	Below 1 V → 10 to 14 V
2 (C11-1) - Body ground*1	G - Body ground	A/T shift indicator signal (2)	A/T 2 indicator OFF → ON	Below 1 V → 10 to 14 V
D (C11-2) - Body ground*1	LG-B - Body ground	A/T shift indicator signal (D)	A/T D indicator OFF → ON	Below 1 V → 10 to 14 V
N (C11-3) - Body ground*1	GR - Body ground	A/T shift indicator signal (N)	A/T N indicator OFF → ON	Below 1 V → 10 to 14 V
R (C11-4) - Body ground*1	R-W - Body ground	A/T shift indicator signal (R)	A/T R indicator OFF → ON	Below 1 V → 10 to 14 V
P (C11-5) - Body ground*1	R - Body ground	A/T shift indicator signal (P)	A/T P indicator OFF → ON	Below 1 V → 10 to 14 V
D-BELT (C11-6) - Body ground	W-R - Body ground	Seat belt warning light for driver's seat signal	Ignition switch ON, seat belt unfastened → fastened	Below 1 V → 10 to 14 V
ILL- (C11-7) - Body ground	W-R - Body ground	Illumination signal	Light control switch TAIL, light control rheostat position MIN → MAX	Below 1 V → 10 to 14 V
P-BELT (C11-8) - Body ground	O - Body ground	Seat belt warning light for passenger's seat signal	Ignition switch ON, sit on passenger seat, seat belt unfastened → fastened	Below 1 V → 10 to 14 V
VSC (C11-10)*2 - Body ground	BR-W - Body ground	VSC warning light signal	Ignition switch ON, VSC warning light ON → OFF	Below 1 V → 10 to 14 V
ABS (C11-11) - Body ground	P - Body ground	ABS signal	Ignition switch ON, ABS warning light ON → OFF	6.7 to 12 V → Below 1 V
O/D OFF (C11-12) - Body ground	G-O - Body ground	O/D OFF signal	O/D OFF indicator light ON → OFF	Below 1 V → 10 to 14 V
BRAKE (C11-14) - Body ground	B-Y - Body ground	Brake signal	Ignition switch ON, BRAKE warning light ON → OFF	6.7 to 12 V → Below 1 V
BRAKE LEVEL (C11-15) - Body ground	Y-R - Body ground	Brake fluid level warning light signal	Ignition switch ON, brake fluid level warning light ON → OFF	Below 1 V → 10 to 14 V
OIL-P (C11-16) - Body ground	G-Y - Body ground	Oil pressure signal	Oil pressure warning light ON → OFF	Below 1 V → 10 to 14 V
L (C11-17) - Body ground*1	G-R - Body ground	A/T shift indicator signal (L)	A/T L indicator OFF → ON	Below 1 V → 10 to 14 V
KEY SW (C11-18) - Body ground	Y - Body ground	Unlock warning switch signal	Key is inserted → removed	Below 1 V → 10 to 14 V
FUEL (C11-19) - Body ground	V - Body ground	Fuel level signal	Ignition switch ON, fuel level is FULL → EMPTY	Below 1 V → 10 to 14 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AIRBAG (C11-20) - Body ground	B-Y - Body ground	SRS warning light signal	Ignition switch ON, SRS warning light ON → OFF	8 to 14 V → Below 1 V
4P-OUT (C11-21) - Body ground	V-W - Body ground	Speed signal (Output)	Ignition switch ON and turn wheel slowly	Pulse generation (see waveform 1)
HOT (C11-23) - Body ground	Y-R - Body ground	Coolant temperature signal	Ignition switch ON, HOT indicator OFF → ON	Below 1 V → 2 to 5 V
COLD (C11-24) - Body ground	Y - Body ground	Coolant	Ignition switch ON, COLD indicator OFF → ON	Below 1 V → 2 to 5 V
D-DOOR (C11-25) - Body ground	R-Y - Body ground	Driver door condition signal	Driver door OPEN → CLOSE	Below 1 V → 10 to 14 V
DOOR (C11-26) - Body ground	L - Body ground	Except driver door condition signal	Except driver door OPEN → CLOSE	Below 1 V → 10 to 14 V
SLIP (C11-27)*2 - Body ground	B-R - Body ground	SLIP indicator signal	Ignition switch ON, SLIP indicator ON → OFF	Below 1 V → 10 to 14 V
TRAC OFF (C11-30)*2 - Body ground	R-L - Body ground	TRAC OFF indicator signal	Ignition switch ON, TRAC OFF indicator ON → OFF	Below 1 V → 10 to 14 V
CHECK ENGINE (C11-31) - Body ground	Y-R - Body ground	MIL signal	Ignition switch ON, MIL ON → OFF	Below 1 V → 10 to 14 V
CHG- (C11-32) - Body ground	B-W - Body ground	Charge warning light signal	Ignition switch ON, charge warning light OFF → ON	10 to 14 V → Below 1 V

ME

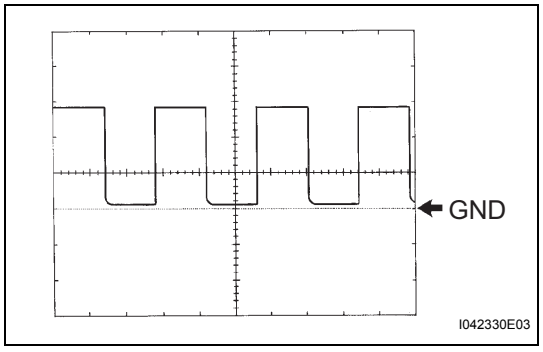
HINT:
*1: A/T
*2: w/ VSC
If the result is not as specified, the combination meter may be malfunctioning.
Waveform 1 (Reference):



Item	Condition
Tool setting	5 V/DIV., 20 msec./DIV.
Vehicle condition	Driving at approx. 20 km/h (12.4 mph)

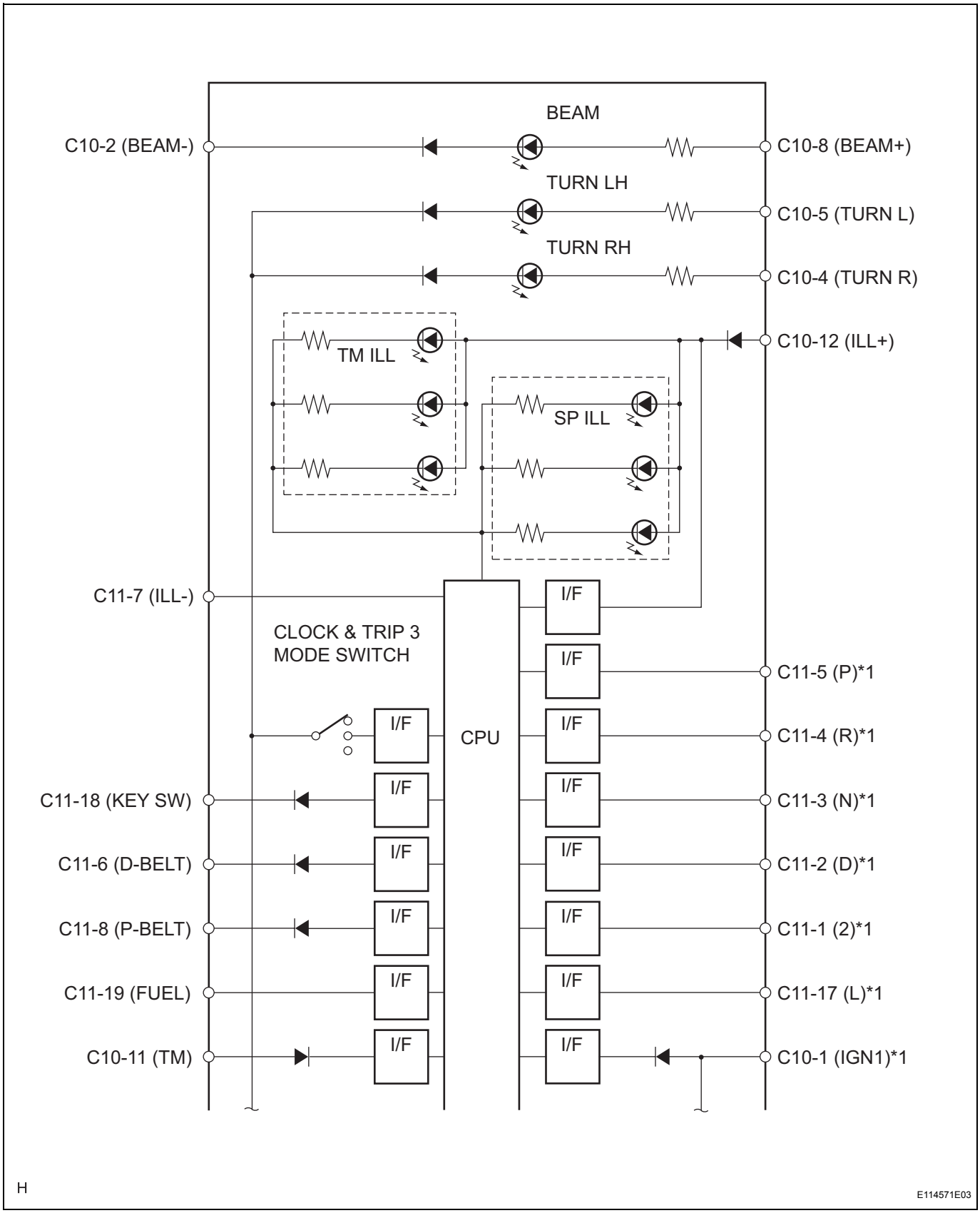
HINT:
As the vehicle speed increases, the wavelength shortens.

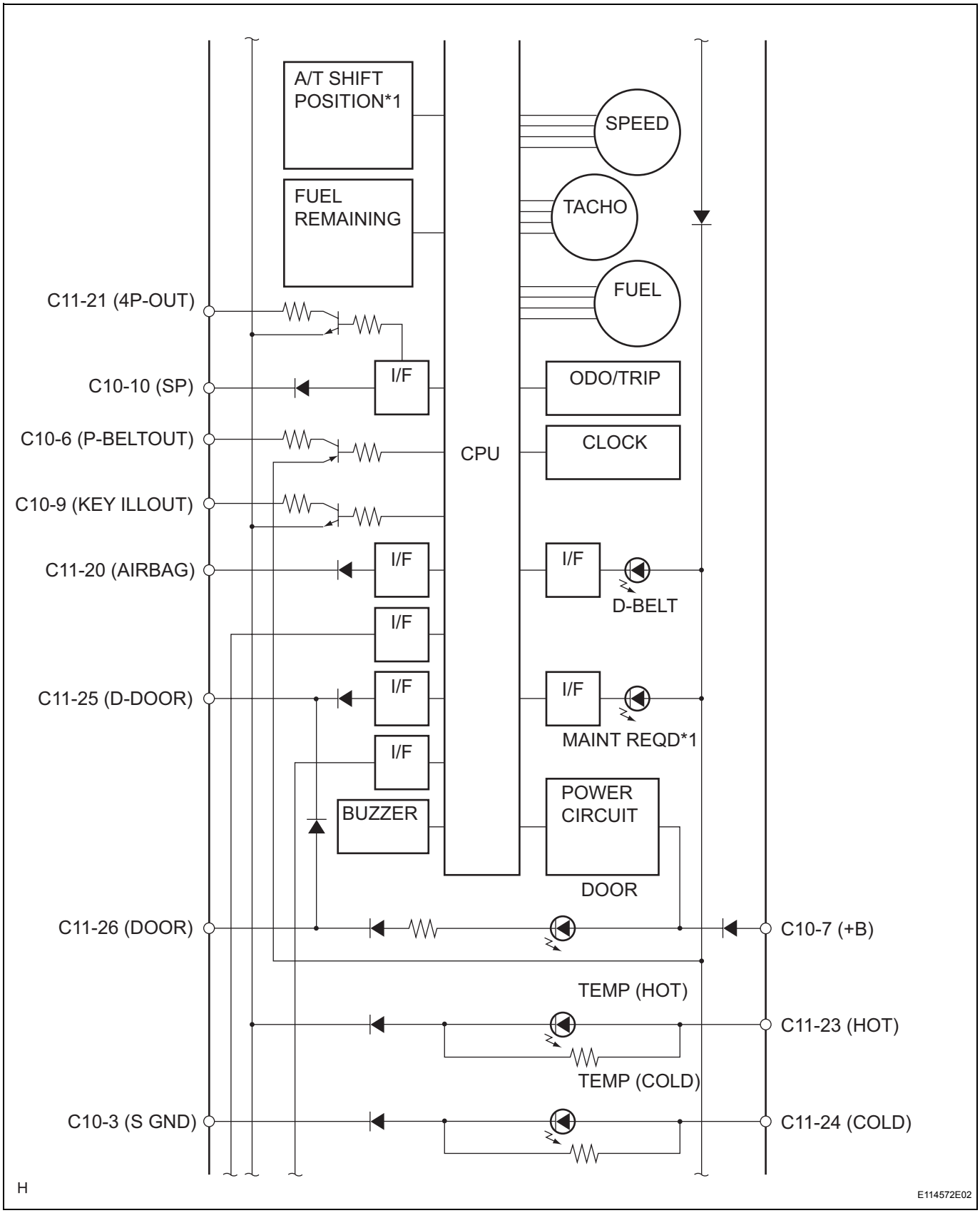
Waveform 2 (Reference):



Item	Condition
Tool setting	5 V/DIV., 10 msec./DIV.
Vehicle condition	Engine idling

HINT:
As the vehicle speed increases, the wavelength shortens.


BEAM
C10-2 (BEAM-)
C10-8 (BEAM+)
TURN LH
C10-5 (TURN L)
TURN RH
C10-4 (TURN R)
TM ILL
C10-12 (ILL+)
SP ILL
C11-7 (ILL-)
CLOCK & TRIP 3
MODE SWITCH
I/F
CPU
C11-5 (P)*1
C11-4 (R)*1
C11-18 (KEY SW)
C11-3 (N)*1
C11-6 (D-BELT)
C11-2 (D)*1
C11-8 (P-BELT)
C11-1 (2)*1
C11-19 (FUEL)
C11-17 (L)*1
C10-11 (TM)
C10-1 (IGN1)*1
H
E114571E03


A/T SHIFT POSITION*1
FUEL REMAINING
SPEED
TACHO
FUEL
C11-21 (4P-OUT)
C10-10 (SP)
C10-6 (P-BELTOUT)
C10-9 (KEY ILLOUT)
C11-20 (AIRBAG)
C11-25 (D-DOOR)
C11-26 (DOOR)
I/F
CPU
ODO/TRIP
CLOCK
D-BELT
MAINT REQD*1
BUZZER
POWER CIRCUIT
DOOR
C10-7 (+B)
TEMP (HOT)
C11-23 (HOT)
TEMP (COLD)
C10-3 (S GND)
C11-24 (COLD)
H
E114572E02

ME

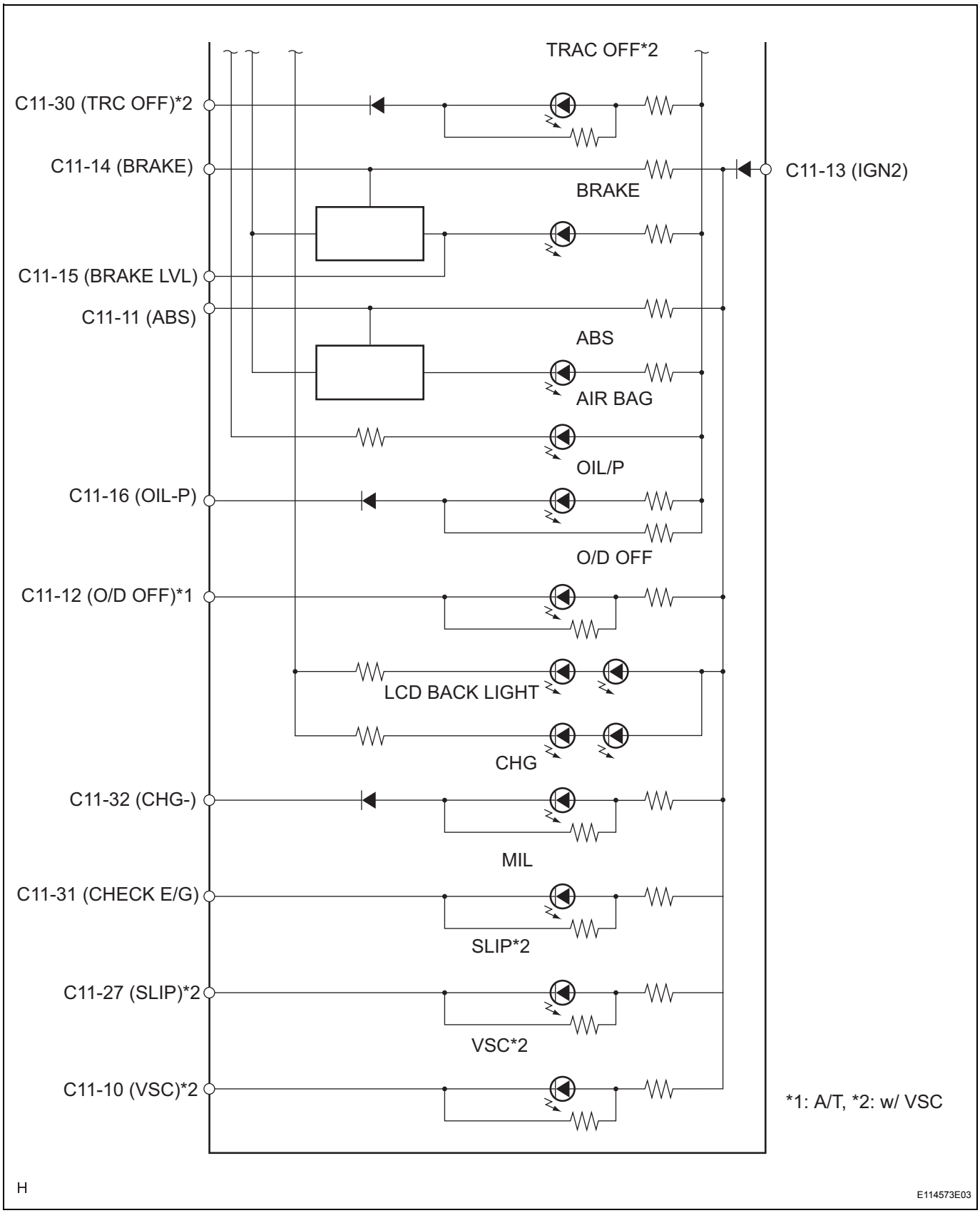

TRAC OFF*2
C11-30 (TRC OFF)*2
C11-14 (BRAKE)
BRAKE
C11-13 (IGN2)
C11-15 (BRAKE LVL)
C11-11 (ABS)
ABS
AIR BAG
OIL/P
C11-16 (OIL-P)
O/D OFF
C11-12 (O/D OFF)*1
LCD BACK LIGHT
CHG
C11-32 (CHG-)
MIL
C11-31 (CHECK E/G)
SLIP*2
C11-27 (SLIP)*2
VSC*2
C11-10 (VSC)*2
*1: A/T, *2: w/ VSC
H
E114573E03

Table of terminal connection

Terminal No.		Wire Harness Side
C11	1	Park / Neutral Position Switch (2)*1
	2	Park / Neutral Position Switch (D)*1
	3	Park / Neutral Position Switch (N)*1
	4	Park / Neutral Position Switch (R)*1
	5	Park / Neutral Position Switch (P)*1
	6	Front Seat Inner Belt Assembly (Driver Side)
	7	Light Control Rheostat
	8	Front Seat Inner Belt Assembly (Passenger Side)
	9	-
	10	Skid Control ECU with Actuator*2
	11	Skid Control ECU with Actuator*2
	12	ECM
	13	Ignition Switch
	14	Skid Control ECU with Actuator*2
	15	Brake Fluid Level Warning Switch
	16	Low Oil Pressure Warning Switch
	17	Park / Neutral Position switch (L)*1
	18	Unlock Warning Switch Assembly
	19	Fuel Sender Gauge Assembly
	20	Center Airbag Sensor Assembly
	21	ECM
	22	-
	23	ECM
	24	ECM
	25	Door Courtesy Light Switch Assembly (Driver Side)
	26	Door Courtesy Light Switch Assembly (Except Driver Side)
	27	Skid Control ECU with Actuator*2
	28	-
	29	-
	30	Skid Control ECU with Actuator*2
	31	ECM
	32	Generator Assembly

HINT:
*1: A/T
*2: w/ VSC

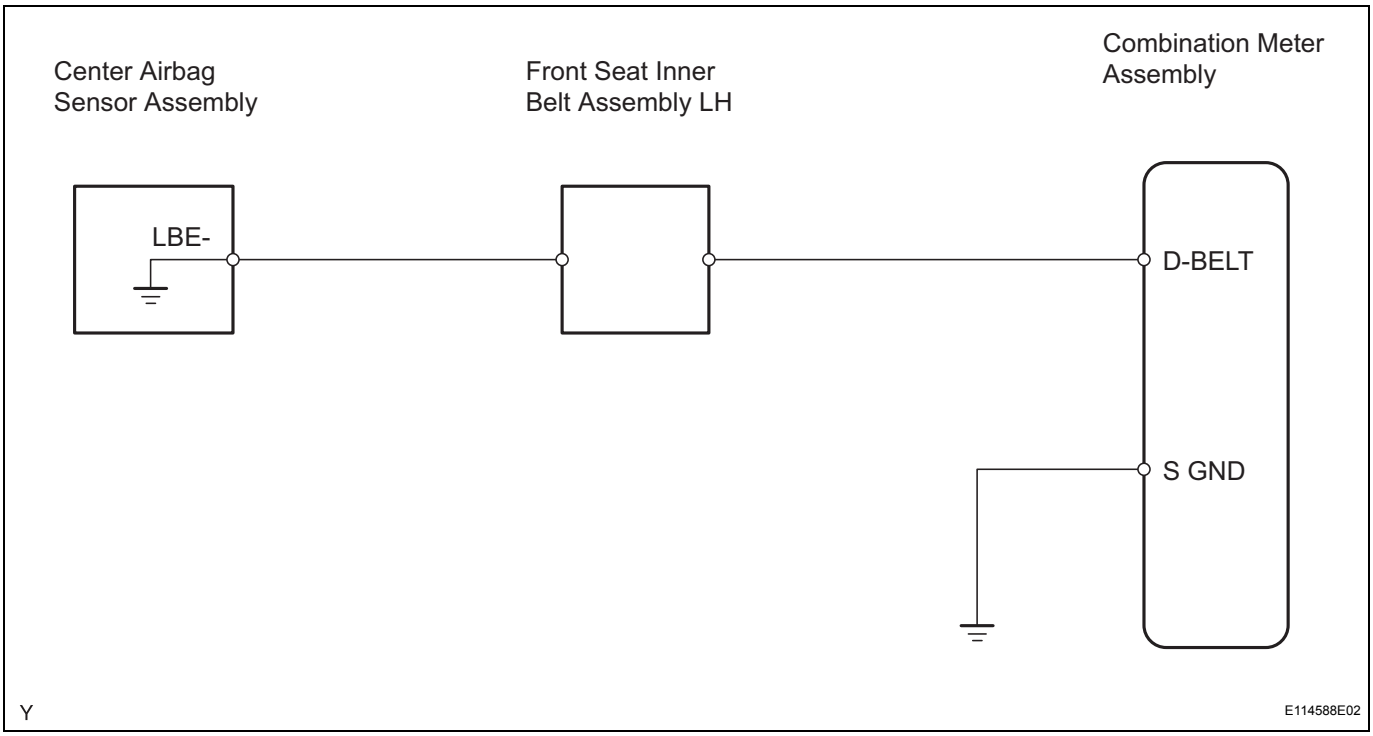
Table of terminal connection

Terminal No.		Wire Harness Side
C10	1	GAUGE Fuse
	2	Headlight Dimmer Switch (GND)
	3	GND
	4	Turn Signal Flasher
	5	Turn Signal Flasher
	6	Seat Belt Warning Light for Passenger's Seat
	7	DOME Fuse
	8	Headlight
	9	Illumination Relay
	10	Skid Control ECU with Actuator*
	11	ECM
	12	Headlight Dimmer Switch (Light Control Switch)

HINT:
*: w/ VSC

Driver Side Seat Belt Warning Light does not Operate

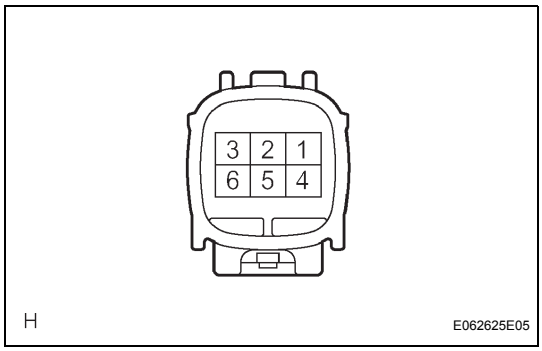
WIRING DIAGRAM



ME

INSPECTION PROCEDURE

1	INSPECT FRONT SEAT INNER BELT ASSEMBLY LH



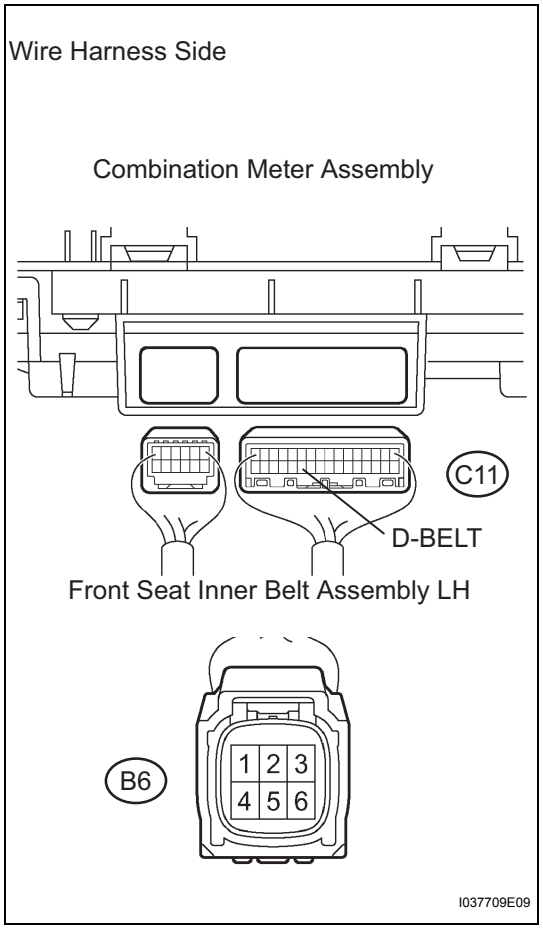
(a) Remove the inner belt LH.
(b) Measure the resistance of the belt.
Standard resistance

Tester Connection	Condition	Specified Condition
B6-1 - B6-3	Seat belt is fastened	10 kΩ or higher
B6-1 - B6-3	Seat belt is unfastened	Below 1 Ω

NG → **REPLACE FRONT SEAT INNER BELT ASSEMBLY LH**

OK

2	CHECK WIRE HARNESS (COMBINATION METER - FRONT SEAT INNER BELT LH)



(a) Disconnect the C11 meter connector.
(b) Disconnect the B6 belt connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

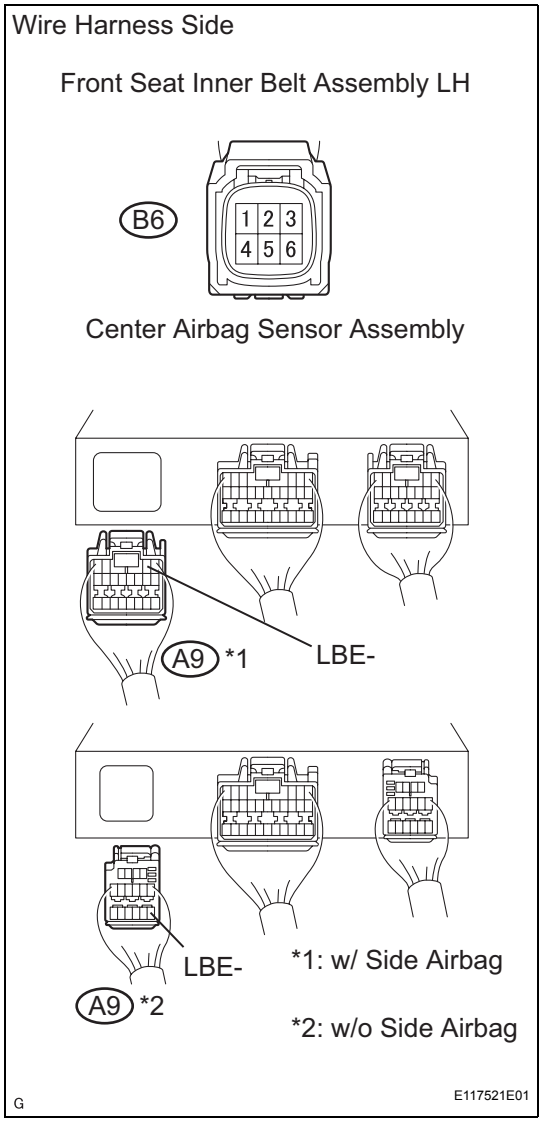
Tester Connection	Specified Condition
C11-6 (D-BELT) - B6-3	Below 1 Ω
C11-6 (D-BELT) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

ME

3	CHECK WIRE HARNESS (FRONT SEAT INNER BELT LH - CENTER AIRBAG SENSOR)



(a) Disconnect the B6 belt connector.
(b) Disconnect the A9 sensor connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
B6-1 - A9-2*1 (LBE-)	Below 1 Ω
B6-1 - A9-7*2 (LBE-)	Below 1 Ω
B6-1 - Body ground	10 kΩ or higher

HINT:
*1: w/ Side airbag
*2: w/o Side airbag

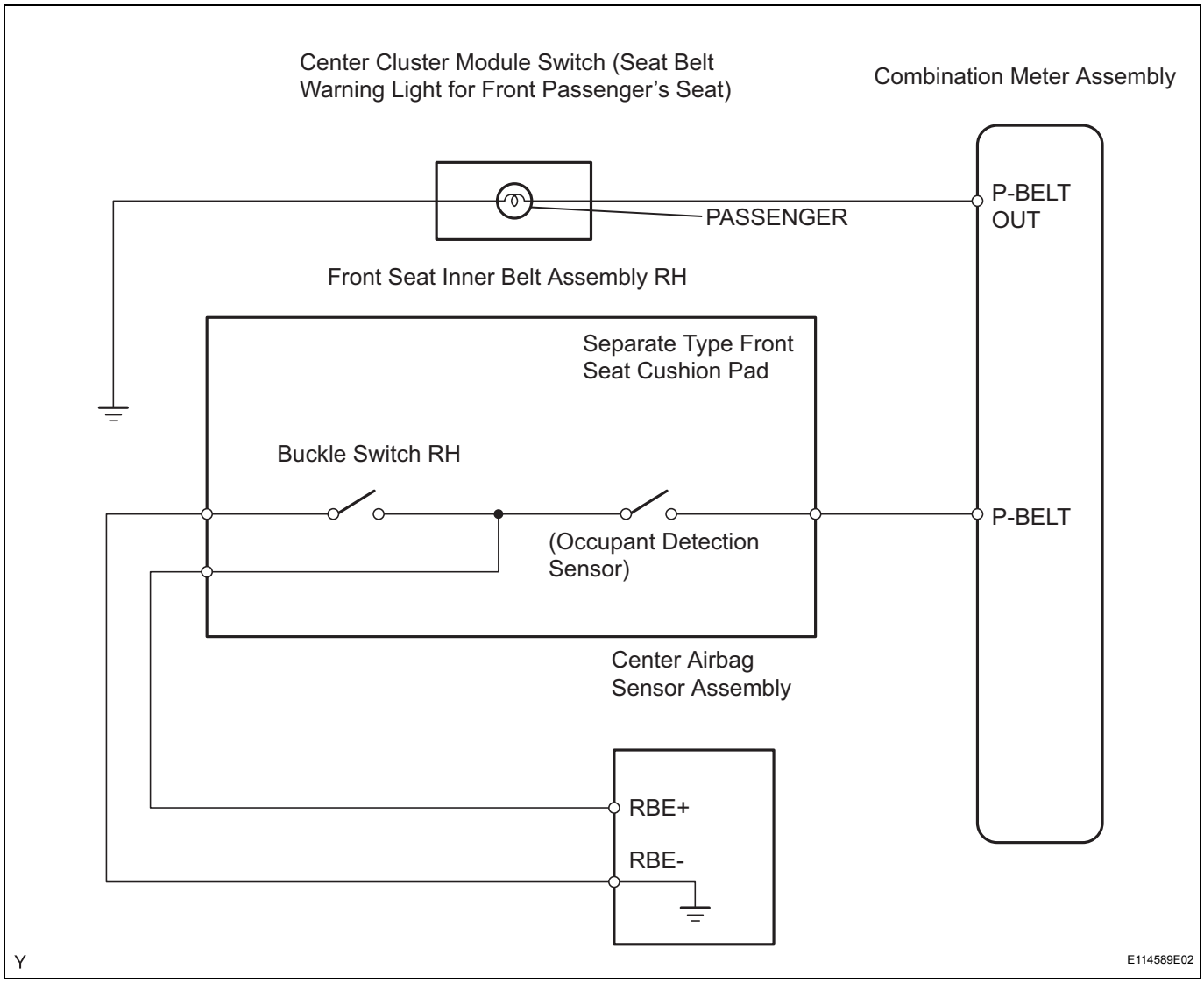
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

Front Passenger Side Seat Belt Warning Light Malfunction

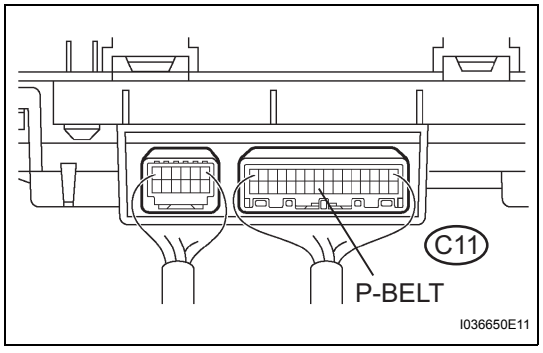
WIRING DIAGRAM



ME

DESCRIPTION

1	CHECK COMBINATION METER ASSEMBLY



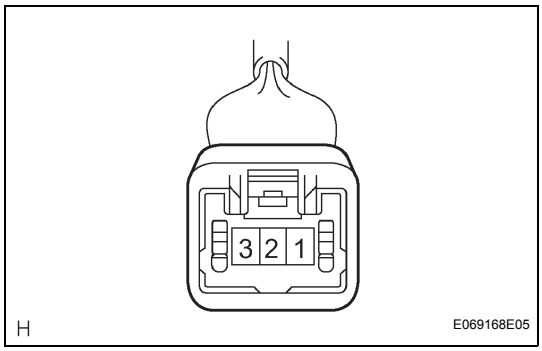
(a) Measure the resistance of the connector.
Standard resistance

Tester Connection	Condition	Specified Condition
C11-8 (P-BELT) - Body ground	Ignition switch is OFF, sit on passenger seat, passenger seat belt is unfastened	Below 1 Ω

OK	Go to step 6

NG

2 **INSPECT FRONT SEAT INNER BELT ASSEMBLY RH**



(a) Disconnect the B7 connector.
(b) Measure the resistance of the belt.
Standard resistance

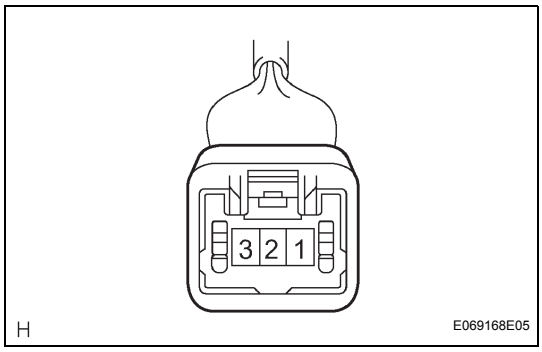
Tester Connection	Condition	Specified Condition
1 - 3	Seat belt is unfastened (occupant detection sensor ON)	Below 1 Ω

NG → **REPLACE FRONT SEAT INNER BELT ASSEMBLY RH**

ME

OK

3 **INSPECT SEPARATE TYPE FRONT SEAT CUSHION PAD**



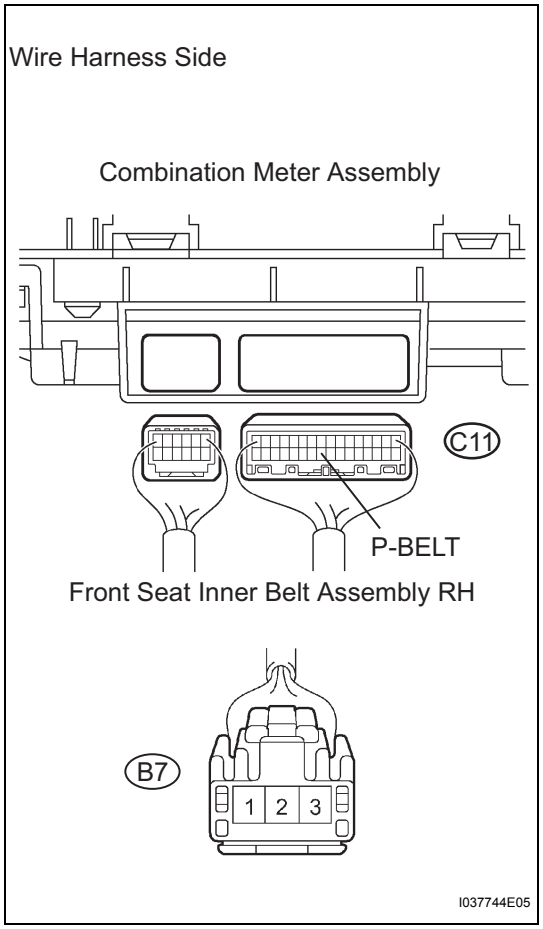
(a) Disconnect the B7 connector.
(b) Measure the resistance of the belt.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Seat belt is fastened	Below 1,330 Ω
1 - 2	Seat belt is unfastened	Below 330 Ω

NG → **REPLACE SEPARATE TYPE FRONT SEAT CUSHION PAD**

OK

4	CHECK WIRE HARNESS (COMBINATION METER - FRONT SEAT INNER BELT RH)



(a) Disconnect the C11 meter connector.
(b) Disconnect the B7 belt connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

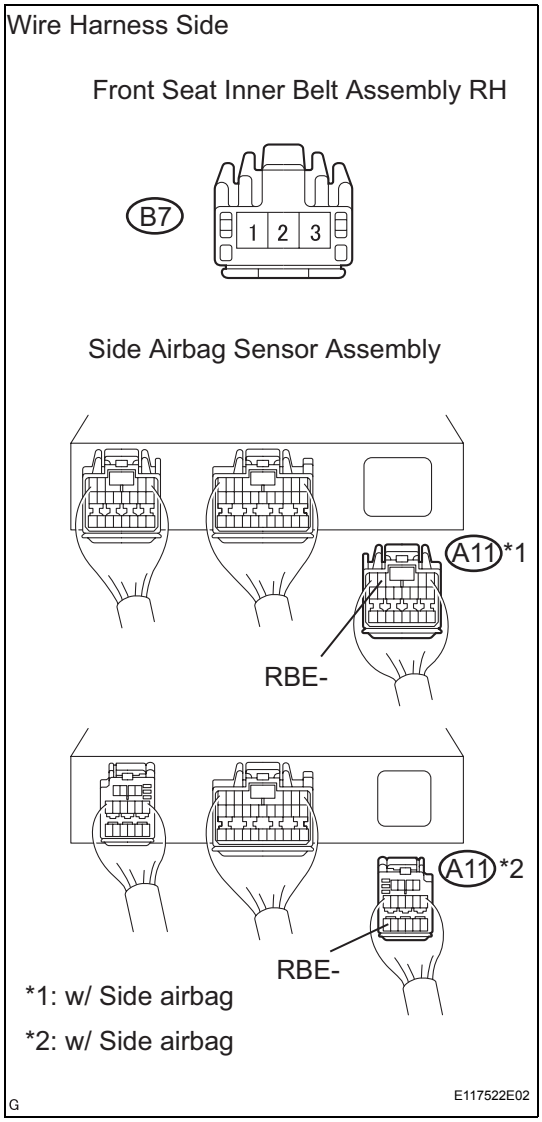
Tester Connection	Specified Condition
C11-8 (P-BELT) - B7-3	Below 1 Ω
C11-8 (P-BELT) - Body ground	10 kΩ or higher
B7-1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

ME

5	CHECK WIRE HARNESS (FRONT SEAT INNER BELT RH - CENTER AIRBAG SENSOR)



(a) Disconnect the B7 belt connector.
(b) Disconnect the A11 sensor connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
B7-1 - A11-3 (RBE-)*1	Below 1 Ω
B7-1 - A11-2 (RBE-)*2	Below 1 Ω
B7-1 - Body ground	10 kΩ or higher

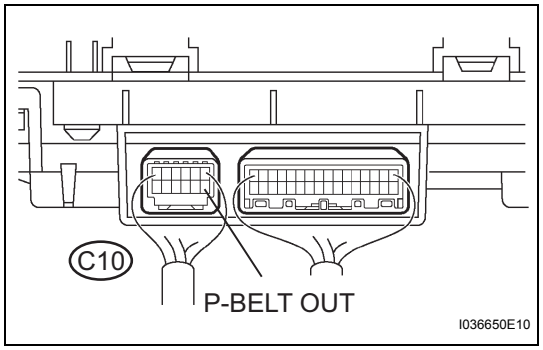
HINT:
*1: w/ Side airbag
*2: w/o Side airbag

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

6	CHECK COMBINATION METER ASSEMBLY (P-BELT OUT VOLTAGE)



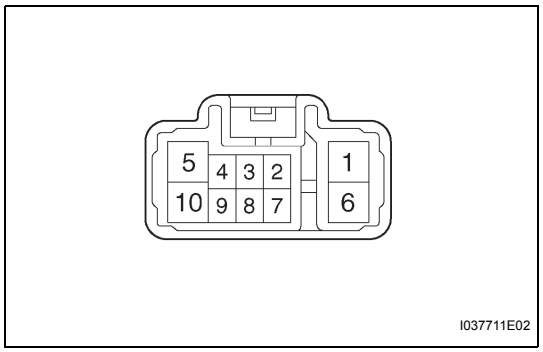
(a) Remove the combination meter but do not disconnect the connector.
(b) Measure the voltage of the connector.
Standard voltage

Tester Connection	Condition	Specified Condition
C10-6 (P-BELT OUT) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

7	INSPECT CENTER CLUSTER MODULE SWITCH (SEAT BELT WARNING LIGHT FOR PASSENGER'S SEAT)



(a) Remove the center cluster module switch.
(b) Apply battery voltage to the terminals of the module switch and check that the passenger seat belt warning light.
OK

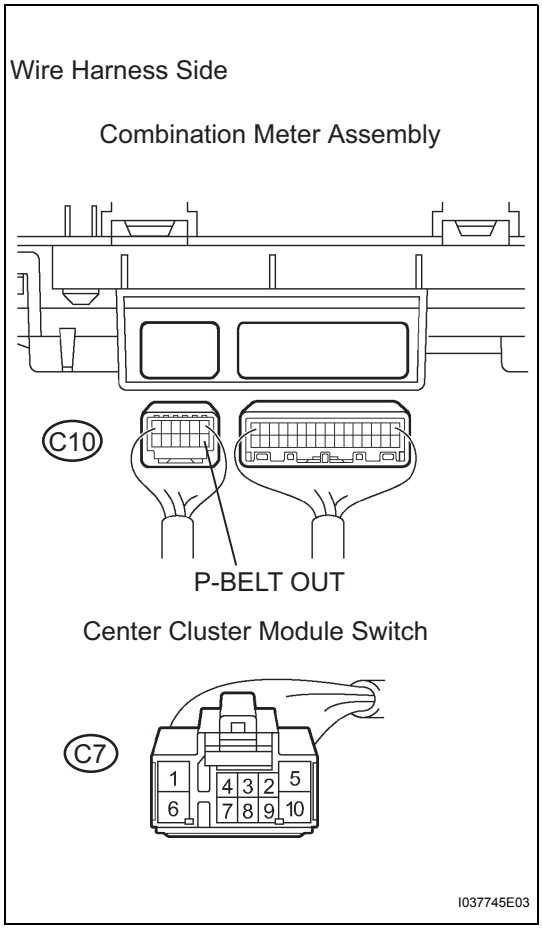
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 9 Battery negative (-) → Terminal 1	Seat belt warning light turns on

NG → **REPLACE CENTER CLUSTER MODULE SWITCH**

OK

ME

8	CHECK WIRE HARNESS (COMBINATION METER - CENTER CLUSTER MODULE SWITCH)



(a) Disconnect the C10 meter connector.
(b) Disconnect the C7 switch connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C10-6 (P-BELT OUT) - C7-9	Below 1 Ω
C10-6 (P-BELT OUT) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

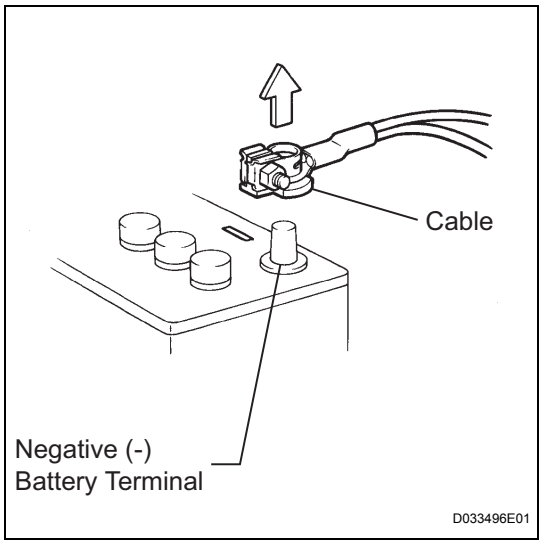
REPAIR OR REPLACE WIRE HARNESS (CENTER CLUSTER MODULE SWITCH - BODY GROUND)

METER / GAUGE SYSTEM

PRECAUTION

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

System Name	See procedure
Sliding Roof System	IN-23



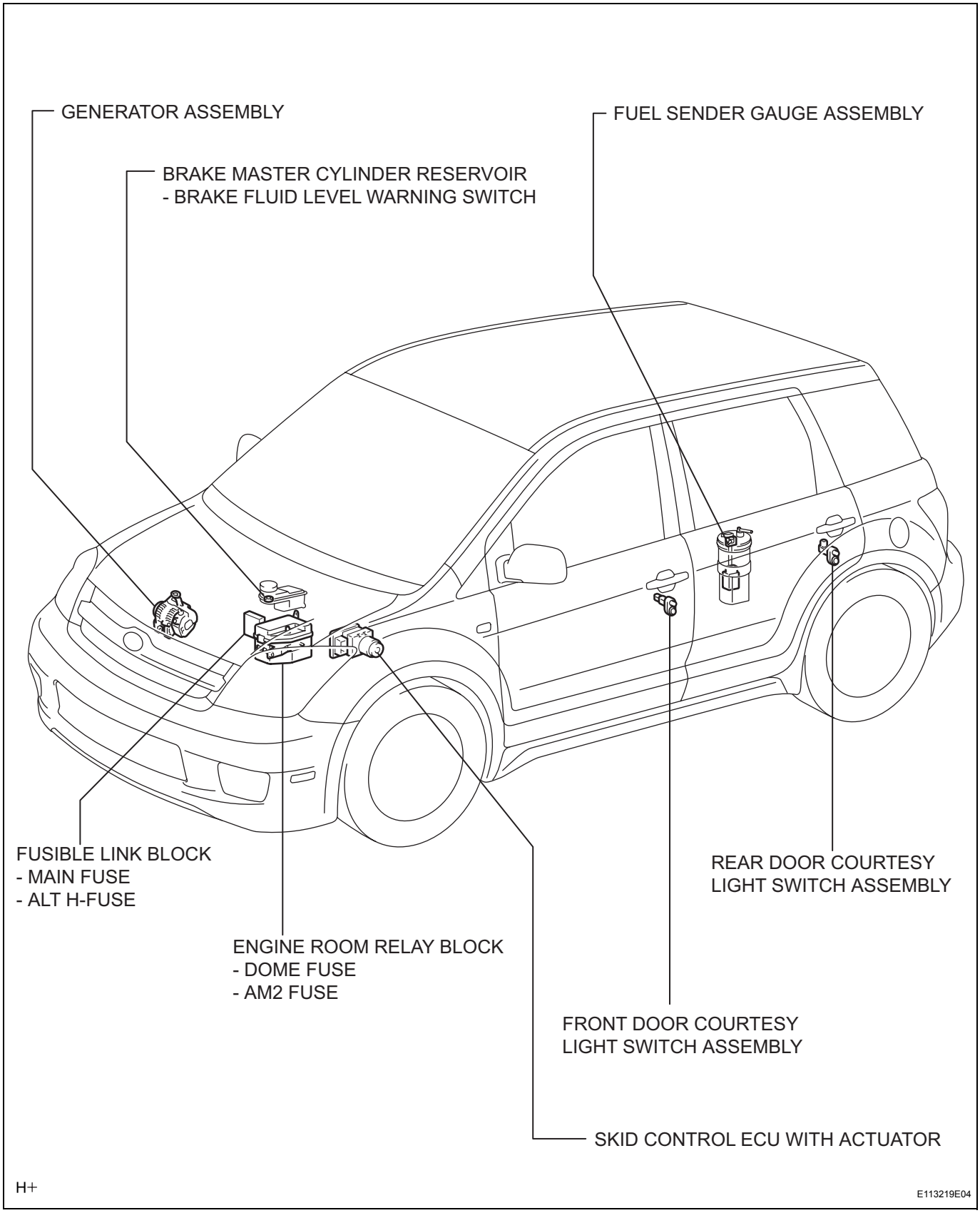
1. DISCONNECT AND RECONNECT CABLE OF NEGATIVE BATTERY TERMINAL

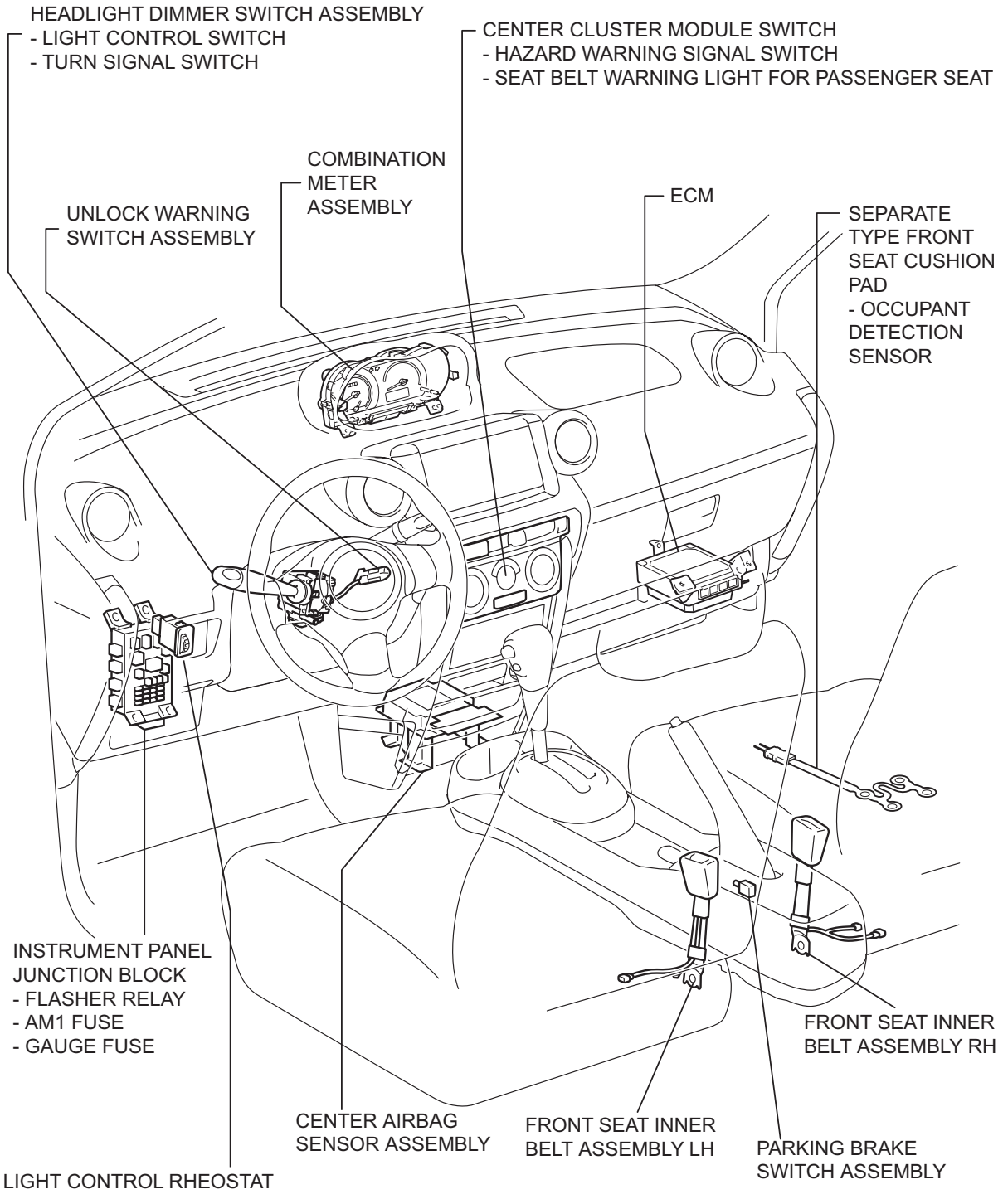
(a) Before performing electronic work, disconnect the cable from the negative (-) battery terminal in order to prevent it from shorting and burning out.

(b) When disconnecting and reconnecting the battery cable, turn the ignition switch OFF and headlight dimmer switch OFF. Then loosen the terminal nut completely. Be careful not to damage the cable or terminal.

(c) When the battery cable is disconnected, the settings of the clock and radio, and memory of DTCs, etc. are erased. Before disconnecting the battery cable, take notes of the settings and memory.

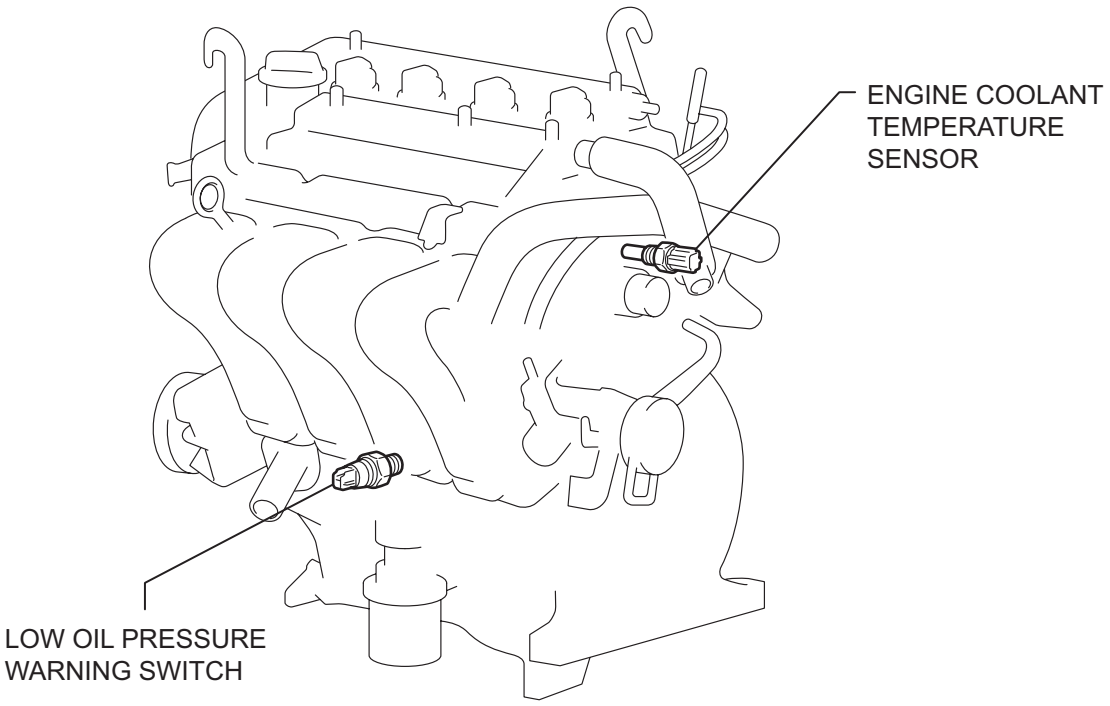
PARTS LOCATION




HEADLIGHT DIMMER SWITCH ASSEMBLY
- LIGHT CONTROL SWITCH
- TURN SIGNAL SWITCH
CENTER CLUSTER MODULE SWITCH
- HAZARD WARNING SIGNAL SWITCH
- SEAT BELT WARNING LIGHT FOR PASSENGER SEAT
COMBINATION METER ASSEMBLY
ECM
UNLOCK WARNING SWITCH ASSEMBLY
SEPARATE TYPE FRONT SEAT CUSHION PAD
- OCCUPANT DETECTION SENSOR
INSTRUMENT PANEL JUNCTION BLOCK
- FLASHER RELAY
- AM1 FUSE
- GAUGE FUSE
FRONT SEAT INNER BELT ASSEMBLY RH
CENTER AIRBAG SENSOR ASSEMBLY
FRONT SEAT INNER BELT ASSEMBLY LH
PARKING BRAKE SWITCH ASSEMBLY
LIGHT CONTROL RHEOSTAT
H
E114570E04

ME

ME

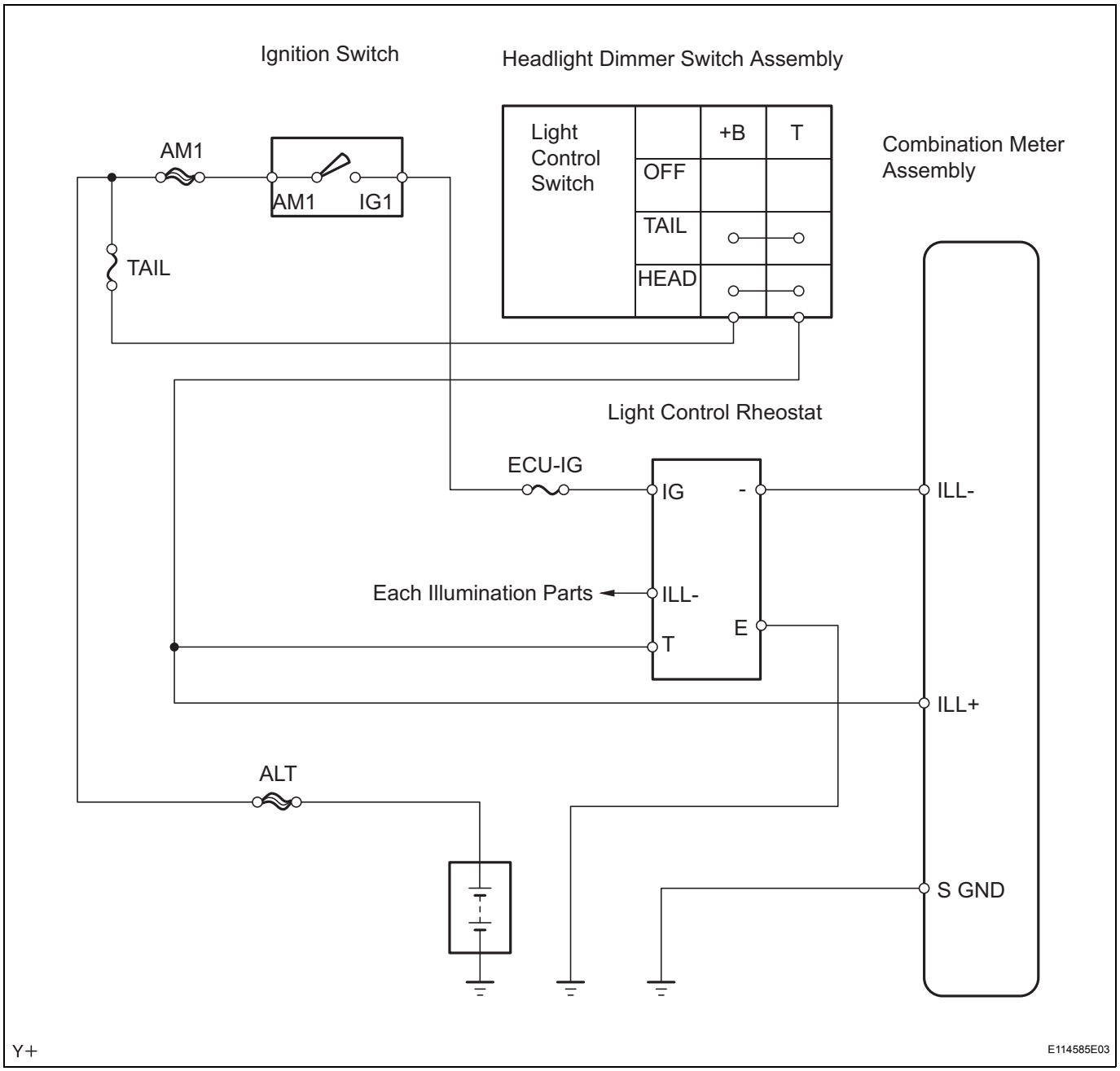


N

E110705E03

Operating Light Control Rheostat does not Change Light Brightness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK LIGHT CONTROL RHEOSTAT

(a) Operate the light control rheostat and check that the illumination of the radio and player, center cluster module switch, etc. change accordingly.

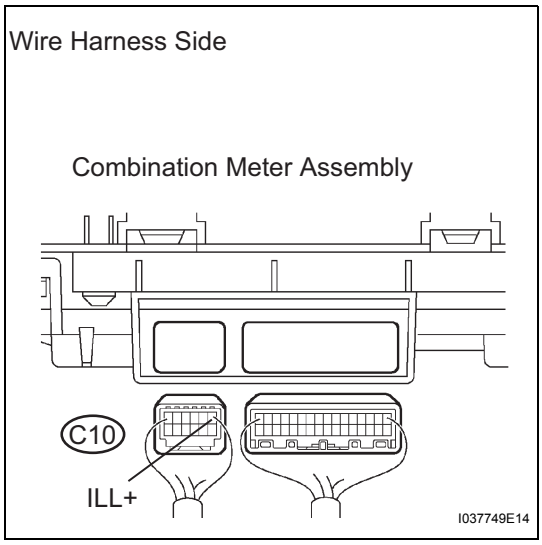
OK:

The illumination can be adjusted.

NG → **Go to step 6**

OK

2	CHECK WIRE HARNESS (COMBINATION METER - BATTERY)



(a) Disconnect the C10 meter connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

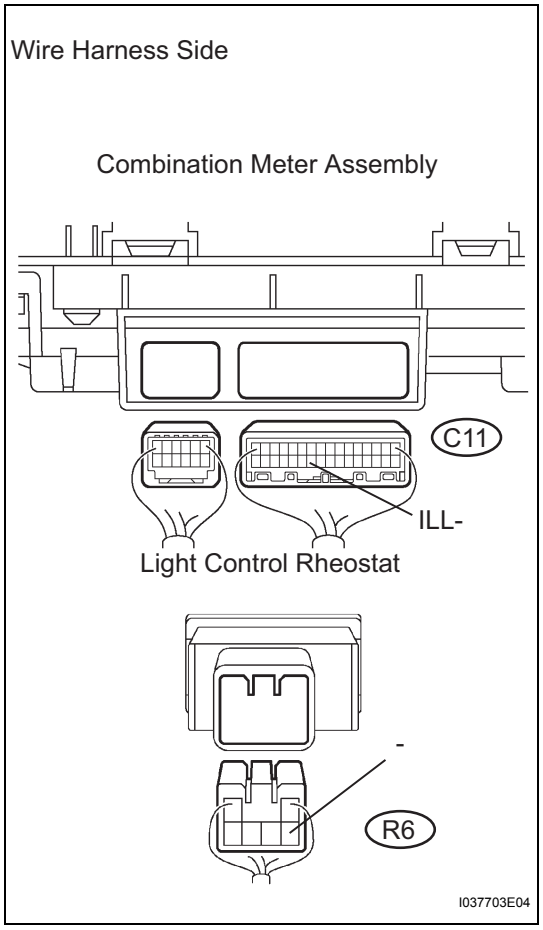
Tester Connection	Condition	Specified Condition
C1-12 (ILL+) - Body ground	Ignition switch is ON and light control switch is at TAIL or HEAD	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

ME

3 CHECK WIRE HARNESS (COMBINATION METER - LIGHT CONTROL RHEOSTAT)



(a) Disconnect the C11 meter connector.
(b) Disconnect the R6 rheostat connector.
(c) Measure the resistance of the wire harness side connectors.

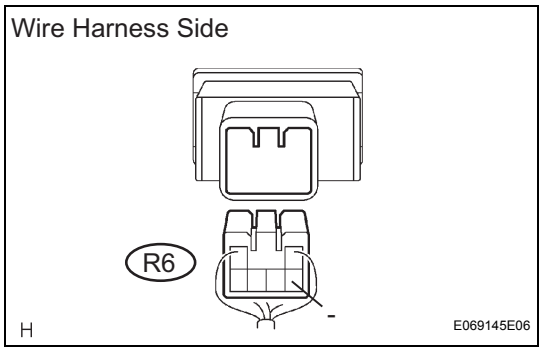
Standard resistance

Tester Connection	Specified Condition
C11-7 (ILL-) - R6-3 (-)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK LIGHT CONTROL RHEOSTAT



(a) Disconnect the R6 rheostat connector.
(b) Measure the voltage of the wire harness side connector.

Standard voltage

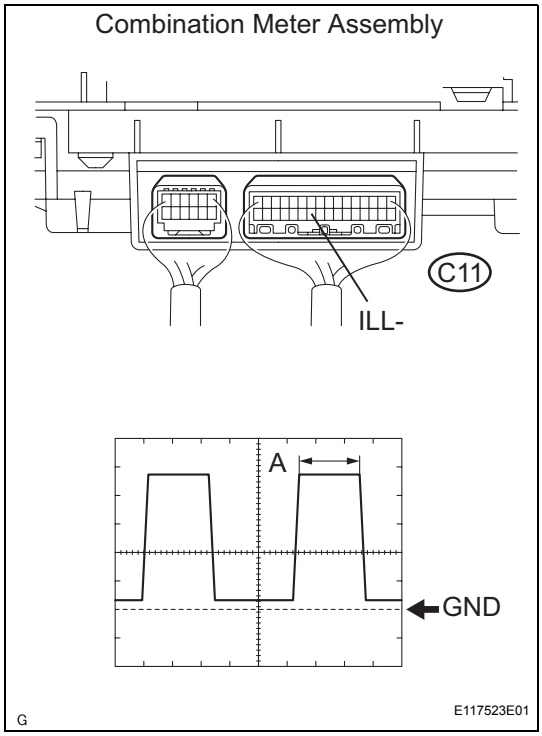
Tester Connection	Condition	Specified Condition
R6-3 (-) - Body ground	Ignition switch is ON and light control switch is at TAIL or HEAD	10 to 14 V

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

ME

5	CHECK COMBINATION METER ASSEMBLY (ILL- VOLTAGE)



(a) Remove the combination meter but do not disconnect the connectors.
(b) Turn the ignition switch ON.
(c) Using an oscilloscope, check the signal waveform of the meter.

Item	Contents
Terminal No.	C11-7 (ILL-) - Body ground
Tool setting	2 V/DIV., 1 msec./DIV.
Vehicle condition	Ignition switch ON

OK:

As shown in the illustration.

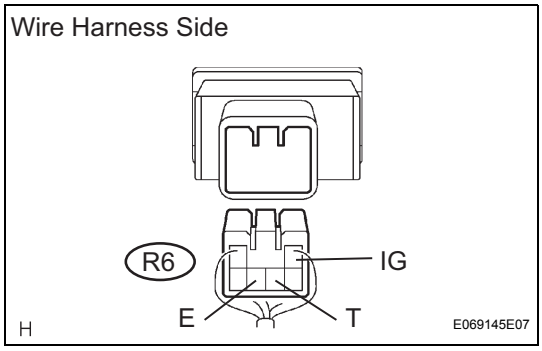
HINT:
Waveform changes as illumination dims ("A" becomes longer).

NG → **REPLACE LIGHT CONTROL RHEOSTAT**

OK

REPLACE COMBINATION METER ASSEMBLY

6	CHECK WIRE HARNESS (LIGHT CONTROL RHEOSTAT - BATTERY AND BODY GROUND)



(a) Disconnect the R6 rheostat connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
R6-1 (IG) - Body ground	Ignition switch is ON	10 to 14 V
R6-4 (T) - Body ground	Ignition switch ON, combination switch position TAIL or HEAD	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
R6-5 (E) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

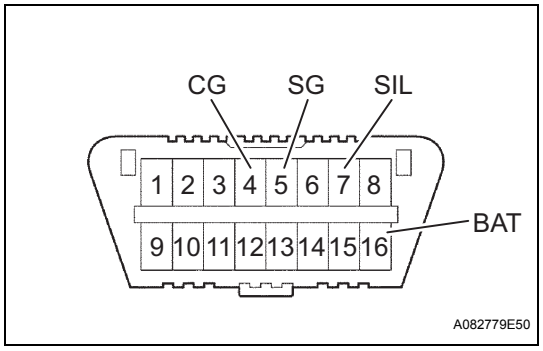
REPLACE LIGHT CONTROL RHEOSTAT

DIAGNOSIS SYSTEM

1. DESCRIPTION

Meter / gauge system data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

ME

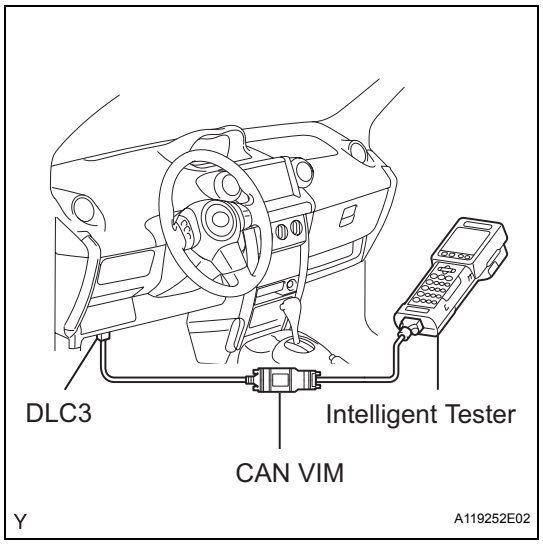
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V

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

HINT:

Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch ON and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DATA LIST according to the display on the tester.

Skid control ECU with actuator

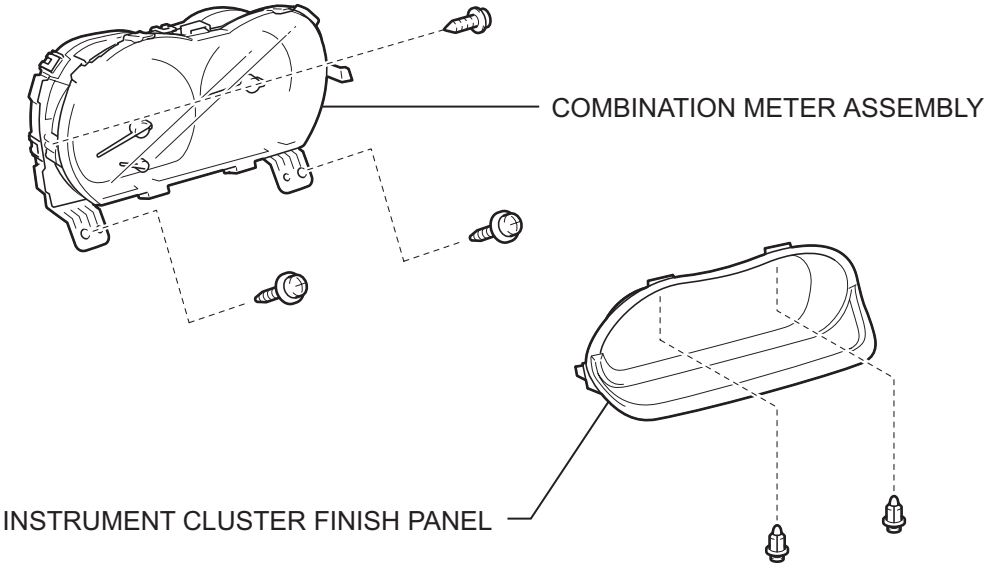
Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
WHEEL SPD FR	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost equal to speedometer value (when driving)	-
WHEEL SPD FL	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost equal to speedometer value (when driving)	-
WHEEL SPD RR	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost equal to speedometer value (when driving)	-
WHEEL SPD RL	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326km/h (202 mph)	Almost equal to speedometer value (when driving)	-

ECM

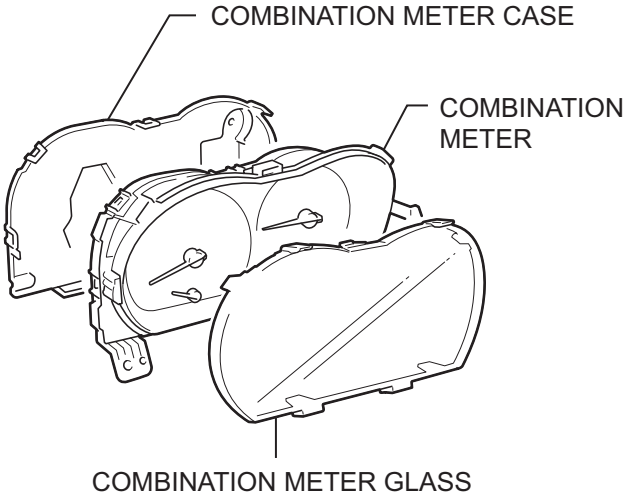
Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ENGINE SPD	Engine speed: Min.: 0, Max.: 16,383 rpm	600 to 700 rpm: Idling (M/T) 650 to 750 rpm: Idling (A/T)	-
COOLANT TEMP	Engine coolant temperature (ECT): Min.: -40°C (-40°F), Max.: 140°C (284°F)	75 to 100°C (167 to 203°F): After warming up engine	• If value -40°C (-40°F): ECT sensor open • If value 140°C (284°F) or higher: ECT sensor shorted

COMBINATION METER

COMPONENTS



Combination Meter Assembly

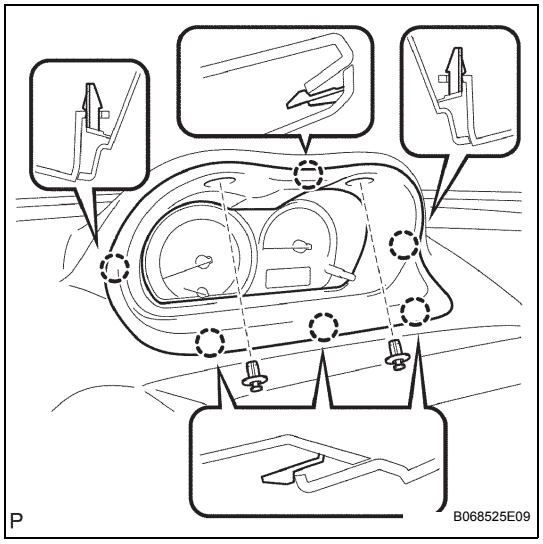


P

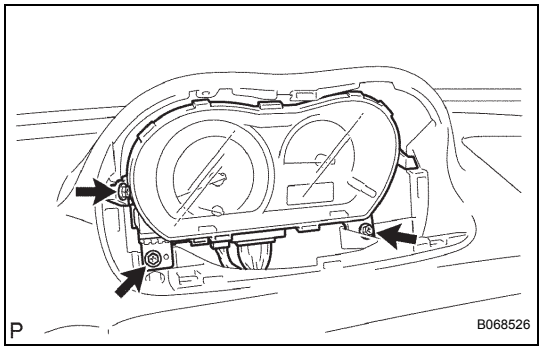
B117665E03

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

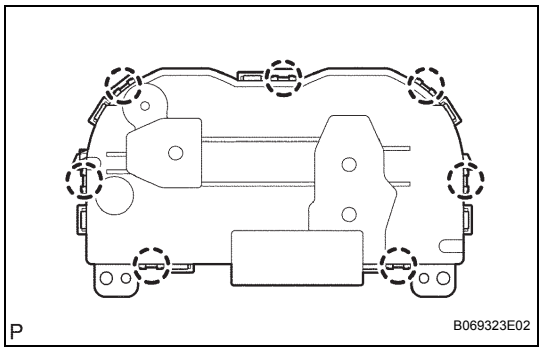


2. **REMOVE INSTRUMENT CLUSTER FINISH PANEL**
   (a) Remove the 2 clips.
   (b) Using a screwdriver, detach the 6 claws and remove the cluster finish panel.
   HINT:
   Tape the screwdriver tip before use.



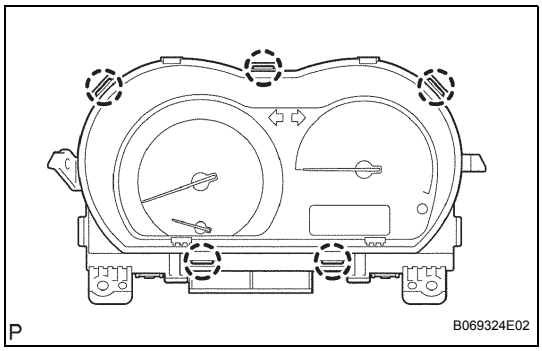
3. **REMOVE COMBINATION METER ASSEMBLY**
   (a) Remove the 3 screws.
   (b) Disconnect the connectors and remove the combination meter.

DISASSEMBLY



1. **REMOVE COMBINATION METER CASE**
   (a) Using a screwdriver, detach the 7 claws and remove the meter case.
   HINT:
   Tape the screwdriver tip before use.

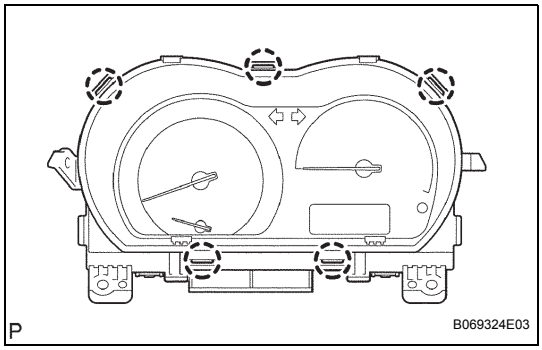
ME



2. REMOVE COMBINATION METER GLASS

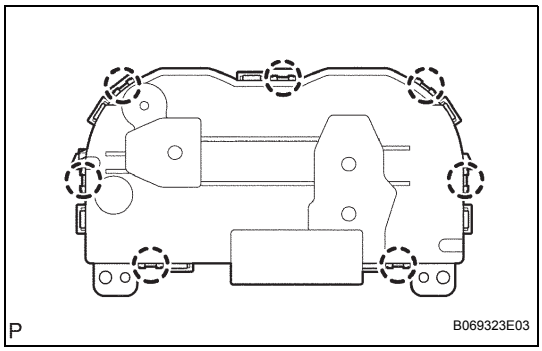
(a) Using a screwdriver, detach the 5 claws and remove the meter glass.
HINT:
Tape the screwdriver tip before use.

REASSEMBLY



1. INSTALL COMBINATION METER GLASS

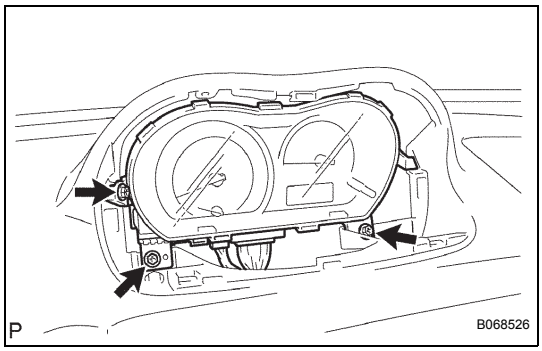
(a) Attach the 5 claws to install the meter glass.



2. INSTALL COMBINATION METER CASE

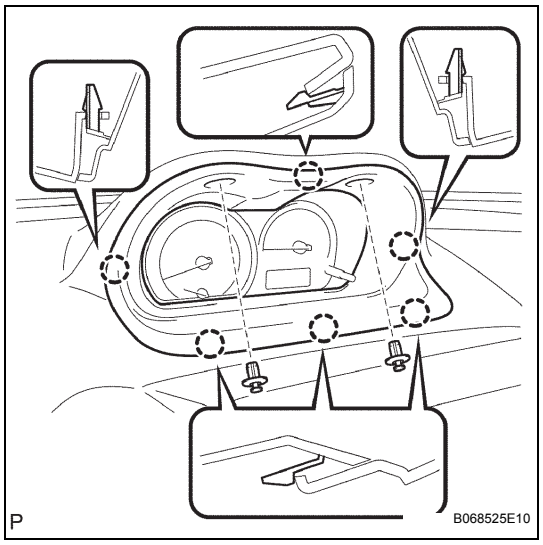
(a) Attach the 7 claws to install the meter case.

INSTALLATION



1. INSTALL COMBINATION METER ASSEMBLY

(a) Connect the connectors and install the combination meter with the 3 screws.



2. **INSTALL INSTRUMENT CLUSTER FINISH PANEL**
   (a) Attach the 6 claws to install the cluster finish panel.
   (b) Install the 2 clips.

3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

5. **CHECK SRS WARNING LIGHT**
   (a) Check the SRS warning light (see page RS-28).

ON-VEHICLE INSPECTION

1. INSPECT SPEEDOMETER

(a) Check the operation.

(1) Using a speedometer tester, inspect the speedometer for acceptable indication error and check the operation of the odometer.

Reference: km/h (Canada)

Standard Indication	Acceptable Range
20 km/h	18.9 to 22.0 km/h
40 km/h	37.9 to 41.8 km/h
60 km/h	57.2 to 62.0 km/h
80 km/h	76.6 to 82.5 km/h
100 km/h	96.8 to 102.7 km/h
120 km/h	117.2 to 123.2 km/h
140 km/h	137.3 to 144.5km/h
160 km/h	157.7 to 165.9 km/h
180 km/h	178.3 to 187.5 km/h

Reference: mph (U.S.A.)

Standard Indication	Acceptable Range
20 mph	19.7 to 22.6 mph
40 mph	39.8 to 43.2 mph
60 mph	59.9 to 64.0 mph
80 mph	79.2 to 85.4 mph
100 mph	101.8 to 107.0 mph

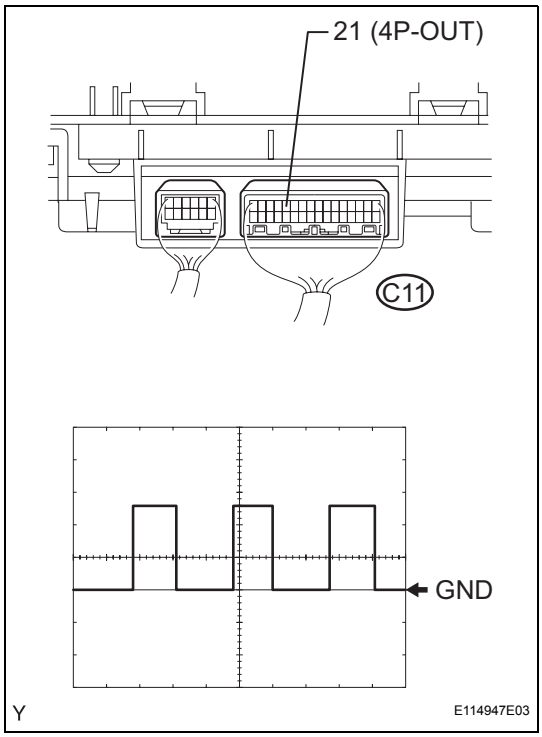
NOTICE:
Do not use worn, underinflated or overinflated tires, as the speedometer reading will be inaccurate.

(2) Check the deflection width of the speed meter indicator.

Reference:
Below 0.5 km/h (0.3 mph)

If the result is not as specified, the speedometer may have a malfunction.

ME



2. INSPECT OUTPUT SIGNAL OF VEHICLE SPEED SENSOR

(a) Check the output signal waveform.

(1) Remove the combination meter, but do not disconnect the connector.

(2) Connect an oscilloscope to terminal C11-21 and body ground.

(3) Start the engine.

(4) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Driving at approx. 20 km/h (12.4 mph)

OK:

As shown in the illustration.

HINT:

As the vehicle speed increases, the cycle of the signal waveform narrows.

3. INSPECT TACHOMETER

(a) Check operation.

(1) Connect the tune-up test tachometer, and start the engine.

NOTICE:

- **Reversing the connection of the tachometer will damage the transistors and the insides of the diodes.**
- **When removing or installing the tachometer, be careful not to drop or subject it to heavy shocks.**

(2) Compare the result of the test with the standard indication.

DC 13.5 V, 25°C (77°F)

Standard Indication (r/min)	Acceptable Range (r/min) Data in ( ) are for reference
700	630 to 770
1,000	(900 to 1,100)
2,000	(1,850 to 2,150)
3,000	2,850 to 3,150
4,000	(3,800 to 4,200)
5,000	4,800 to 5,200
6,000	(5,750 to 6,250)
7,000	6,700 to 7,300

Wire Harness Side

I030899E14

4. INSPECT FUEL RECEIVER GAUGE

(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON, then check the position of the receiver gauge needle.

OK:

Needle position is on EMPTY.

(c) Connect terminals 2 and 3 on the wire harness side connector of the fuel sender gauge.

(d) Turn the ignition switch ON, then check the position of the receiver gauge needle.

OK:

Needle position is on FULL.

5. INSPECT FUEL LEVEL WARNING

(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON, check that the fuel level needle indicates EMPTY and fuel level warning light comes on.

OK:

Fuel level warning light comes on.

6. INSPECT WATER TEMPERATURE RECEIVER GAUGE

(a) Disconnect the connector from the water temperature receiver gauge.

(b) Turn the ignition switch ON, and then check the water temperature receiver gauge warning light.

OK:

COLD indicator light comes on.

(c) Ground terminal 2 on the wire harness side, then check the water temperature receiver gauge warning light.

OK:

HOT indicator light comes on / blinks.

7. INSPECT LOW OIL PRESSURE WARNING LIGHT

(a) Disconnect the connector from the low oil pressure switch.

(b) Turn the ignition switch ON.

(c) Ground the terminal of the wire harness side connector, then check the low oil pressure warning light.

OK:

Low oil pressure warning light comes on.

8. INSPECT PARKING BRAKE WARNING LIGHT

(a) Inspect the parking brake warning light.

(1) Disconnect the connector from the parking brake warning switch.

(2) Turn the ignition switch ON.

(3) Ground the terminal of the wire harness side connector, and then check that the parking brake warning light illuminates.

OK:

Parking brake warning light illuminates.

ME

(b) Inspect the parking brake warning light.
(1) Disconnect the connector from the brake fluid level warning switch.
(2) Turn the ignition switch ON.
(3) Connect terminal 1 and 2 of the wire harness side connector, and then check that the parking brake warning light illuminates.
OK:
Parking brake warning light illuminates.

9. INSPECT BRAKE FLUID LEVEL WARNING SWITCH
(a) Remove the reservoir cap and strainer.
(b) Disconnect the connector.
(c) Measure the resistance between the terminals.
Standard resistance:
Float up (switch off):
10 kΩ or higher
(d) Use a siphon, etc., to take fluid out of the reservoir.
(e) Measure the resistance between the terminals.
Standard resistance:
Float down (switch on):
Below 1 Ω
(f) Pour the fluid back in the reservoir.
(g) Reconnect the connector.

10. INSPECT WASHER LEVEL WARNING SWITCH
(a) Disconnect the connector from the washer level warning switch.
(b) Turn the ignition switch ON.
(c) Ground the terminal of the wire harness side connector, then check the washer level warning light.
OK:
Washer level warning light comes on.

11. RESET OIL REPLACEMENT REMINDER LIGHT (INDICATOR)

Indicator condition:

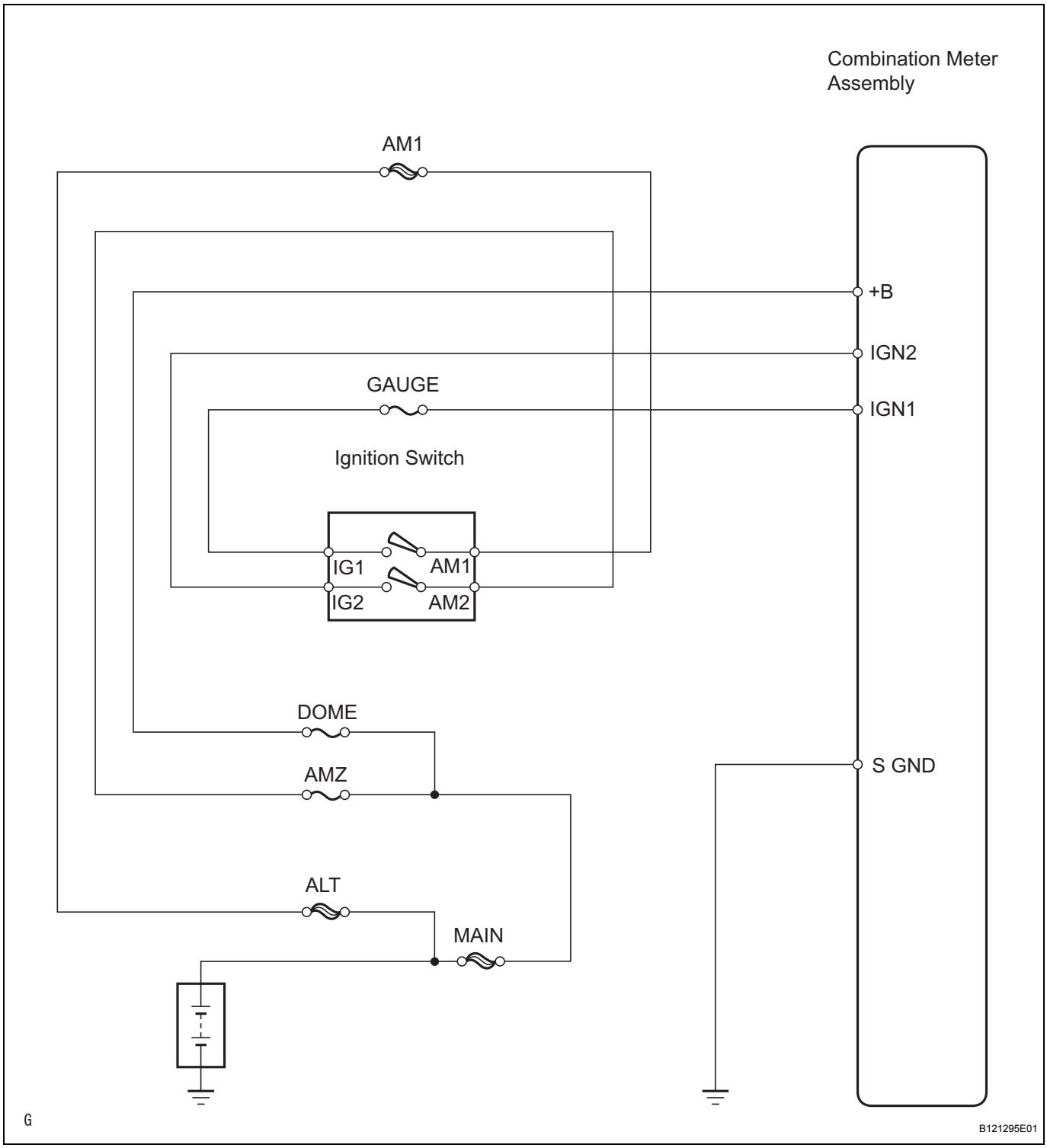
State	Condition	Specified State
Blinking	Vehicle is driven about 8,000 km (5,000 miles) since oil is changed	Indicator blinks for 15 seconds after ignition switch is turned ON (including 3 seconds for a valve check)
Continuously Illuminated	Vehicle is driven about 12,000 km (7,500 miles) since oil is changed	Indicator is continuously illuminated after ignition switch is turned ON.

(a) Set the liquid crystal display (LCD) to ODO.
(b) Turn the ignition switch OFF.
(c) Press and hold the reset switch, and turn the ignition switch ON.
(d) After turning the ignition switch ON, keep holding the reset switch for at least 5 seconds. The reset procedure is completed.
HINT:
- If the ignition switch is turned OFF during the reset procedure:
LCD: off
IND: off

- If the reset switch is released too quickly during the reset procedure:
  LCD: returns to ODO display
  IND: is not reset

Entire Combination Meter does not Operate

WIRING DIAGRAM



1	**INSPECT FUSE (MAIN, DOME, AM2, GAUGE, AM1)**

(a) Measure the resistance of the ALT H-fuse and MAIN H-fuse in the fusible link block.

Standard resistance:
Below 1 Ω

(b) Measure the resistance of the DOME fuse and AM2 fuse in the engine room relay block.
Standard resistance:
Below 1 Ω

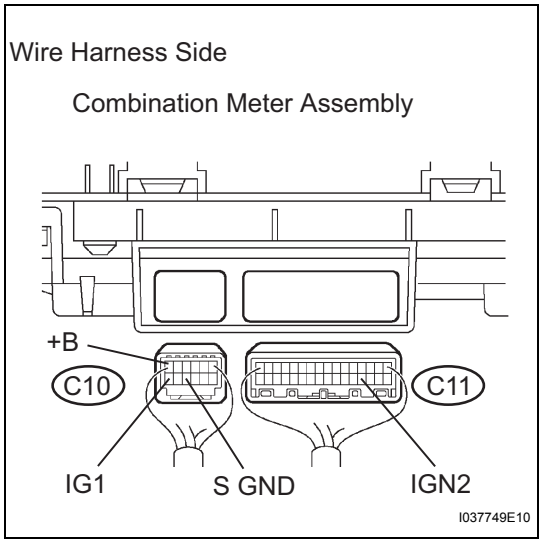
(c) Measure the resistance of the GAUGE fuse and AM1 in the instrument panel junction block.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

ME

2 CHECK WIRE HARNESS (COMBINATION METER - BATTERY AND BODY GROUND)



(a) Disconnect the C10 and C11 meter connectors.

(b) Measure the voltage of the wire harness side connectors.
Standard voltage

Tester Connection	Condition	Specified Condition
C10-7 (+B) - Body ground	Always	10 to 14 V
C10-1 (IGN1) - Body ground	Ignition switch ON	10 to 14 V
C11-3 (IGN2) - Body ground	Ignition switch ON	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
C10-3 (S GND) - Body ground	Below 1 Ω

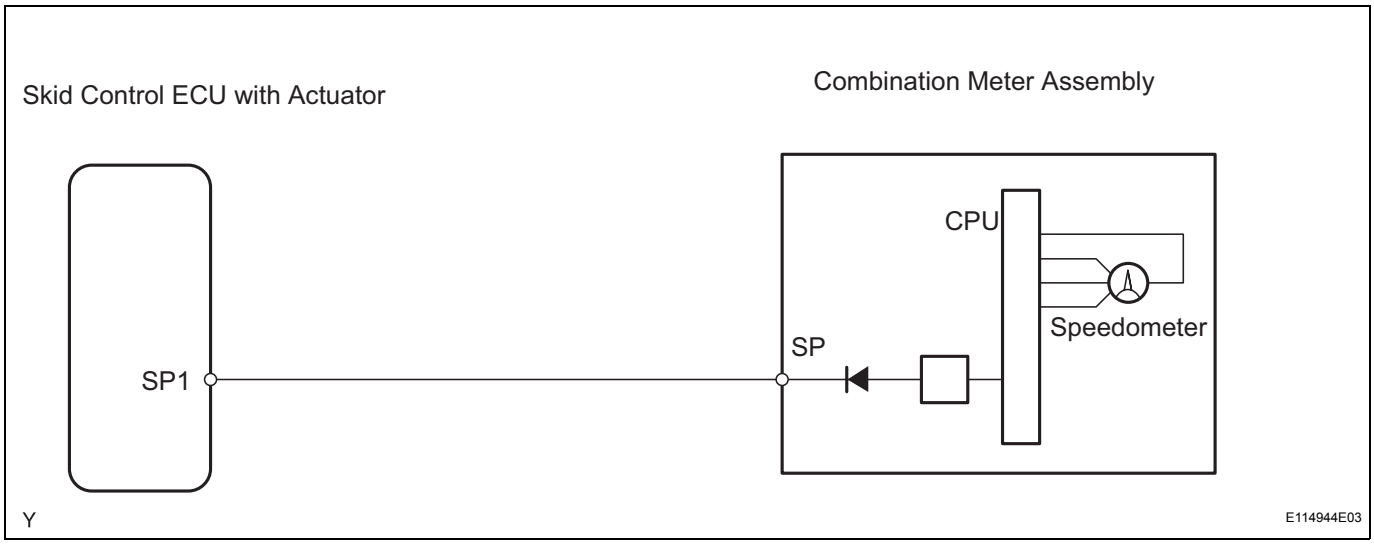
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

Speedometer Malfunction

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
When using the intelligent tester, start from *1. When not using the intelligent tester, start from *2.

1	READ VALUE OF INTELLIGENT TESTER (VEHICLE SPEED)*1

(a) Check the DATA LIST for proper functioning of the vehicle speed.

Skid control ECU with actuator:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
WHEEL SPD FR	Vehicle speed / Min.: 0 km/h (0 mph) Max.: 326 km/h (202 mph)	Almost equal to actual speed (When driving)	-
WHEEL SPD FL	Vehicle speed / Min.: 0 km/h (0 mph) Max.: 326 km/h (202 mph)	Almost equal to actual speed (When driving)	-
WHEEL SPD RR	Vehicle speed / Min.: 0 km/h (0 mph) Max.: 326 km/h (202 mph)	Almost equal to actual speed (When driving)	-
WHEEL SPD RL	Vehicle speed / Min.: 0 km/h (0 mph) Max.: 326 km/h (202 mph)	Almost equal to actual speed (When driving)	-

OK:
Vehicle speed displayed on tester is almost equal to actual vehicle speed.

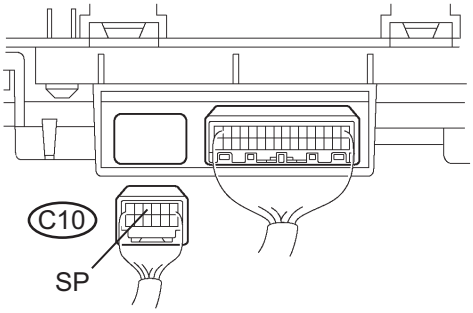
NG → **GO TO BRAKE SYSTEM**

OK

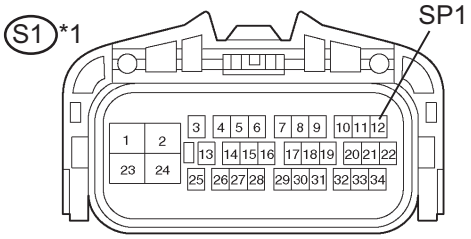
2	**CHECK WIRE HARNESS (COMBINATION METER - SKID CONTROL ECU WITH ACTUATOR)*2**

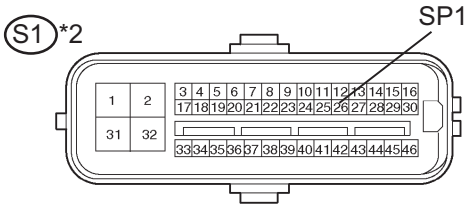
Wire Harness Side

Combination Meter Assembly



Skid Control ECU with Actuator





Y

*1: w/o VSC

*2: w/ VSC

E076426E02

(a) Disconnect the C10 meter connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C10-10 (SP) - S1-12 (SP1)*1	Below 1 Ω
C10-10 (SP) - S1-26 (SP1)*2	Below 1 Ω
C10-10 (SP) - Body ground	10 kΩ or higher

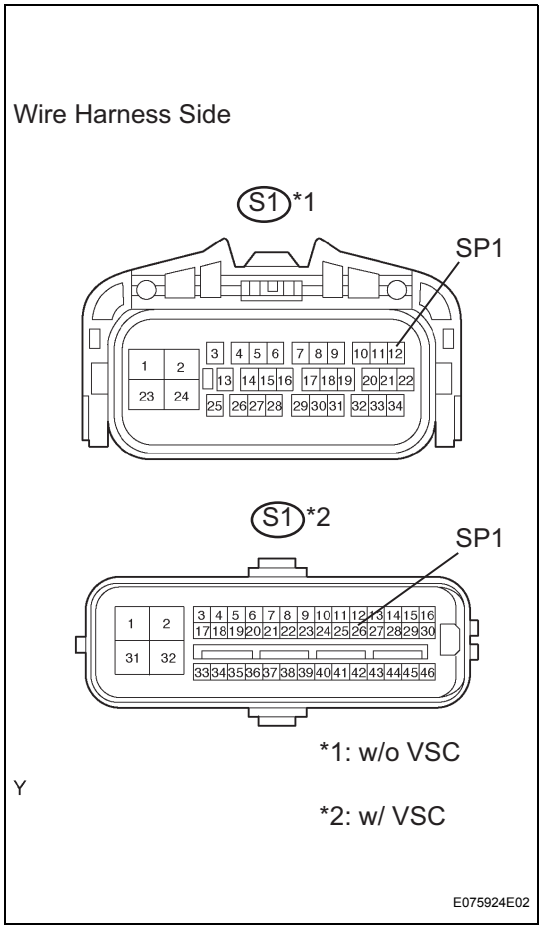
HINT:
*1: w/o VSC
*2: w/ VSC

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

ME

3	CHECK SKID CONTROL ECU WITH ACTUATOR (SP1 VOLTAGE)



(a) Disconnect the S1 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

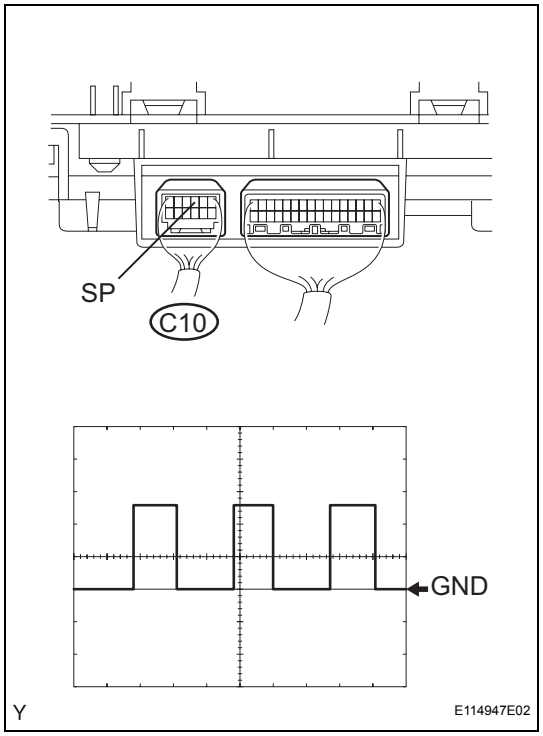
Tester Connection	Condition	Specified Condition
S1-12 (SP1)*1 - Body ground	Ignition switch ON	10 to 14 V
S1-26 (SP1)*2 - Body ground	Ignition switch ON	10 to 14 V

HINT:
*1: w/o VSC
*2: w/ VSC

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

4	CHECK COMBINATION METER ASSEMBLY



(a) Remove the combination meter but do not disconnect the connectors.
(b) Start the engine.
(c) Using an oscilloscope, check the signal waveform of the meter.

Item	Content
Terminal No.	C10-10 (SP) - Body ground
Tool setting	5 V/DIV., 20 msec./DIV.
Vehicle condition	Driving at approx. 20 km/h (12.4 mph)

OK:

As shown in the illustration.

HINT:

As the vehicle speed increases, the wavelength shortens.

NG → **GO TO BRAKE SYSTEM**

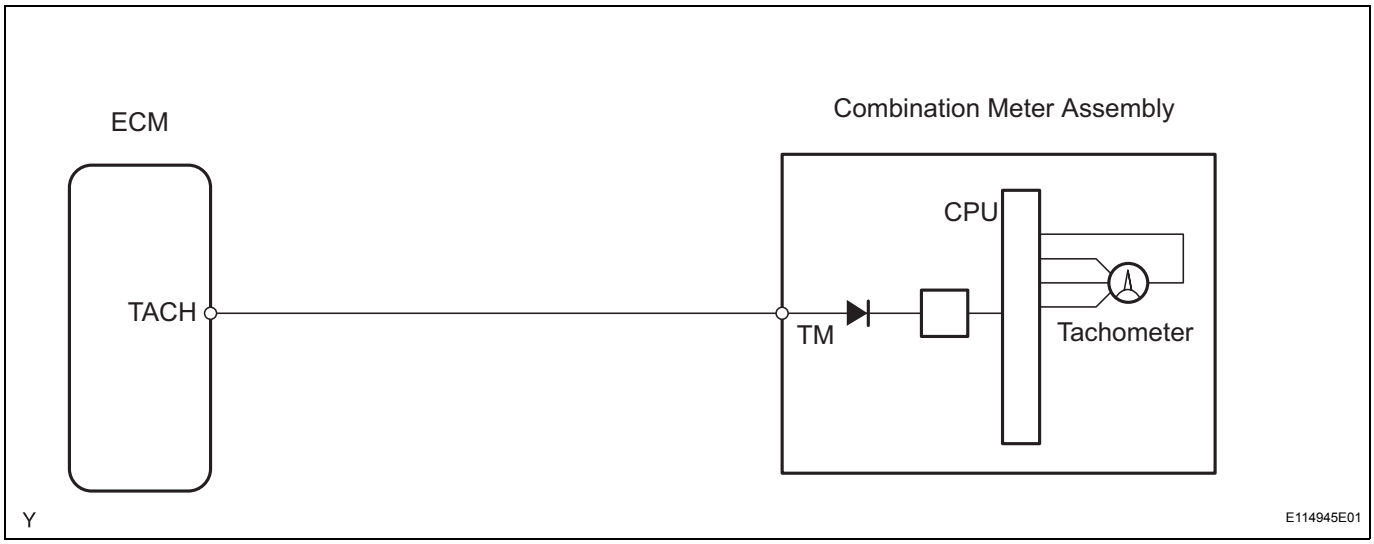
OK

REPLACE COMBINATION METER ASSEMBLY

ME

Tachometer Malfunction

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
When using the intelligent tester, start from *1. When not using the intelligent tester, start from *2.

1	READ VALUE OF INTELLIGENT TESTER (ENGINE SPEED)*1

(a) Check the DATA LIST for the proper functioning of the engine speed.

ECM:

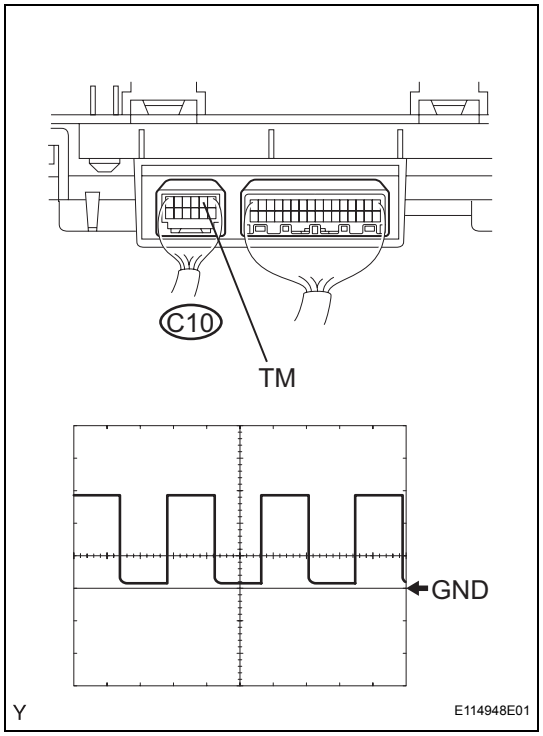
Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ENGINE SPD	Engine speed / Min.: 0 rpm, Max.: 16,383 rpm	Almost equal to actual engine speed (When engine is running)	-

OK:
Engine speed on tester is almost equal to actual engine speed.

NG → **GO TO SFI SYSTEM**

OK

2	CHECK COMBINATION METER ASSEMBLY*2



(a) Remove the combination meter but do not disconnect the connector.
(b) Start the engine.
(c) Using an oscilloscope, check the signal waveform of the meter.

Item	Content
Terminal No.	C10-11 (TM) - Body ground
Tool Setting	5 V/DIV., 10 msec/DIV.
Vehicle Condition	Engine idling

OK:

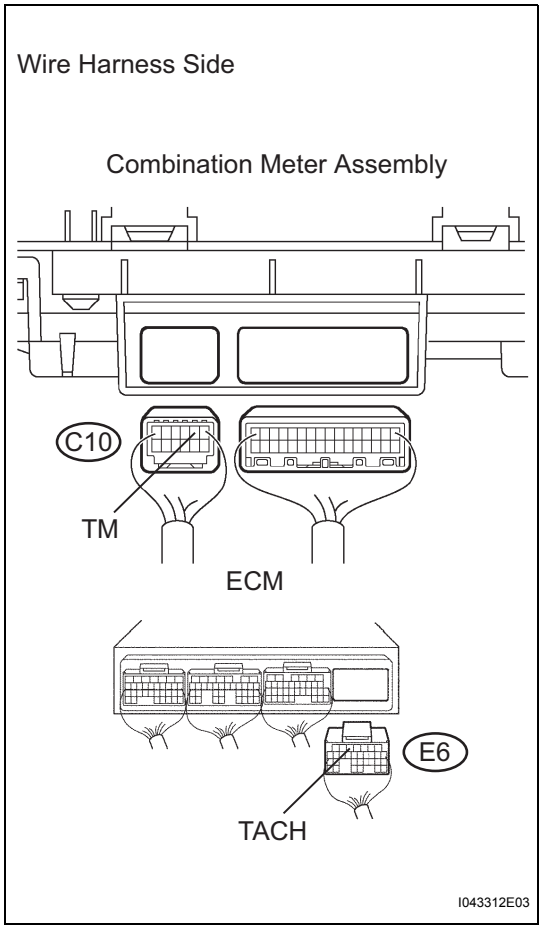
As shown in the illustration.

ME

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

3	CHECK WIRE HARNESS (COMBINATION METER - ECM)



(a) Disconnect the C10 meter connector.
(b) Disconnect the E6 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C10-11 (TM) - E6-5 (TACH)	Below 1 Ω
C10-11 (TM) - Body ground	10 kΩ or higher

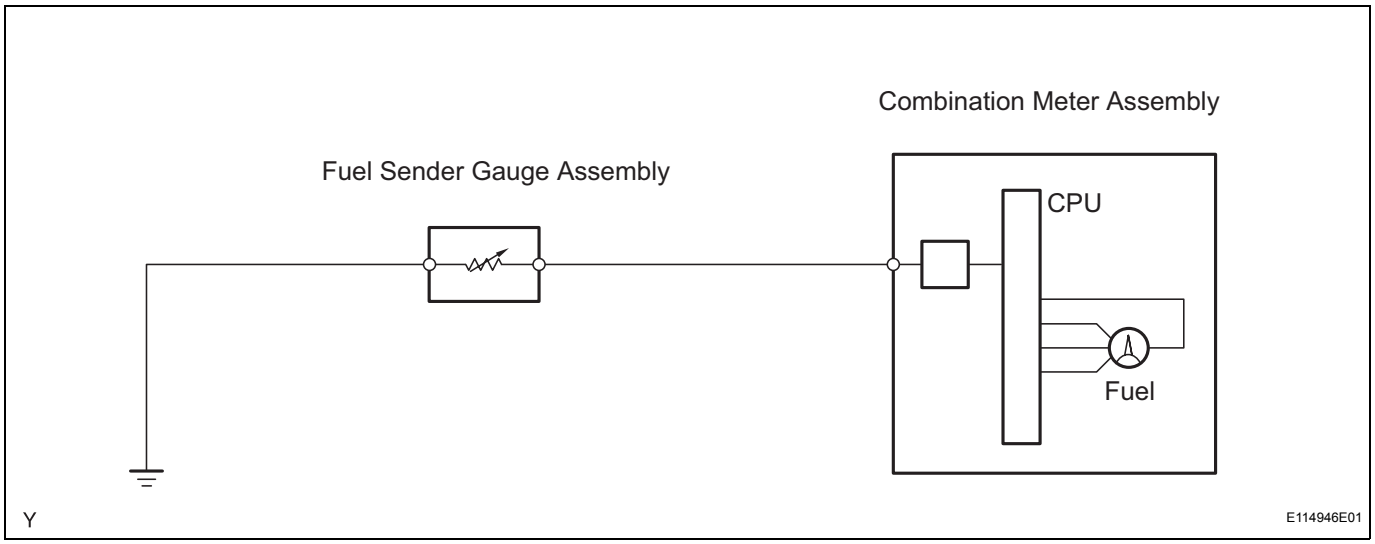
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

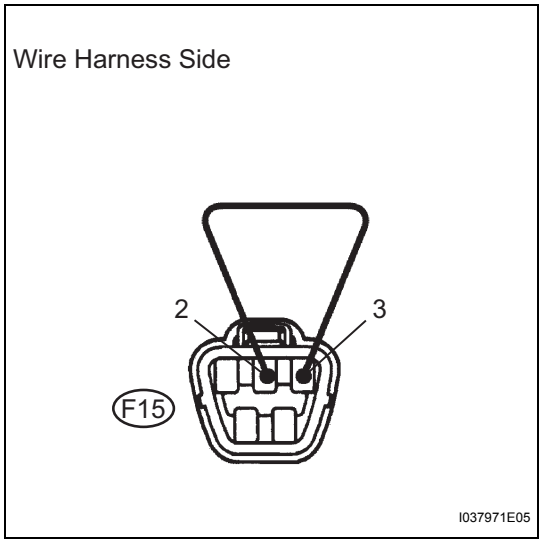
Fuel Gauge Malfunction

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK METER INDICATOR OPERATION (FUEL GAUGE)



(a) Disconnect the F15 gauge connector.
(b) Check the meter indicator conditions.
OK

Wire Connection	Condition	Specified Condition
2 - 3	Short circuit (ignition switch ON)	Fuel gauge on combination meter indicates "F" or more

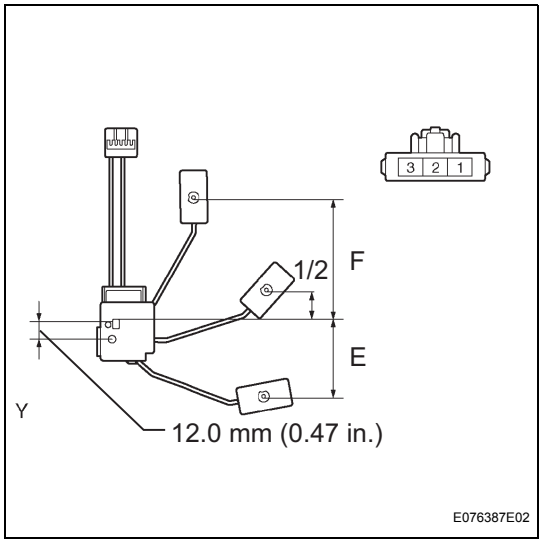
(c) Measure the voltage of the wire harness side connector.
Standard voltage

Wire Connection	Condition	Specified Condition
2 - Body ground	Ignition switch ON	10 to 14 V

NG → **Go to step 3**

OK

2	INSPECT FUEL SENDER GAUGE ASSEMBLY



(a) Remove the fuel sender gauge.
(b) Connect an ohmmeter to terminals 2 and 3.
(c) Measure the resistance of the gauge.

Standard resistance

Float Level	Float Position	Specified Condition
F	80.8 to 86.8 mm (3.18 to 3.42 in.)	4.0 +-1 Ω
1/2	15.9 to 21.9 mm (0.62 to 0.86 in.)	55.0 +-3 Ω
E	52.2 to 58.2 mm (2.05 to 2.29 in.)	107.0 +-1 Ω

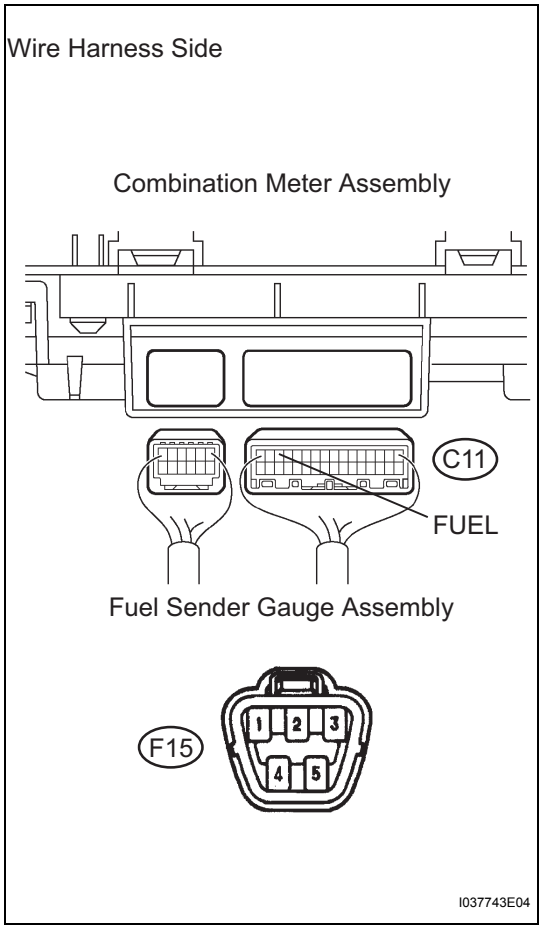
NG → **REPLACE FUEL SENDER GAUGE ASSEMBLY**

OK

REPLACE COMBINATION METER ASSEMBLY

ME

3	CHECK WIRE HARNESS (COMBINATION METER - FUEL SENDER GAUGE)



(a) Disconnect the C11 connector.
(b) Disconnect the F15 gauge connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C11-19 (FUEL) - F15-2	Below 1 Ω
F15-3 - Body ground	Below 1 Ω
C11-19 (FUEL) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

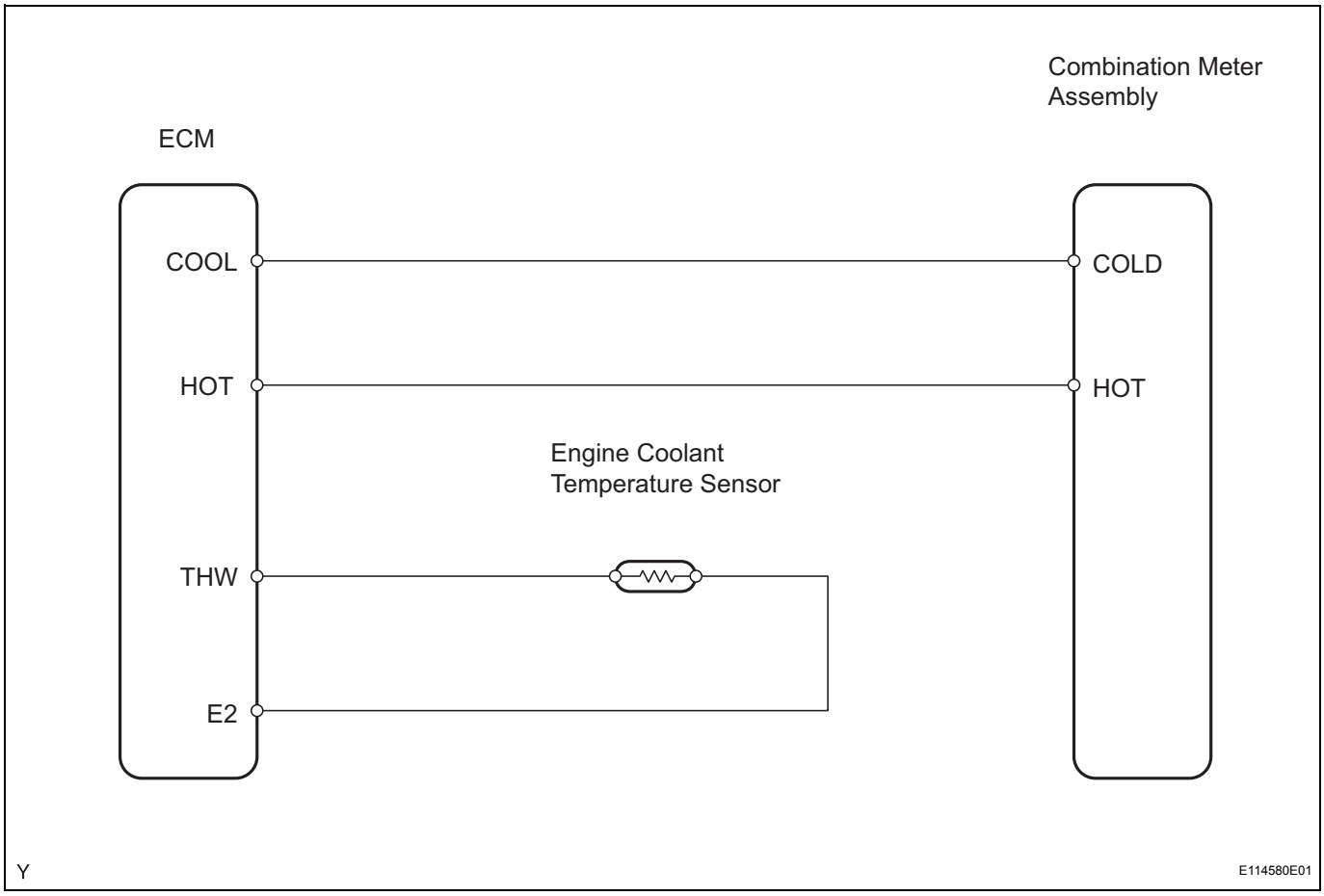
OK

REPLACE COMBINATION METER ASSEMBLY

ME

Engine Coolant Temperature Gauge Malfunction

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
When using the intelligent tester, start from *1. When not using the intelligent tester, start from *2.

1	READ VALUE OF INTELLIGENT TESTER (COOLANT TEMPERATURE)*1

(a) Check the DATA LIST for proper functioning of the engine coolant temperature sensor.

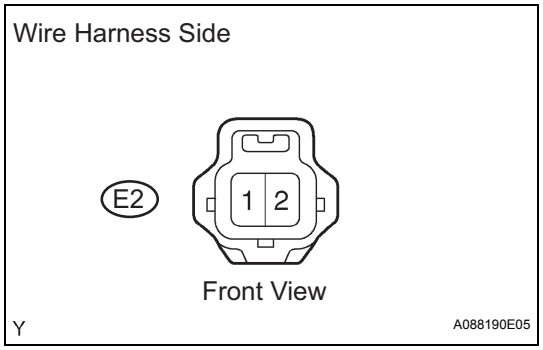
ECM:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
COOLANT TEMP	Engine coolant Temperature (ECT): Min.: -40°C (-40°F), Max.: -140°C (-284°F)	75 to 100°C (167 to 203°F): After warming up engine	• If value -40°C (-40°F): ECT sensor open • If value 140°C (284°F) or higher: ECT sensor shorted

NG → **GO TO SFI SYSTEM**

OK

2 CHECK COMBINATION METER ASSEMBLY (INDICATOR CHECK)*2



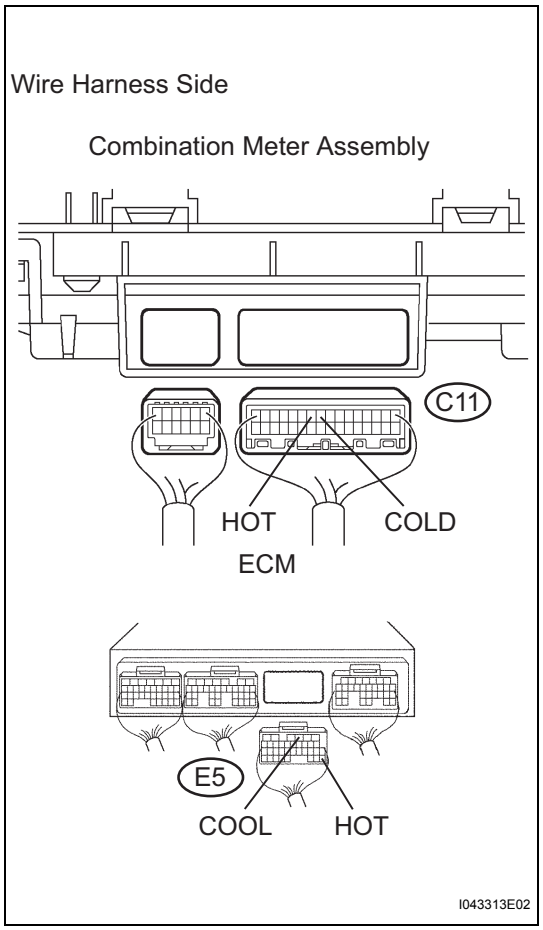
(a) Disconnect the E2 connector from the engine coolant temperature sensor.
(b) Check the meter indicator conditions according to the table below.
OK

Wire Connection	Condition	Specified Condition
1 - 2	Short circuit (Ignition switch ON)	Warning light blinks (red)
All wires are disconnected	Open circuit (Ignition switch ON)	Warning light turns on (blue)

OK → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

NG

3 CHECK WIRE HARNESS (COMBINATION METER - ECM)



(a) Disconnect the C11 meter connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E5-3 (COOL) - C11-24 (COLD)	Below 1 Ω
E5-28 (HOT) - C11-23 (HOT)	Below 1 Ω
C11-24 (COLD) - Body ground	10 kΩ or higher
C11-23 (HOT) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

ME

4	**CHECK OPERATION OF COMBINATION METER SYSTEM WITH A NEW OR NORMALLY FUNCTIONING COMBINATION METER**

(a) Temporarily replace the combination meter with a new or normally functioning combination meter.
(b) Check that the malfunction disappears.
OK:
Malfunction disappears.

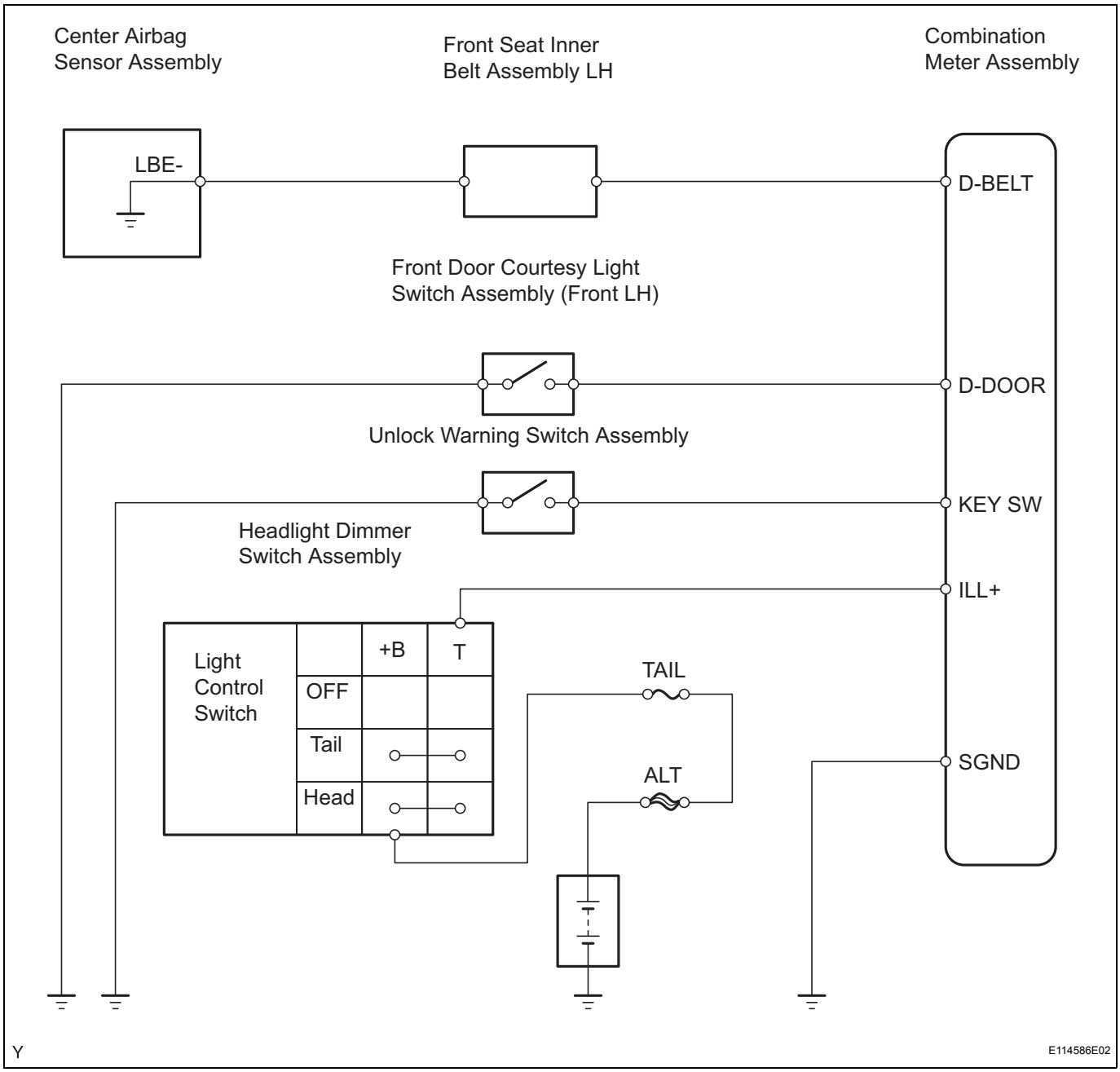
NG → **GO TO SFI SYSTEM**

OK →

REPLACE COMBINATION METER ASSEMBLY

Warning Buzzer does not Sound

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK BUZZER (SEAT BELT, KEY REMINDER, TAILLIGHT REMINDER)

(a) Check that the seat belt, key reminder and taillight reminder warning buzzers sound.

Result	Proceed to
Seat belt warning buzzer does not sound	A
Key reminder warning buzzer does not sound	B

Result	Proceed to
Taillight reminder warning buzzer does not sound (Meter illumination is normal)	C
All warning buzzers do not sound	D

B → **Go to step 5**

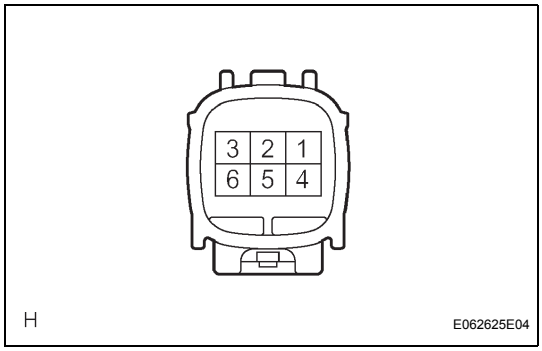
C → **Go to step 9**

D → **REPLACE COMBINATION METER ASSEMBLY**

A

ME

2 INSPECT FRONT SEAT INNER BELT ASSEMBLY LH



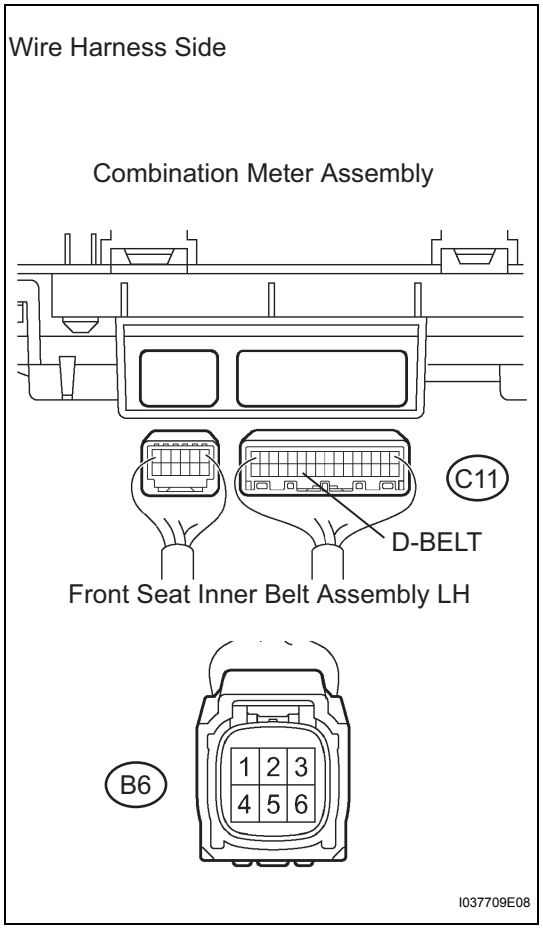
(a) Remove the inner belt LH.
(b) Measure the resistance of the belt.
Standard resistance

Tester Connection	Condition	Specified Condition
B6-1 - B6-3	Seat belt is fastened	10 kΩ or higher
B6-1 - B6-3	Seat belt is unfastened	Below 1 Ω

NG → **REPLACE FRONT SEAT INNER BELT ASSEMBLY LH**

OK

3	CHECK WIRE HARNESS (COMBINATION METER - FRONT SEAT INNER BELT LH)



(a) Disconnect the C11 meter connector.
(b) Disconnect the B6 belt connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

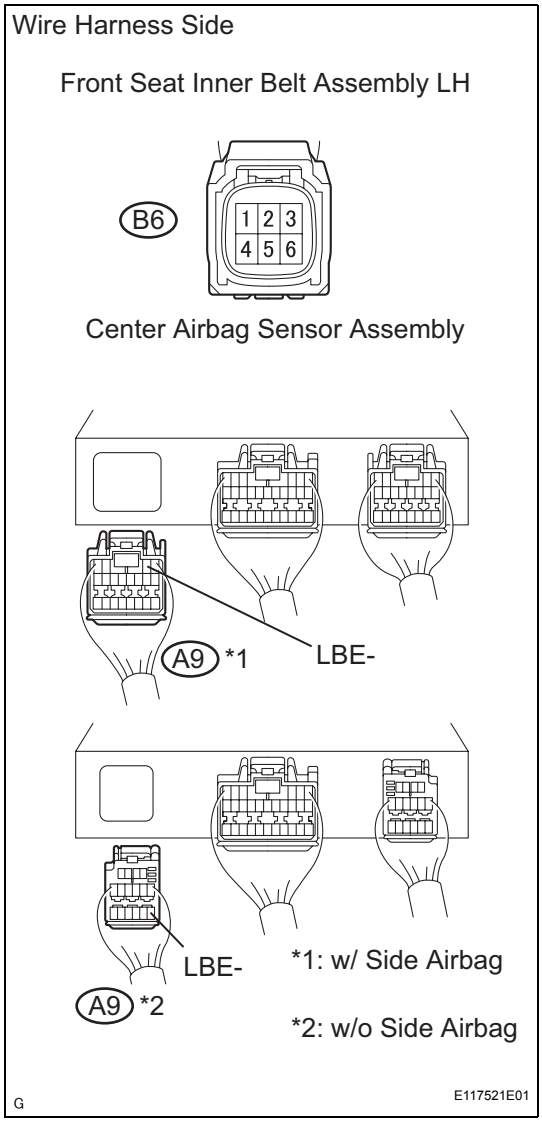
Tester Connection	Specified Condition
C11-6 (D-BELT) - B6-3	Below 1 Ω
C11-6 (D-BELT) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

ME

4	CHECK WIRE HARNESS (FRONT SEAT INNER BELT LH - CENTER AIRBAG SENSOR)



(a) Disconnect the B6 belt connector.
(b) Disconnect the A9 sensor connector.
(c) measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
B6-1 - A9-2 (LBE-)*1	Below 1 Ω
B6-1 - A9-7 (LBE-)*2	Below 1 Ω
B6-1 - Body ground	10 kΩ or higher

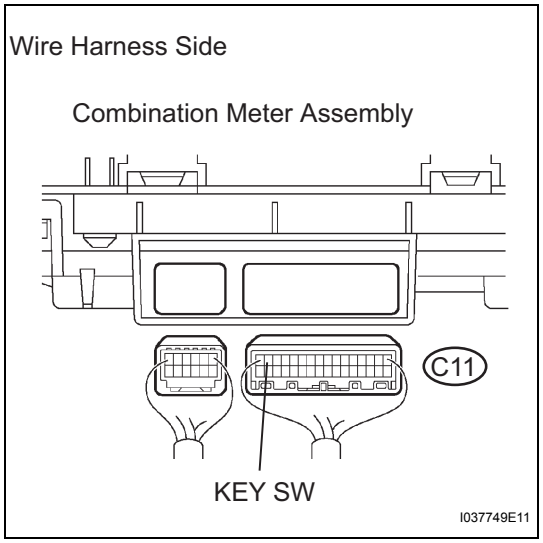
HINT:
*1: w/ Side airbag
*2: w/o Side airbag

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE COMBINATION METER ASSEMBLY

5 CHECK WIRE HARNESS (COMBINATION METER - BODY GROUND)



(a) Disconnect the C11 meter connector.
(b) Measure the resistance of the wire harness side connector.

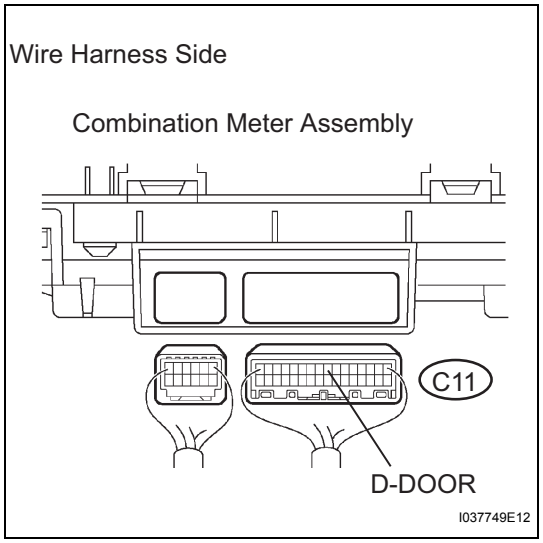
Standard resistance

Tester Connection	Condition	Specified Condition
C11-18 (KEY SW) - Body ground	No key in ignition key cylinder	10 kΩ or higher
C11-18 (KEY SW) - Body ground	key in ignition key cylinder	Below 1 Ω

NG → **Go to step 7**

OK

6 CHECK WIRE HARNESS (COMBINATION METER - BODY GROUND)



(a) Disconnect the C11 meter connection.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
C11-25 (D-DOOR) - Body ground	Driver side door is closed	10 kΩ or higher
C11-25 (D-DOOR) - Body ground	Driver side door is open	Below 1 Ω

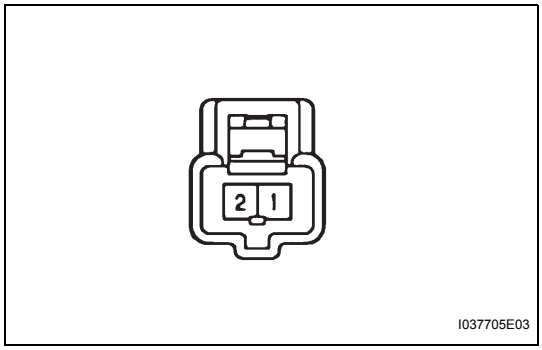
NG → **Go to step 8**

OK

REPLACE COMBINATION METER ASSEMBLY

ME

7	INSPECT UNLOCK WARNING SWITCH ASSEMBLY



(a) Remove the unlock warning switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	No key in ignition key cylinder	10 kΩ or higher
1 - 2	Key in ignition key cylinder	Below 1 Ω

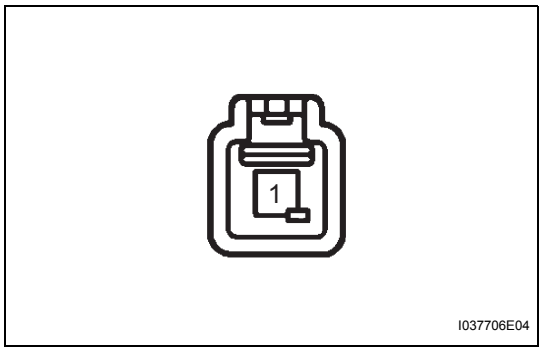
NG → **REPLACE UNLOCK WARNING SWITCH ASSEMBLY**

ME

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR (UNLOCK WARNING SWITCH - METER AND BODY GROUND)

8	INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY



(a) Remove the courtesy switch.
(b) Measure the resistance of the switch.
Standard resistance

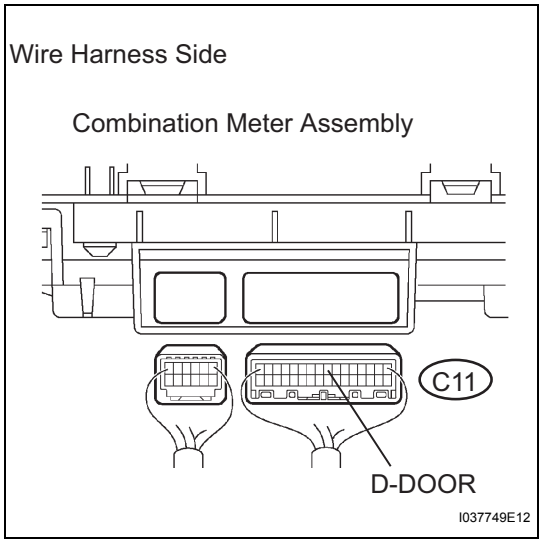
Tester Connection	Condition	Specified Condition
1 - Body ground	Driver side courtesy switch is pushed	10 kΩ or higher
1 - Body ground	Driver side courtesy switch is not pushed	Below 1 Ω

NG → **REPLACE FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR (FRONT DOOR COURTESY LIGHT SWITCH - METER AND BODY GROUND)

9	INSPECT COMBINATION METER ASSEMBLY



(a) Disconnect the C11 meter connection.
(b) Measure the resistance of the wire harness side connector.

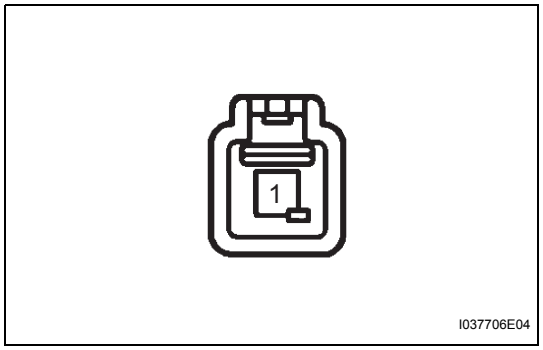
Standard resistance

Tester Connection	Condition	Specified Condition
C11-25 (D-DOOR) - Body ground	Driver side door is closed	10 kΩ or higher
C11-25 (D-DOOR) - Body ground	Driver side door is open	Below 1 Ω

OK → **REPLACE COMBINATION METER ASSEMBLY**

NG

10	INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY



(a) Remove the courtesy light switch.
(b) Measure the resistance of the switch.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Body ground	Driver side courtesy switch shaft is pushed	10 kΩ or higher
1 - Body ground	Driver side courtesy switch shaft is not pushed	Below 1 Ω

NG → **REPLACE FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR (FRONT DOOR COURTESY LIGHT SWITCH - METER AND BODY GROUND)

ME

PROBLEM SYMPTOMS TABLE

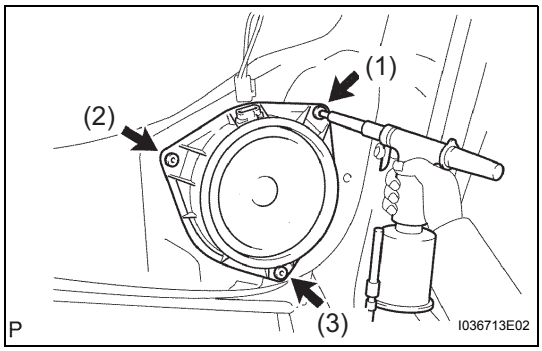
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Audio and visual system

Symptom	Suspected area	See page
No sound can be heard only from the front speaker.	1. Front No. 1 speaker assembly	AV-5
	2. Wire harness	-
No sound can be heard only from the tweeter speaker.	1, Front No. 2 speaker assembly	AV-7
	2. Wire harness	-
No sound can be heard only from the rear speaker.	1. Rear speaker assembly	AV-10
	2. Wire harness	-

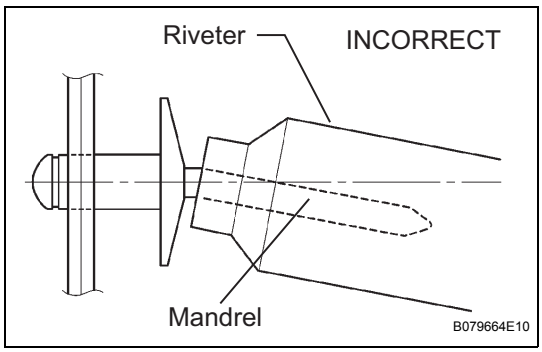
INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

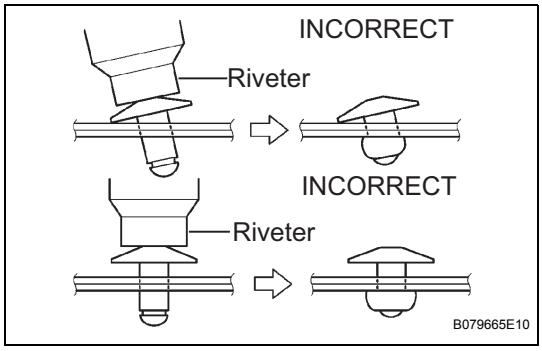


1. INSTALL FRONT NO. 1 SPEAKER ASSEMBLY LH

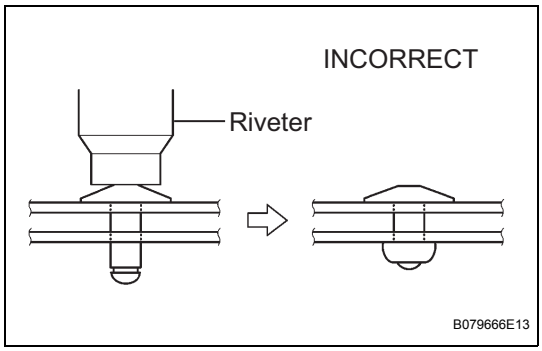
(a) Using an air riveter or a hand riveter, install 3 new strike rivets to the speaker on the front door panel.
HINT:
Install the new strike rivets in the order shown in the illustration.



NOTICE:
- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**



- **Confirm that the rivets are seated properly against the speaker. Do not tilt the riveter when installing the rivet to the speaker. Do not leave any space between the rivet head and the speaker.**



- **Do not leave any space between the speaker and door panel. Firmly hold together the 2 items while installing the rivet.**

(b) Connect the connectors.

2. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-17)

3. INSTALL FRONT ARMREST BASE PANEL UPPER LH (See page ED-18)

4. INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-18)

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. PERFORM INITIALIZATION

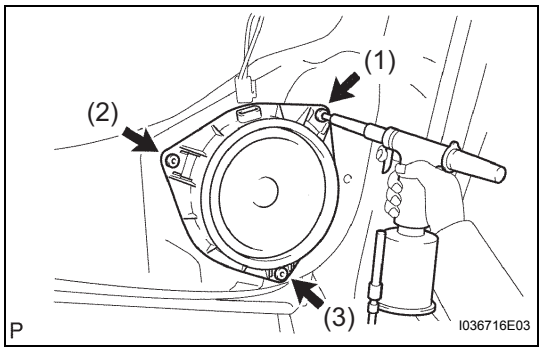
(a) Perform initialization (see page IN-23).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

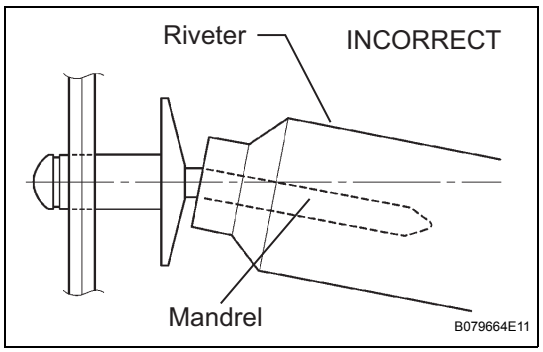
INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

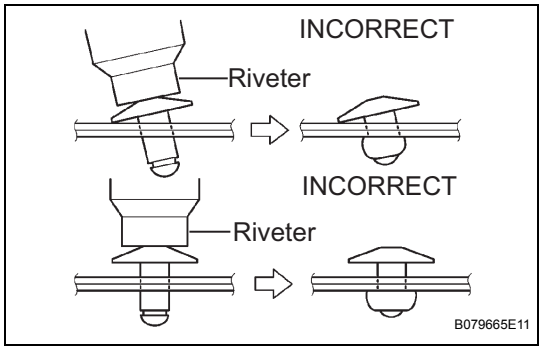


1. INSTALL REAR SPEAKER ASSEMBLY LH

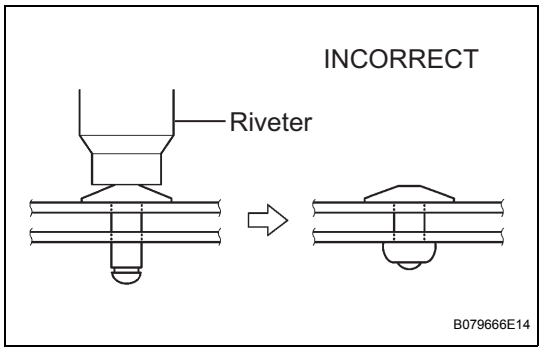
(a) Using an air riveter or a hand riveter, install 3 new strike rivets to the speaker on the rear door panel.
HINT:
Install the new strike rivets in the order shown in the illustration.



NOTICE:
- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**



- **Confirm that the rivets are seated properly against the speaker. Do not tilt the riveter when installing the rivet to the speaker. Do not leave any space between the rivet head and the speaker.**



- **Do not leave any space between the speaker and door panel. Firmly hold together the 2 items while installing the rivet.**

(b) Connect the connector.

2. INSTALL REAR DOOR SERVICE HOLE COVER LH (See page ED-31)

3. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-32)

4. INSTALL REAR DOOR ARMREST BASE PANEL UPPER LH (See page ED-32)

5. INSTALL REAR DOOR REAR GUIDE BRACKET GARNISH LH (See page ED-32)

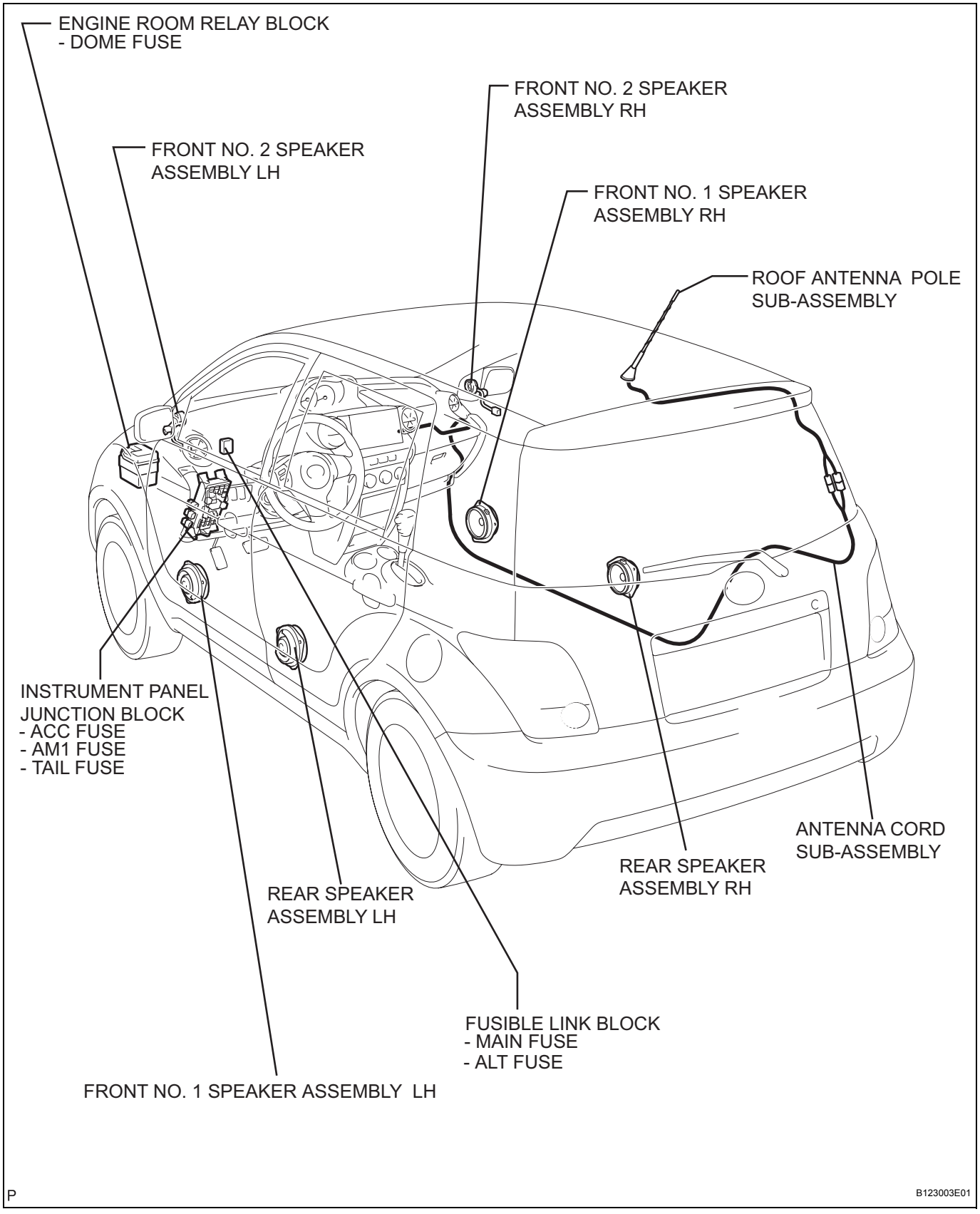
6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

AV

7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

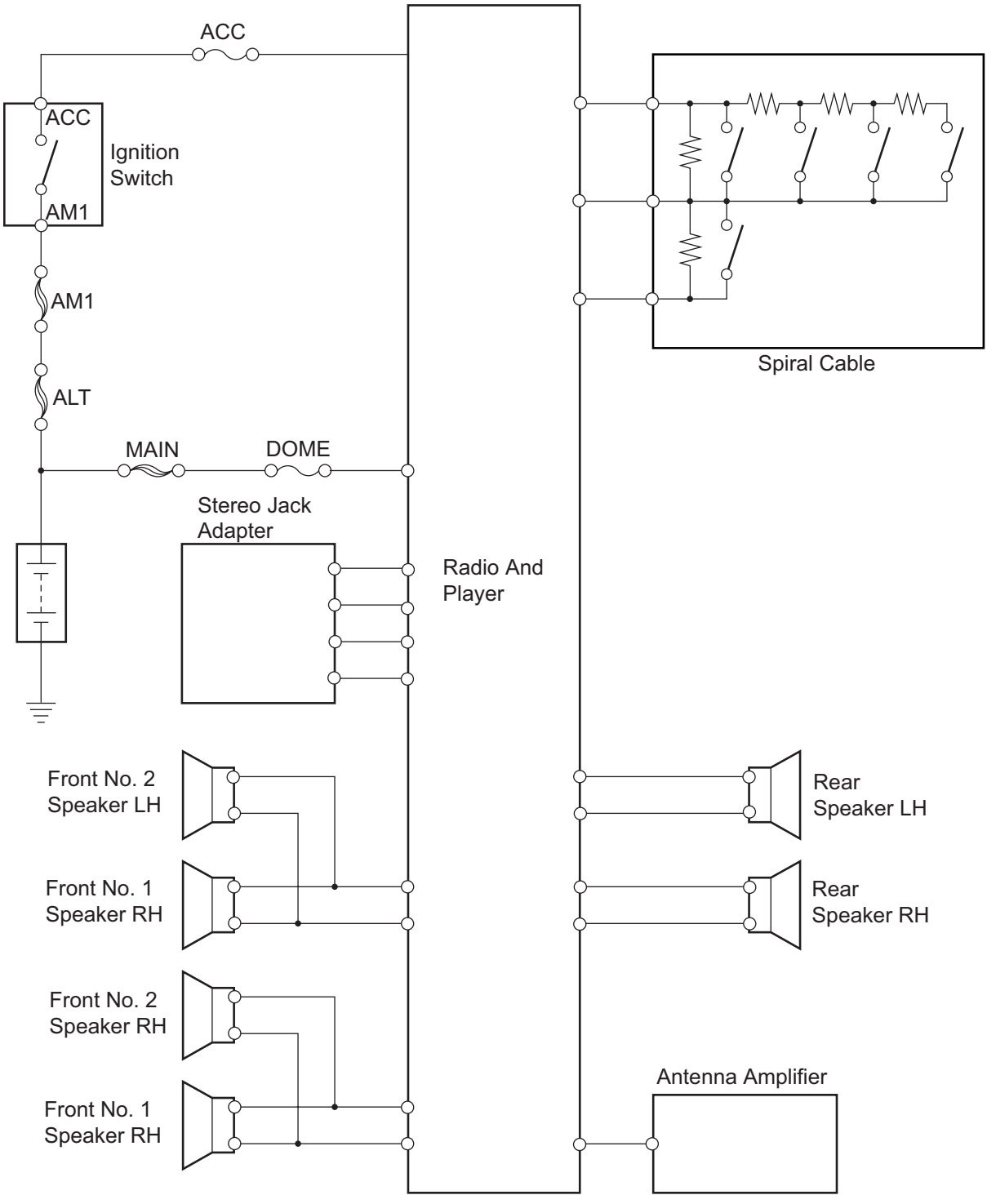
AUDIO AND VISUAL SYSTEM

PARTS LOCATION



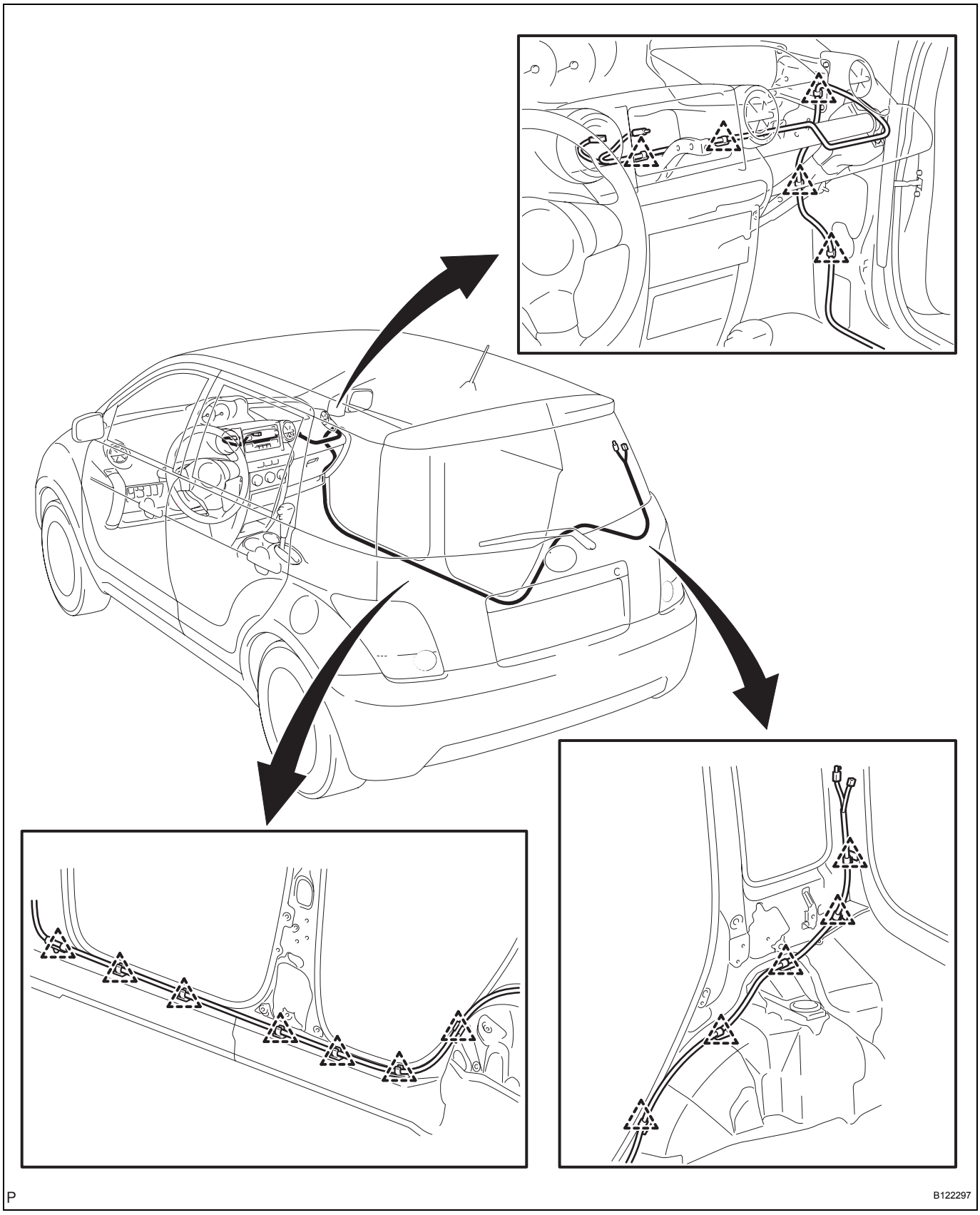
AV

SYSTEM DIAGRAM



INSTALLATION

1. INSTALL ANTENNA CORD SUB-ASSEMBLY



(a) Install the antenna cord with the 17 clamps.
(b) Connect the connectors.

2. **INSTALL ROOF SIDE GARNISH INNER RH (See page IR-14)**
3. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH (See page IR-15)**
4. **INSTALL REAR SEAT 3 POINT TYPE BELT ASSEMBLY RH (See page SB-25)**
5. **INSTALL REAR SEAT BACK HINGE SUB-ASSEMBLY RH (See page SE-16)**
6. **INSTALL DECK TRIM COVER REAR (See page IR-15)**
7. **INSTALL DECK FLOOR BOX REAR (See page IR-15)**
8. **INSTALL NO. 1 DECK BOARD**
9. **INSTALL TONNEAU COVER ASSEMBLY**
10. **INSTALL REAR SEATBACK ASSEMBLY RH (See page SE-17)**
11. **INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-17)**
12. **INSTALL CENTER PILLAR GARNISH LOWER RH (See page IR-16)**
13. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**
14. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
15. **INSTALL COWL SIDE TRIM BOARD RH (See page IR-17)**
16. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-17)**
17. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-17)**
18. **INSTALL INSTRUMENT PANEL ASSEMBLY LOWER (See page IP-22)**
19. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-10)**
20. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
21. **PERFORM INITIALIZATION**
    (a) Perform initialization (see pageIN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

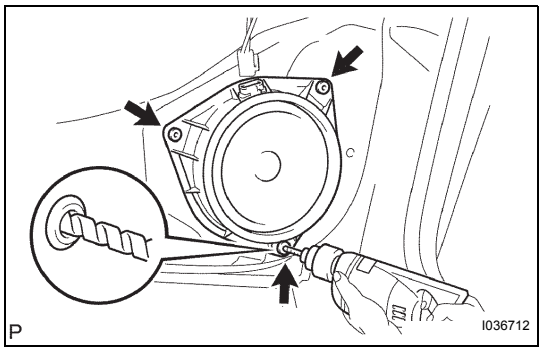
AV

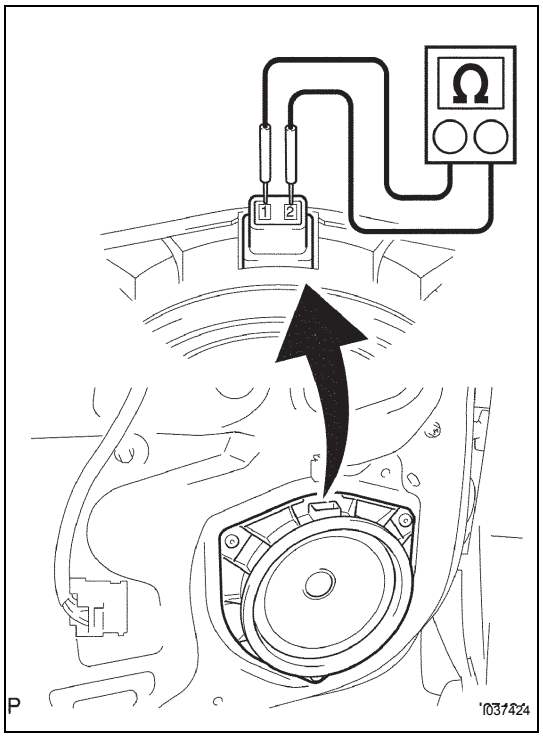
FRONT NO. 1 SPEAKER

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-8)**
3. **REMOVE FRONT ARMREST BASE PANEL UPPER LH (See page ED-8)**
4. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-9)**
5. **REMOVE FRONT NO. 1 SPEAKER ASSEMBLY LH**
   (a) Disconnect the connector.
   (b) Using a drill of less than ϕ 4 mm (0.16 in.), drill out the 3 rivet heads and remove the speaker from the front door panel.
   NOTICE:
   Do not drill the rivet at an angle, as this will cause damage to the drill and drill hole. Line up the drill and rivet, and carefully drill out the rivet head.
   CAUTION:
   Be careful as the cut rivet will be very hot.
   (c) Continue drilling and push out the remaining fragments with the drill.
   (d) Using a vacuum cleaner, remove the rivet fragments and shavings from the inside of the door.





INSPECTION

1. INSPECT FRONT NO. 1 SPEAKER ASSEMBLY

(a) Measure the resistance of the speaker.

Standard resistance

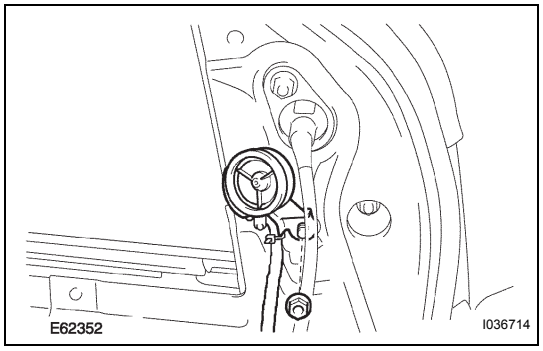
Tester Connection	Condition	Specified Condition
1 - 2	Always	4 Ω

FRONT NO. 2 SPEAKER

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

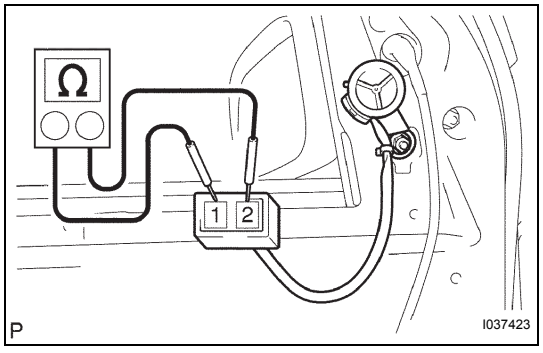
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-8)**
3. **REMOVE FRONT ARMREST BASE PANEL UPPER LH (See page ED-8)**
4. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-9)**
5. **REMOVE FRONT DOOR SERVICE HOLE COVER LH (See page ED-9)**
6. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY LH**
   (a) Disconnect the connector.
   (b) Remove the nut and speaker.



INSPECTION

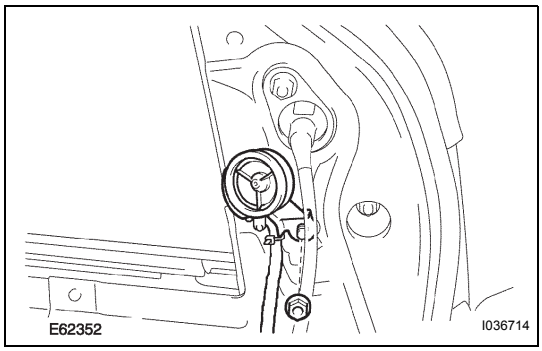
1. **INSPECT FRONT NO. 2 SPEAKER ASSEMBLY**
   (a) Measure the resistance of the speaker.
   Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Always	4 Ω



INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY LH**
   (a) Install the speaker with the nut.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   (b) Connect the connector.
2. **INSTALL FRONT DOOR SERVICE HOLE COVER LH (See page ED-17)**
3. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-17)**
4. **INSTALL FRONT ARMREST BASE PANEL UPPER LH (See page ED-18)**
5. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-18)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

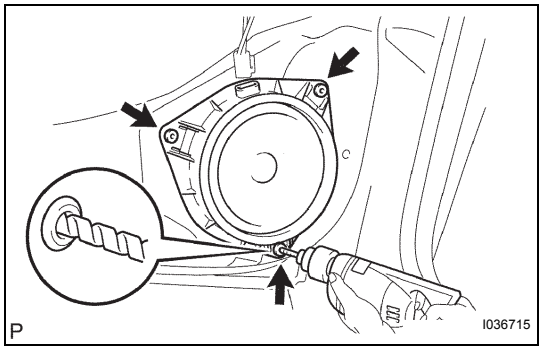
AV

REAR SPEAKER

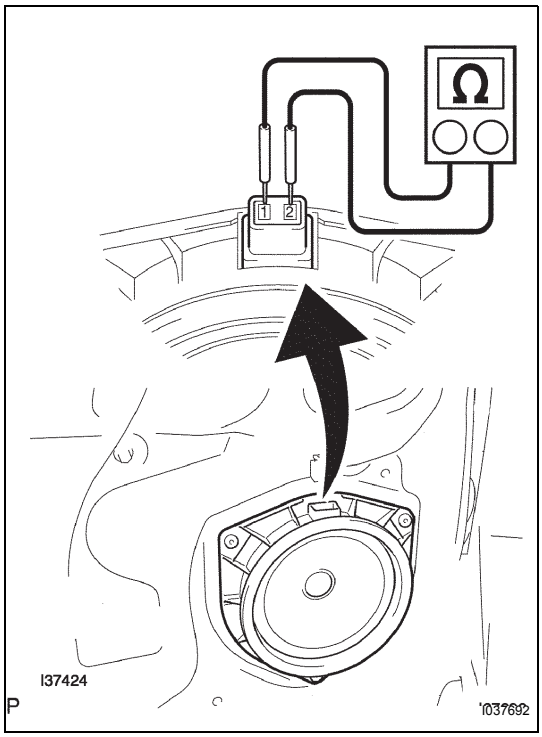
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE REAR DOOR REAR GUIDE BRACKET GARNISH LH (See page ED-24)**
3. **REMOVE REAR DOOR ARMREST BASE PANEL UPPER LH (See page ED-24)**
4. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-24)**
5. **REMOVE REAR DOOR SERVICE HOLE COVER LH (See page ED-25)**
6. **REMOVE REAR SPEAKER ASSEMBLY LH**
   (a) Disconnect the connector.
   (b) Using a drill of less than ϕ 4 mm (0.16 in.), drill out the 3 rivet heads and remove the rear speaker assembly from the rear door panel.
   NOTICE:
   Do not drill the rivet at an angle, as this will cause damage to the drill and drill hole. Line up the drill and rivet, and carefully drill out the rivet head.
   CAUTION:
   Be careful as the cut rivet will be very hot.
   (c) Continue drilling and push out the remaining fragments with the drill.
   (d) Using a vacuum cleaner, remove the rivet fragments and shavings from the inside of the door.



AV



INSPECTION

1. INSPECT REAR SPEAKER ASSEMBLY

(a) Measure the resistance of the speaker.

Standard resistance

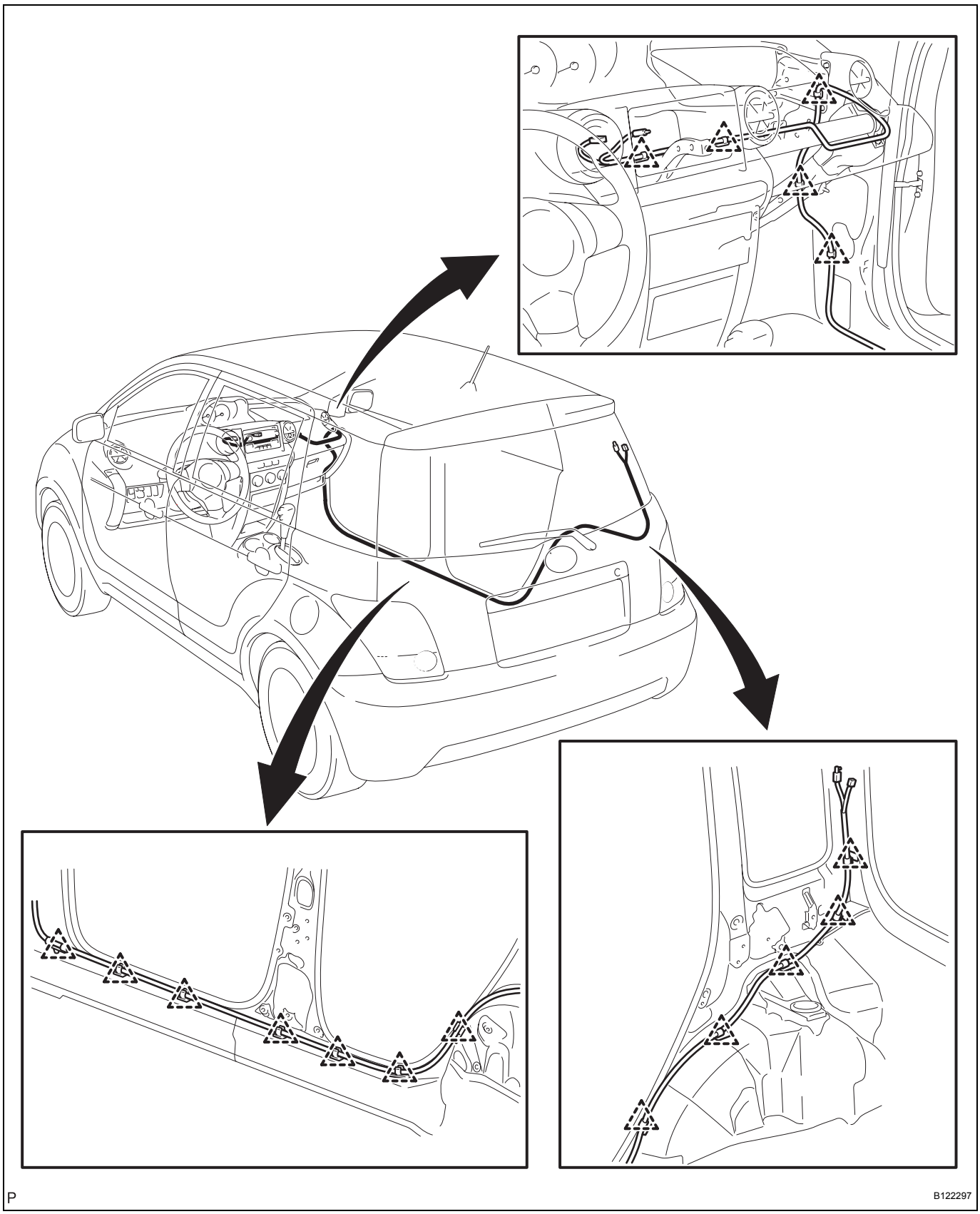
Tester Connection	Condition	Specified Condition
1 - 2	Always	4 Ω

RADIO ANTENNA CORD

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-6)**
3. **REMOVE INSTRUMENT PANEL ASSEMBLY LOWER (See page IP-19)**
4. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-7)**
5. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-7)**
6. **REMOVE COWL SIDE TRIM BOARD RH (See page IR-7)**
7. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
8. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-7)**
9. **REMOVE CENTER PILLAR GARNISH LOWER RH (See page IR-8)**
10. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-12)**
11. **REMOVE REAR SEAT BACK ASSEMBLY RH (See page SE-12)**
12. **REMOVE TONNEAU COVER ASSEMBLY**
13. **REMOVE NO. 1 DECK BOARD**
14. **REMOVE DECK FLOOR BOX REAR (See page IR-8)**
15. **REMOVE DECK TRIM COVER REAR (See page IR-8)**
16. **REMOVE REAR SEAT BACK HINGE SUB-ASSEMBLY RH (See page SE-12)**
17. **REMOVE REAR SEAT 3 POINT TYPE BELT ASSEMBLY RH (See page SB-23)**
18. **REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (See page IR-9)**
19. **REMOVE ROOF SIDE GARNISH INNER RH (See page IR-9)**

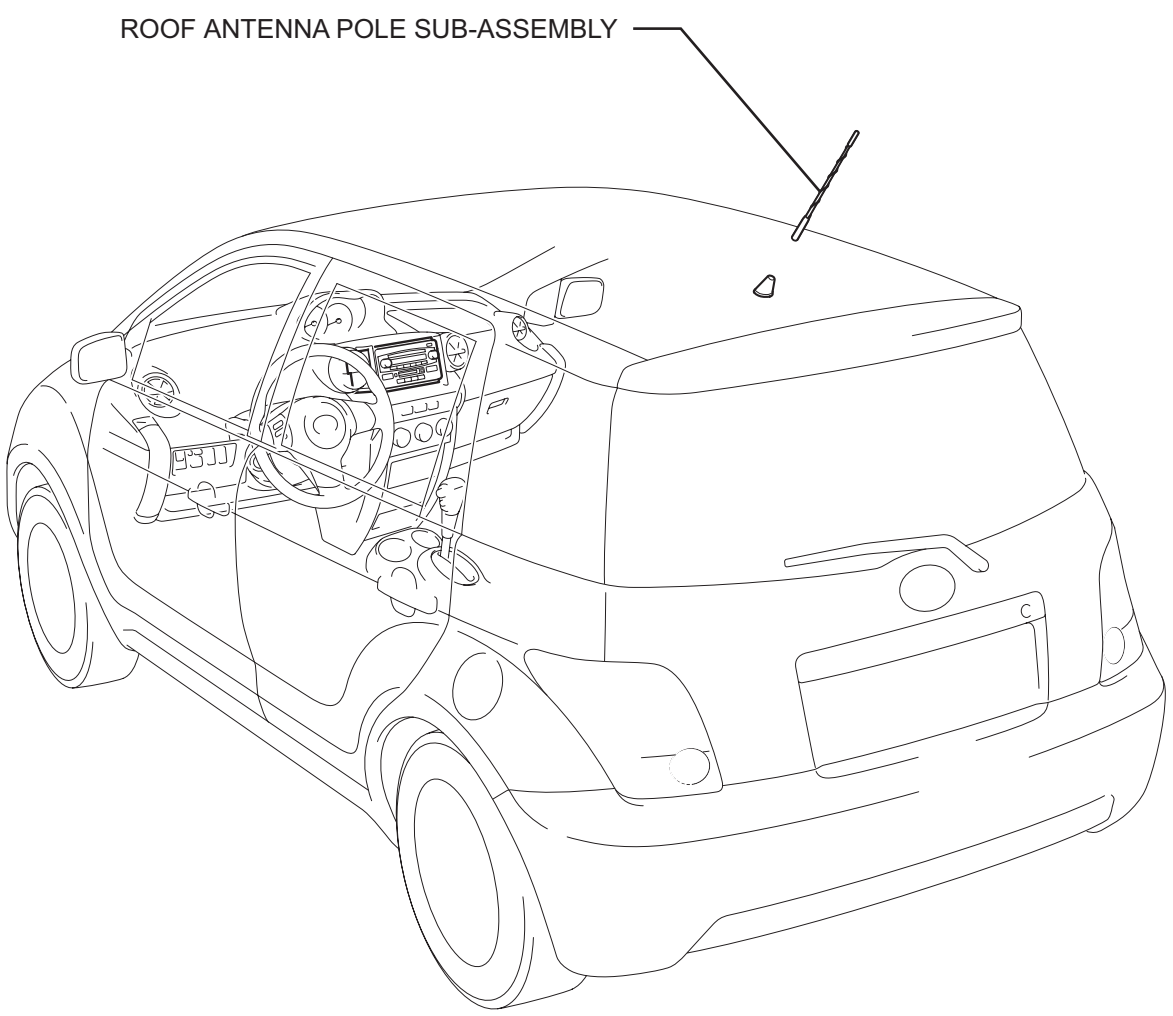
20. REMOVE ANTENNA CORD SUB-ASSEMBLY



(a) Disconnect the connectors.
(b) Remove the 17 clamps.
(c) Remove the antenna cord.

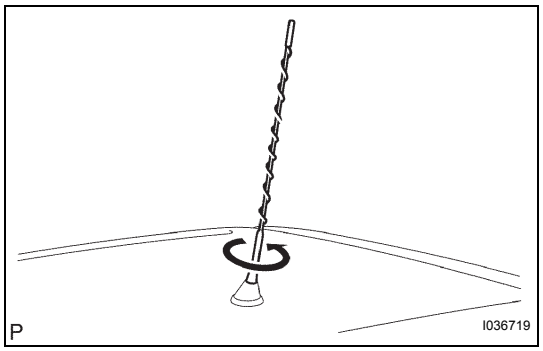
RADIO ANTENNA POLE

COMPONENTS



P

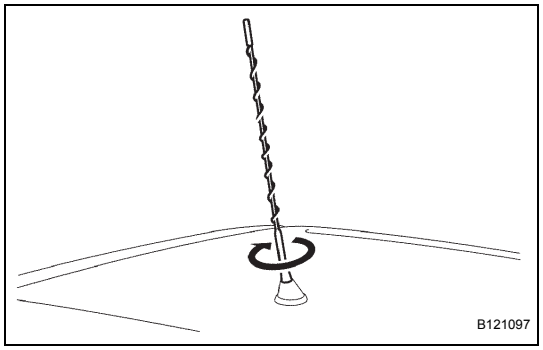
B121908E01



REMOVAL

1. REMOVE ROOF ANTENNA POLE SUB-ASSEMBLY

(a) Turn the roof antenna pole in the direction indicated in the illustration and remove it.



INSTALLATION

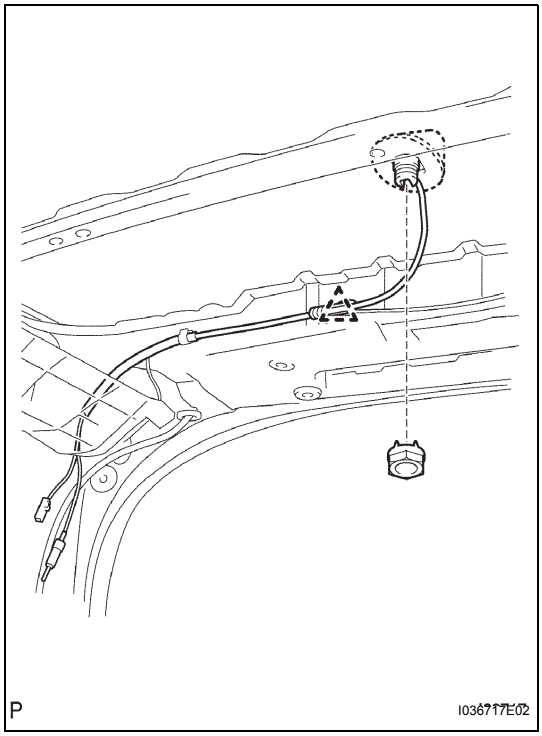
1. INSTALL ROOF ANTENNA POLE SUB-ASSEMBLY

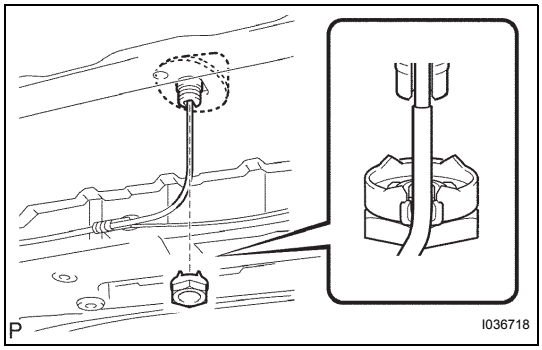
(a) Turn the roof antenna pole in the direction indicated in the illustration and install it.

AMPLIFIER ANTENNA

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE ROOF HEADLINING ASSEMBLY**
   (a) Remove the headlining (see page IR-7).
3. **REMOVE ROOF ANTENNA POLE SUB-ASSEMBLY (See page AV-17)**
4. **REMOVE AMPLIFIER ANTENNA ASSEMBLY**
   (a) Disconnect the connectors.
   (b) Detach the clamp.
   (c) Remove the nut and amplifier antenna.





INSTALLATION

1. **INSTALL AMPLIFIER ANTENNA ASSEMBLY**
   (a) Set the amplifier antenna to the hole on the roof, and place the antenna cord on the cutout of the antenna nut.
   (b) Install the amplifier antenna with the nut.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
   (c) Attach the clamp.
   (d) Connect the connectors.
2. **INSTALL ROOF ANTENNA POLE SUB-ASSEMBLY (See page AV-17)**
3. **INSTALL ROOF HEADLINING ASSEMBLY**
   (a) Install the headlining (see page IR-12).
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

5. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

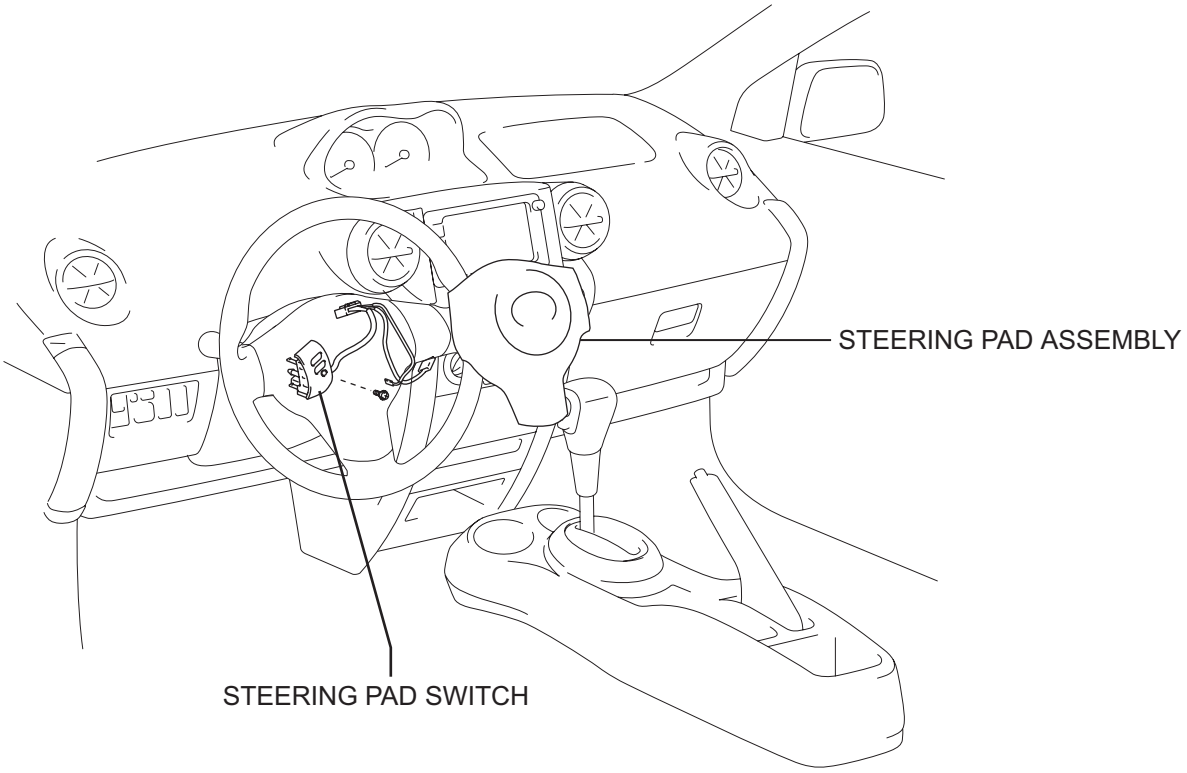
NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

STEERING PAD SWITCH

COMPONENTS

AV

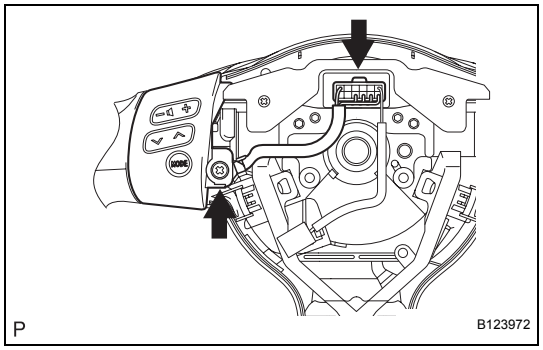


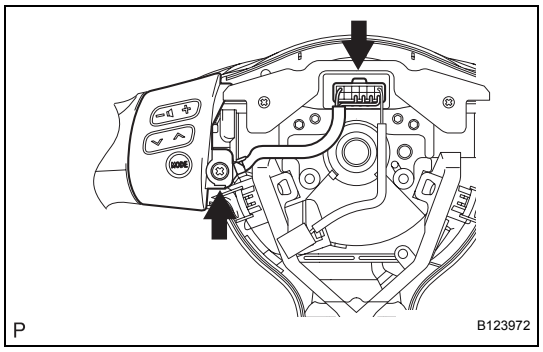
P

B120612E01

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE STEERING PAD ASSEMBLY (See page RS-288)**
3. **REMOVE STEERING PAD SWITCH**
   (a) Disconnect connectors.
   (b) Remove the screw.
   (c) Remove the steering pad switch.





INSTALLATION

1. **INSTALL STEERING PAD SWITCH**
   (a) Install the steering pad switch.
   (b) Install the screw.
   (c) Connect connectors.
2. **INSTALL STEERING PAD ASSEMBLY (See page RS-288)**
3. **INSPECT STEERING PAD ASSEMBLY (See page RS-289)**
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
5. **PERFORM INITIALIZATION**
   (a) Perform initialization (see pageIN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

AV

PROBLEM SYMPTOMS TABLE

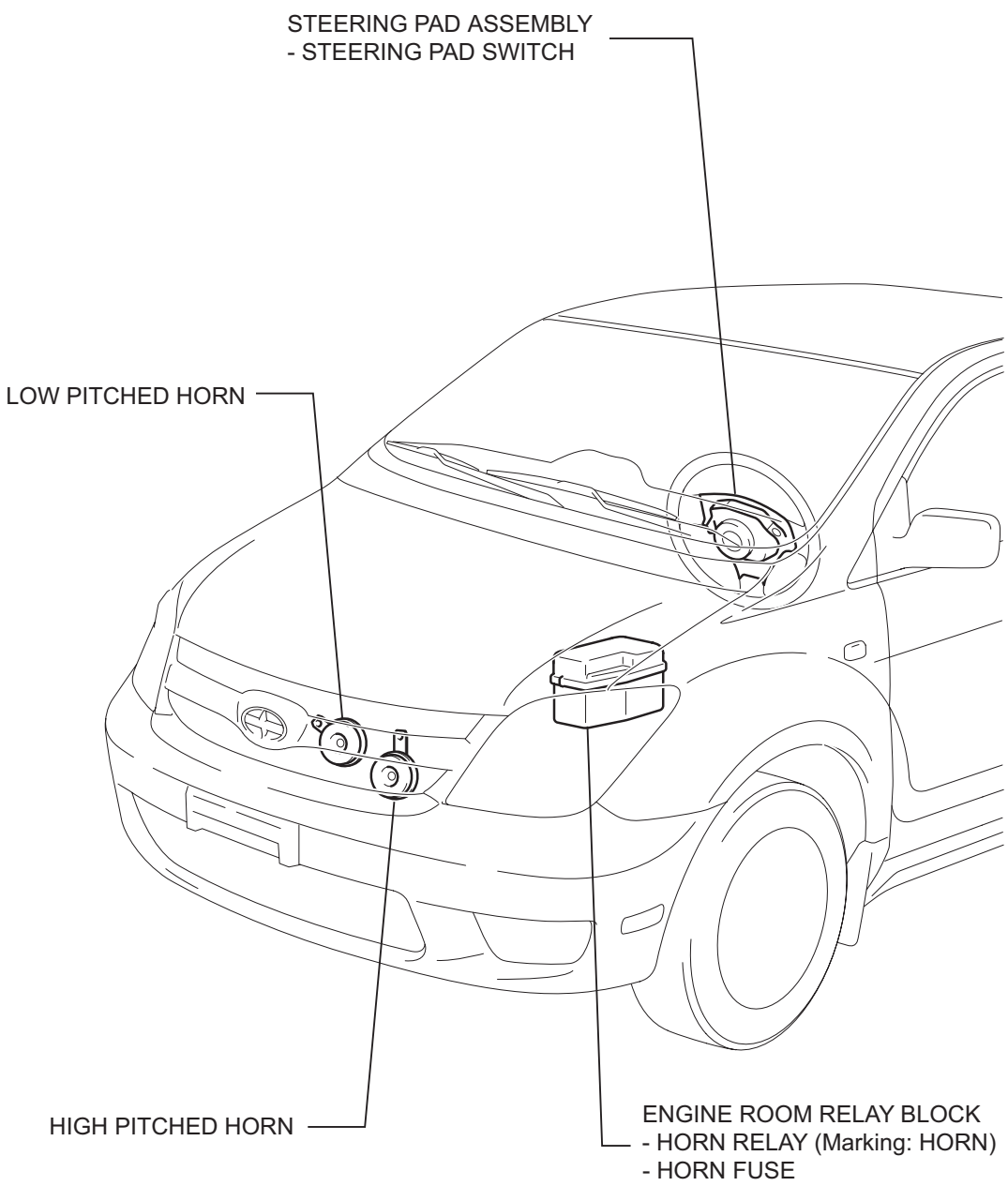
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Horn system

Symptom	Suspected area	See page
Horn does not sound	1. HORN fuse	HO-4
	2. HORN relay	HO-4
	3. High pitched horn	HO-7
	4. Low pitched horn	HO-5
	5. Steering pad switch	
	6. Spiral cable	

HORN SYSTEM

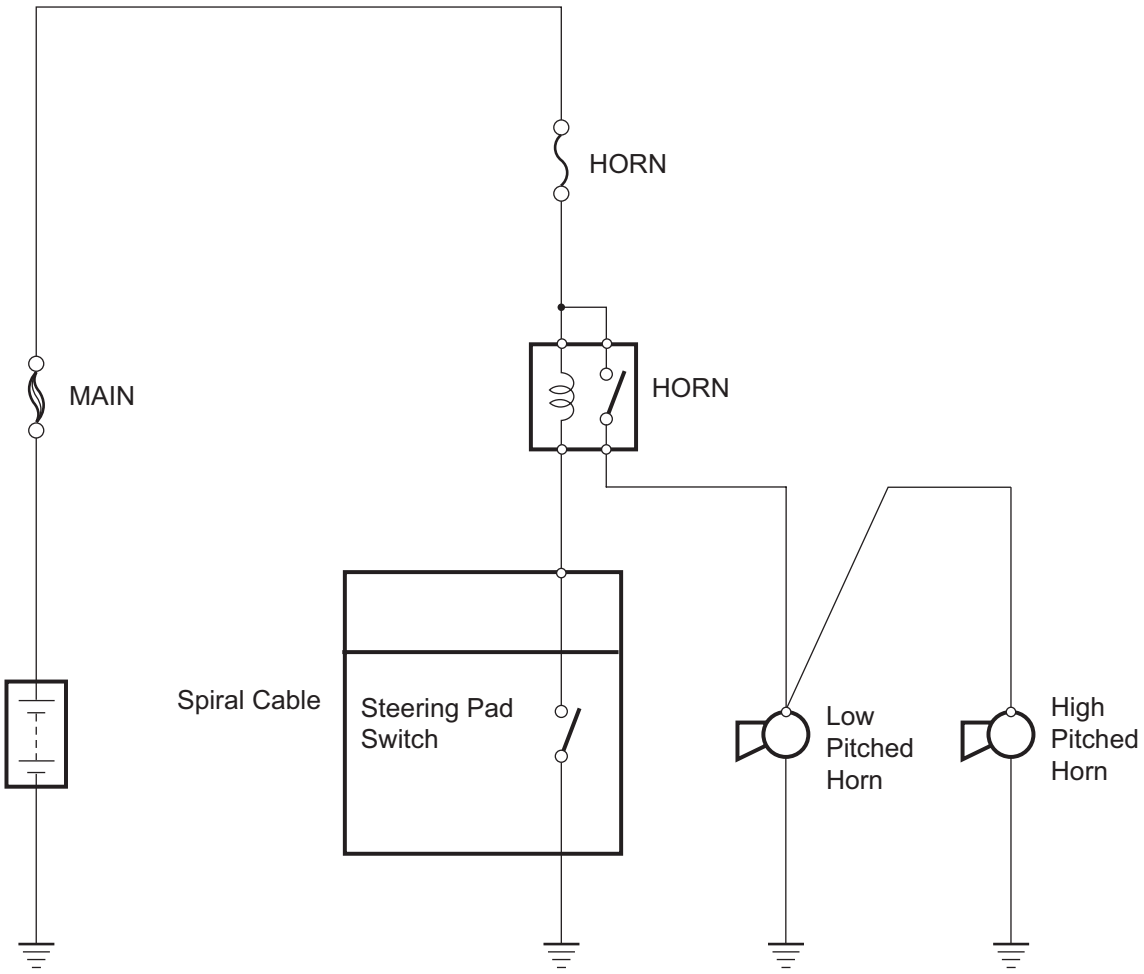
PARTS LOCATION



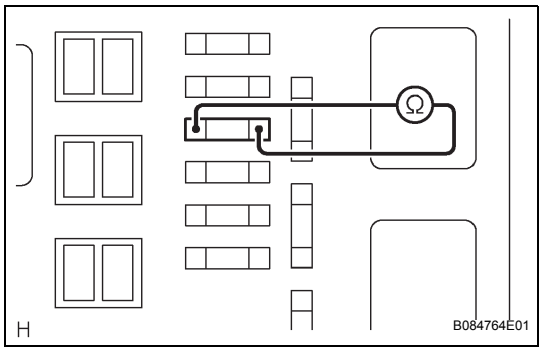
T

B120899E01

SYSTEM DIAGRAM



B119372E04



HORN RELAY

ON-VEHICLE INSPECTION

1. INSPECT FUSE (HORN)

(a) Measure the resistance of the fuse.

Standard resistance:

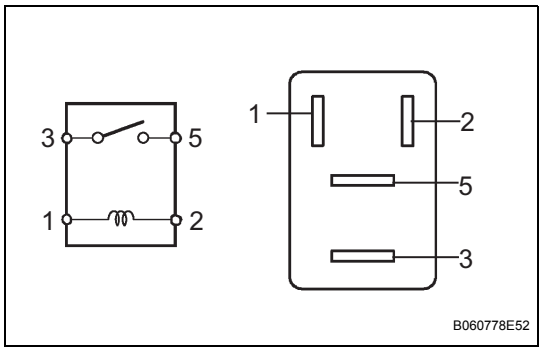
Below 1 Ω

If the result is not as specified, replace the fuse.

2. REMOVE HORN RELAY (Marking: HORN)

(a) Remove the engine room relay block cover.

(b) Remove the horn relay from the engine room relay block.



3. INSPECT HORN RELAY

(a) Measure the resistance of the horn relay.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

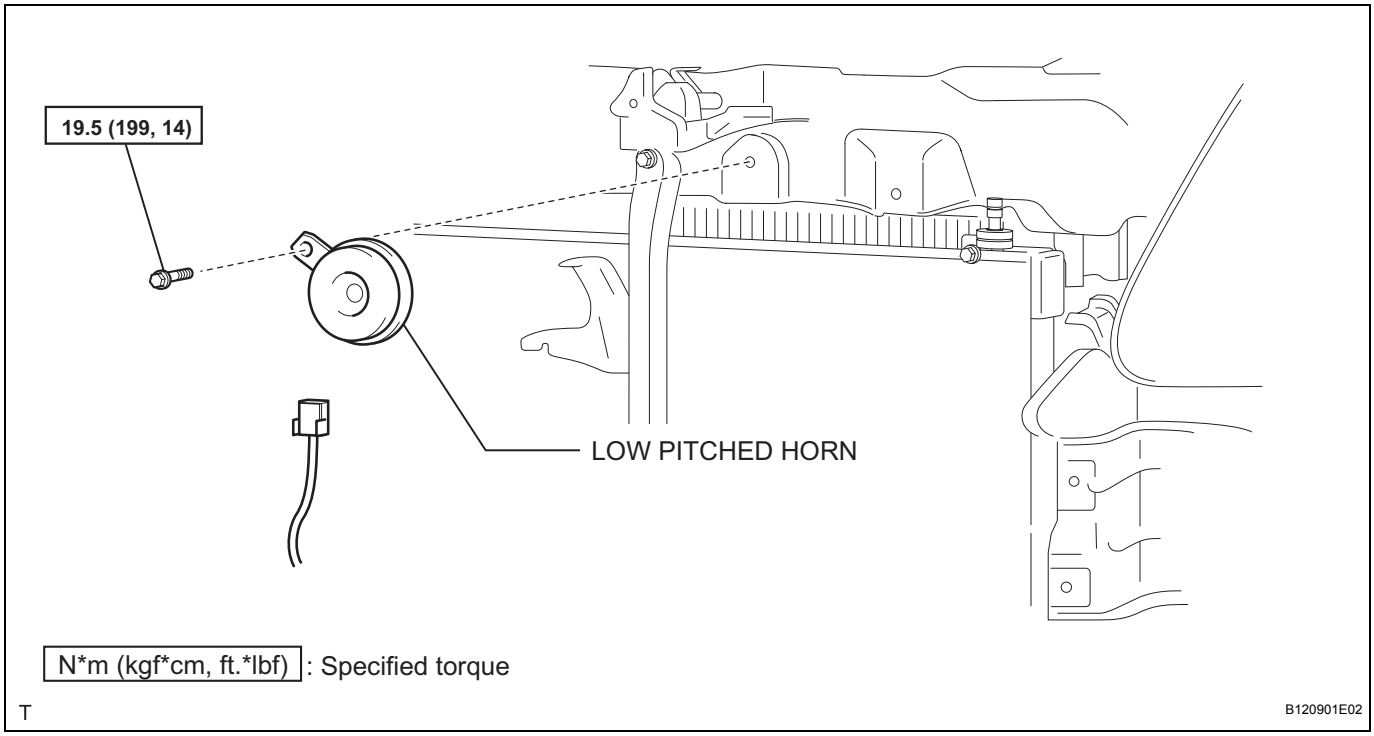
If the result is not as specified, replace the relay.

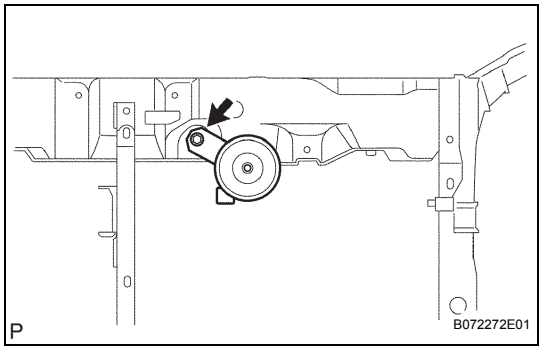
4. INSTALL HORN RELAY

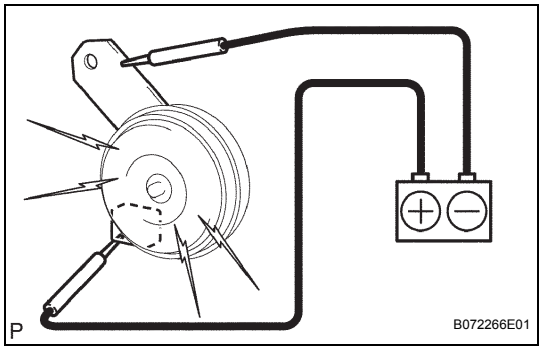
HO

LOW PITCHED HORN

COMPONENTS







REMOVAL

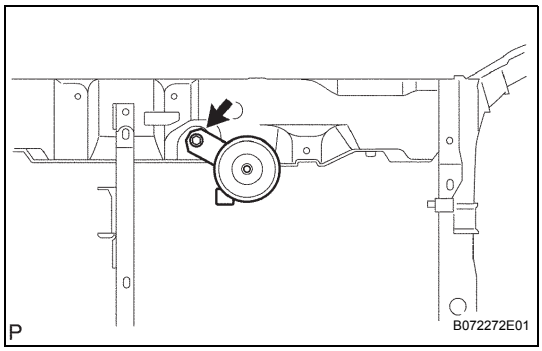
1. **REMOVE LOW PITCHED HORN**
   (a) Disconnect the horn connector.
   (b) Remove the bolt and horn.

INSPECTION

1. **INSPECT LOW PITCHED HORN**
   (a) Apply battery voltage to the horn and check the operation of the horn.
   OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1	Horn sounds
Battery negative (-) → Horn bracket	

If the result is not as specified, replace the horn.



INSTALLATION

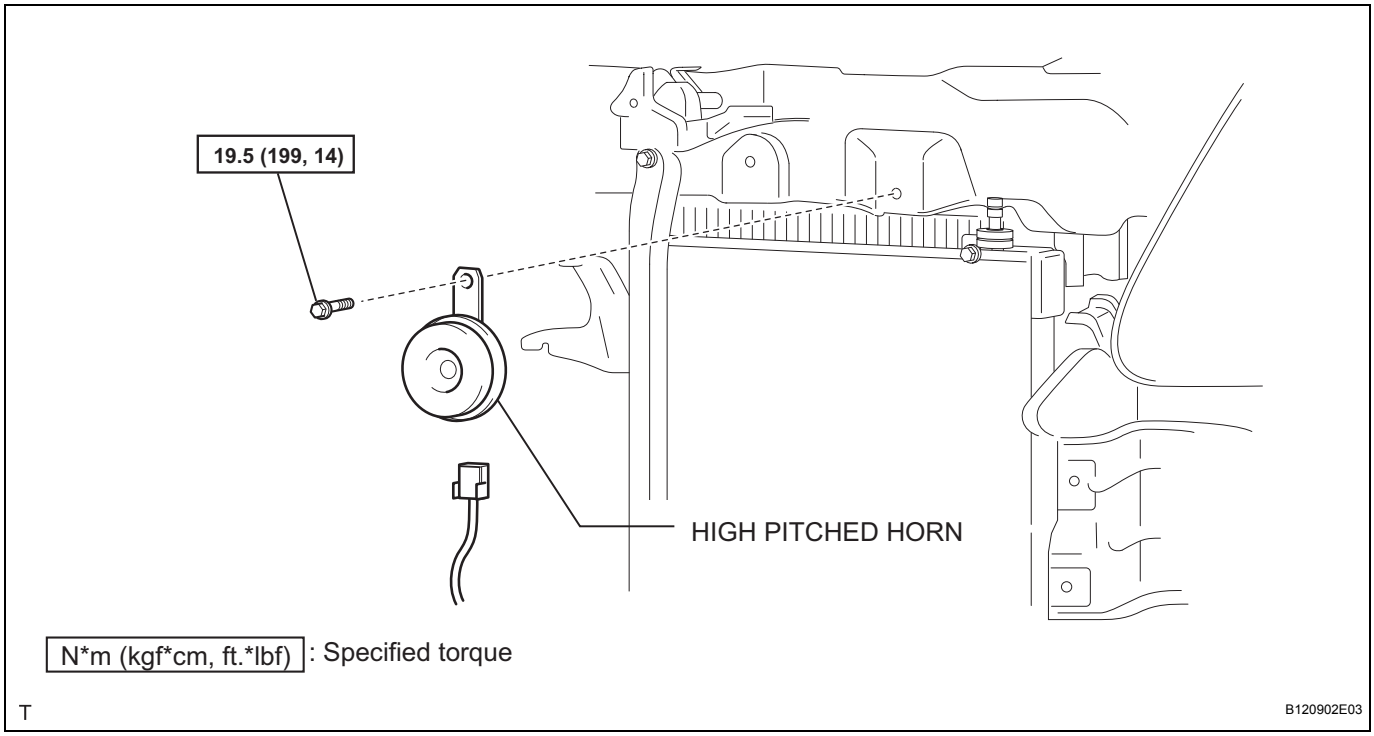
1. INSTALL LOW PITCHED HORN

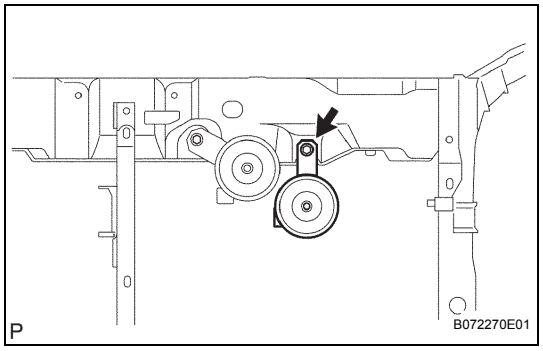
(a) Attach the horn stay to the body panel and then install the horn with the bolt.
Torque: 19.5 N*m (199 kgf*cm, 14 ft.*lbf)

(b) Connect the horn connector.

HIGH PITCHED HORN

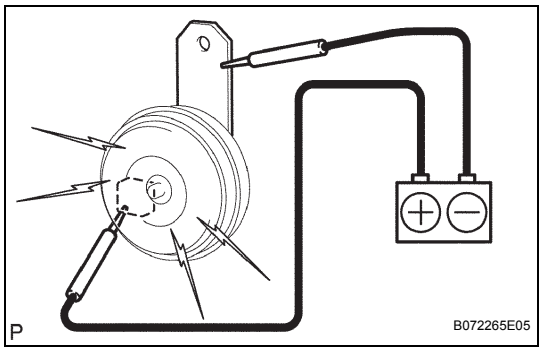
COMPONENTS





REMOVAL

1. **REMOVE HIGH PITCHED HORN**
   (a) Disconnect the horn connector.
   (b) Remove the bolt and horn.

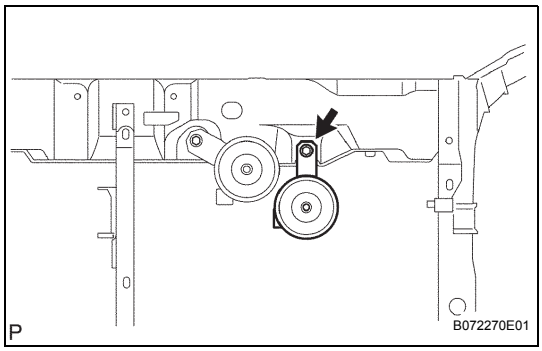


INSPECTION

1. **INSPECT HIGH PITCHED HORN**
   (a) Apply battery voltage to the horn and check the operation of the horn.
   OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1	Horn sounds
Battery negative (-) → Horn bracket	

If the result is not as specified, replace the horn.



INSTALLATION

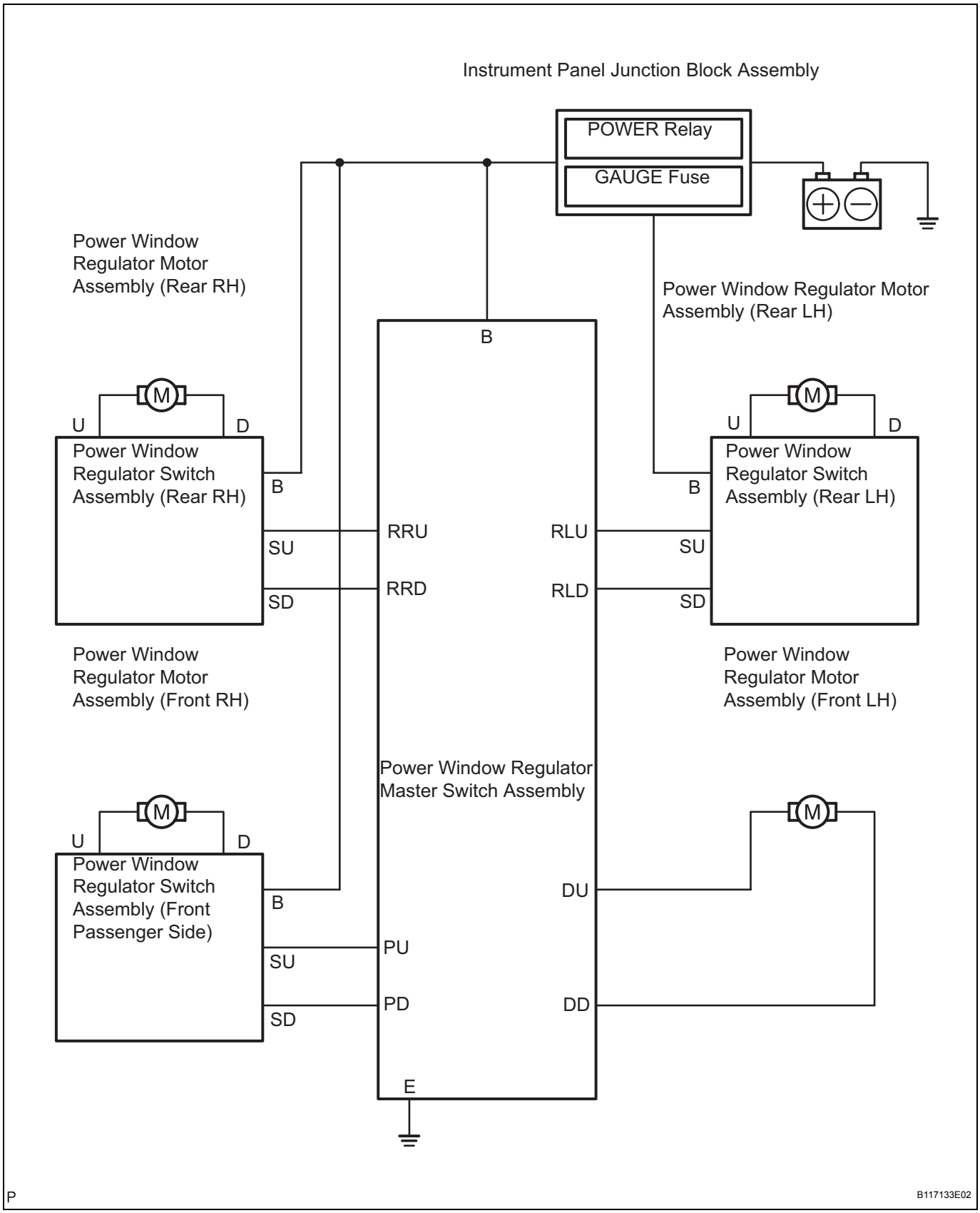
1. INSTALL HIGH PITCHED HORN

(a) Attach the horn stay to the body panel and then install the horn with the bolt.
Torque: 19.5 N*m (199 kgf*cm, 14 ft.*lbf)

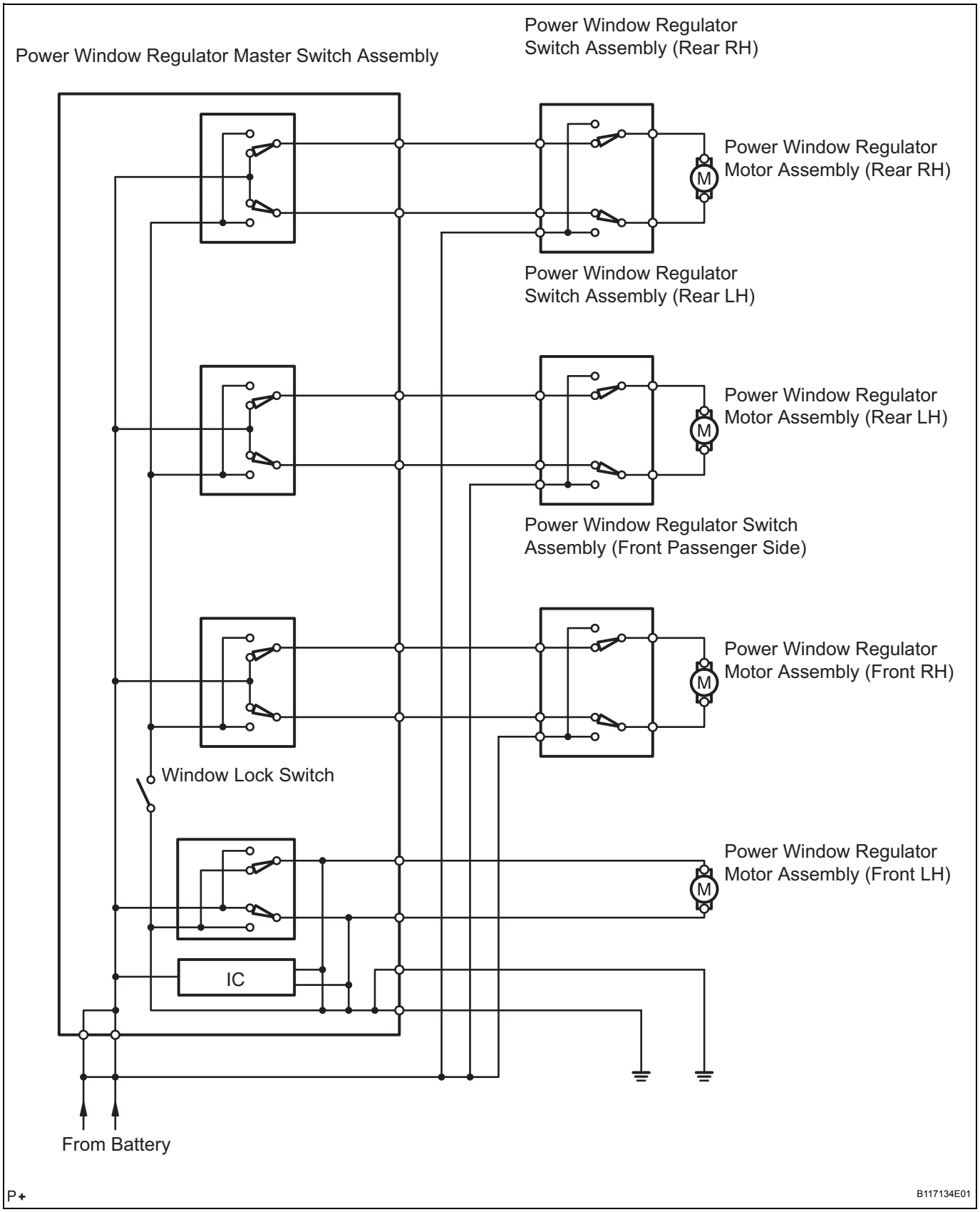
(b) Connect the horn connector.

SYSTEM DIAGRAM

1. POWER WINDOW CONTROL SYSTEM DIAGRAM



2. POWER WINDOW SWITCH INNER CIRCUIT


Power Window Regulator Master Switch Assembly
Power Window Regulator Switch Assembly (Rear RH)
Power Window Regulator Motor Assembly (Rear RH)
Power Window Regulator Switch Assembly (Rear LH)
Power Window Regulator Motor Assembly (Rear LH)
Power Window Regulator Switch Assembly (Front Passenger Side)
Power Window Regulator Motor Assembly (Front RH)
Window Lock Switch
Power Window Regulator Motor Assembly (Front LH)
IC
From Battery
M
P+
B117134E01

WS

SYSTEM DESCRIPTION

1. DESCRIPTION

The power window control system has the following functions.

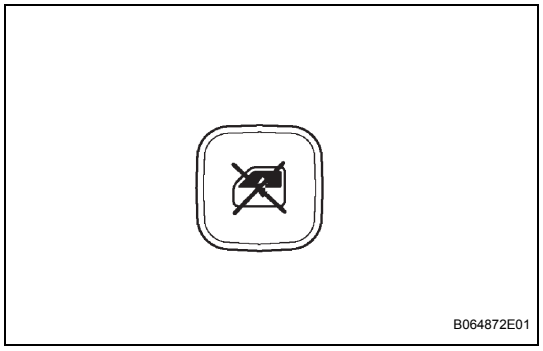
Function	Outline
Manual UP / DOWN function	• Driver side power window: Function that raises window while power window switch is pulled up, and lowers window while pushed halfway down (window stops as soon as switch is released) • Other power windows: Function that raises window while power window switch is pulled up, and lowers window while pushed down (window stops as soon as switch is released)
AUTO DOWN function	Function that enables window of driver side door to be fully opened by one full push downward on power window switch
Remote UP / DOWN function	Function that allows power window master switch to control manual UP / DOWN operation of passenger side power window and rear power windows

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Power window control system

Symptom	Suspected area	See page
All power windows do not operate	1. GAUGE fuse	-
	2. POWER relay	WS-39
	3. Ignition switch	ST-18
	4. Wire harness	-
AUTO DOWN function does not operate	1. Power window regulator master switch assembly	WS-9
	2. Power window regulator motor assembly (front LH)	WS-14
Only one power window does not operate	1. Power window regulator master switch assembly	WS-9
	2. Power window regulator switch assembly	WS-12
	3. Power window regulator motor assembly	WS-14
	4. Wire harness	-
Window lock system does not operate	1. Power window regulator master switch assembly	WS-9



ON-VEHICLE INSPECTION

1. CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY (WINDOW LOCK SWITCH)

(a) Check that operation of the power windows except the driver side power window is disabled when the window lock switch of the power window regulator master switch is pressed.

(b) Check that the power windows can operate when the window lock switch is pressed again.

2. CHECK MANUAL UP / DOWN FUNCTION

(a) Check that the AUTO switch of the master switch can operate the driver side power window as follows:

OK:

Condition	Master Switch	Switch Operation	Power Window
Ignition switch ON	Driver side	Pulled up	UP (closes)
Ignition switch ON	Driver side	Pushed halfway down	DOWN (opens)

(b) Check that each regulator switch can operate each power window as follows:

OK:

Condition	Regulator Switch	Switch Operation	Power Window
• Ignition switch ON • Window lock switch OFF	Passenger side	Pulled up	UP (closes)
• Ignition switch ON • Window lock switch OFF	Passenger side	Pushed down	DOWN (opens)
• Ignition switch ON • Window lock switch OFF	Rear LH	Pulled up	UP (closes)
• Ignition switch ON • Window lock switch OFF	Rear LH	Pushed down	DOWN (opens)

WS

Condition	Regulator Switch	Switch Operation	Power Window
• Ignition switch ON • Window lock switch OFF	Rear RH	Pulled up	UP (closes)
• Ignition switch ON • Window lock switch OFF	Rear RH	Pushed down	DOWN (opens)

3. CHECK AUTO DOWN FUNCTION

(a) Check that the AUTO switch of the master switch can operate the driver side power window as follows:

OK:

Condition	Master Switch	Switch Operation	Power Window
Ignition switch ON	Driver side	Fully pushed down	AUTO DOWN (fully opens)

4. CHECK REMOTE UP / DOWN FUNCTION

(a) Check that the power window regulator master switch can operate the power windows besides the driver side power window as follows:

OK:

Condition	Master Switch	Switch Operation	Power Window
• Ignition switch ON • Window lock switch OFF	Passenger side	Pulled up	UP (closes)
• Ignition switch ON • Window lock switch OFF	Passenger side	Pushed down	DOWN (opens)
• Ignition switch ON • Window lock switch OFF	Rear LH	Pulled up	UP (closes)
• Ignition switch ON • Window lock switch OFF	Rear LH	Pushed down	DOWN (opens)
• Ignition switch ON • Window lock switch OFF	Rear RH	Pulled up	UP (closes)
• Ignition switch ON • Window lock switch OFF	Rear RH	Pushed down	DOWN (opens)

5. CHECK PTC OPERATION

HINT:

PTC operation is a function that prevents overloading of the power window regulator by stopping the motor. PTC operation activates when the power window regulator switch is operated for a predetermined amount of time.

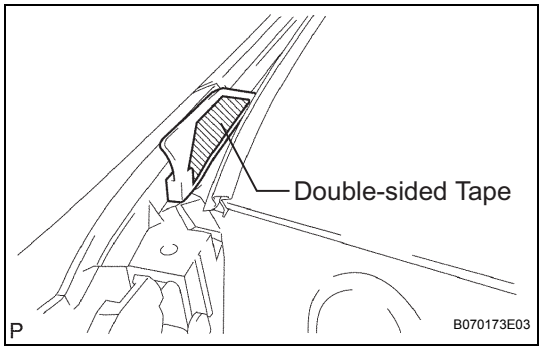
(a) Pull up and hold the power window regulator switch for more than 90 seconds. Then release the switch.

(b) Check that pressing the switch does not move the window.

(c) Wait until 60 seconds have passed since the switch was released in the first step. Check that pressing the switch results in normal window movement.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
3. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
4. **REMOVE FRONT PILLAR GARNISH LH (See page IR-10)**
5. **REMOVE FRONT PILLAR GARNISH RH (See page IR-10)**
6. **REMOVE VISOR ASSEMBLY LH (See page IR-10)**
7. **REMOVE VISOR ASSEMBLY RH (See page IR-10)**
8. **REMOVE ASSIST GRIP SUB-ASSEMBLY (See page IR-11)**
9. **REMOVE VISOR HOLDER LH (See page IR-11)**
10. **REMOVE VISOR HOLDER RH (See page IR-11)**
11. **REMOVE MAP LIGHT ASSEMBLY (See page IR-11)**
12. **REMOVE ROOF HEADLINING ASSEMBLY**
    (a) Slightly lower the front section of the roof headlining (see page IR-7).
    HINT:
    It is not necessary to completely remove the roof headlining.
13. **REMOVE INNER REAR VIEW MIRROR ASSEMBLY (See page MI-5)**
14. **REMOVE FRONT WIPER ARM HEAD CAP**
15. **REMOVE FRONT WIPER ARM LH (See page WW-7)**
16. **REMOVE FRONT WIPER ARM RH (See page WW-7)**
17. **REMOVE COWL TOP VENTILATOR LOUVER LH (See page WW-7)**
18. **REMOVE COWL TOP VENTILATOR LOUVER RH (See page WW-7)**
19. **REMOVE HOOD TO COWL TOP SEAL (See page WW-7)**



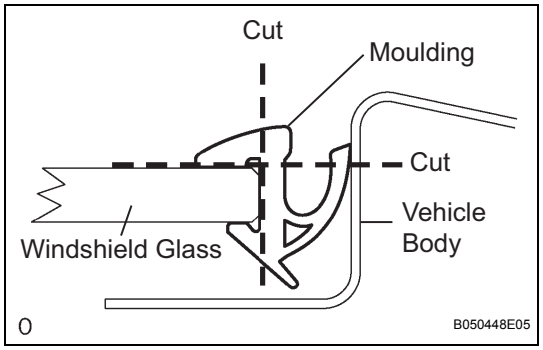
20. REMOVE FRONT FENDER TO COWL SIDE SEAL LH

(a) Using a heat light, heat the installation surfaces of the seal.
Standard heating temperature:
20 to 30°C (68 to 86°F)
NOTICE:
Do not heat the seal and body excessively.

(b) Remove the seal.

21. REMOVE FRONT FENDER TO COWL SIDE SEAL RH

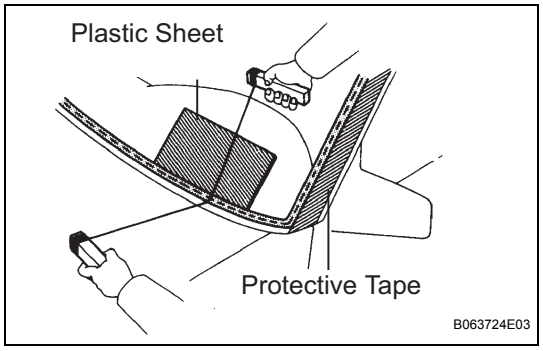
HINT:
Use the same procedures described for the LH side.



22. REMOVE WINDSHIELD MOULDING OUTSIDE

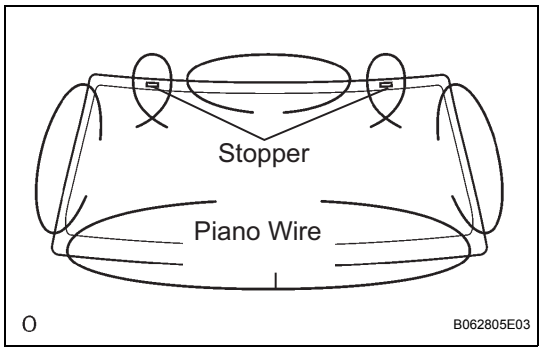
(a) Using a knife, cut off the windshield moulding outside.
NOTICE:
Be careful not to damage the vehicle body with the knife.

(b) Remove the remaining moulding.
HINT:
Make a partial cut in the moulding. Then pull and remove it by hand.



23. REMOVE WINDSHIELD GLASS

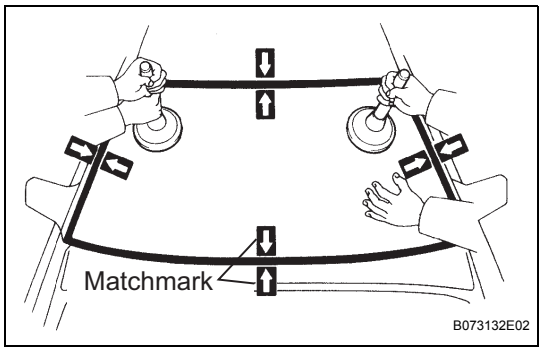
(a) Apply protective tape to the outer surface of the vehicle body to prevent scratches.



(b) From the interior, insert a piano wire between the vehicle body and glass as shown in the illustration.

(c) Tie objects that can serve as handles (for example, wooden blocks) to all wire ends.
NOTICE:
- **When separating the glass from the vehicle, be careful not to damage the vehicle's paint or interior/exterior ornaments.**
- **To prevent the instrument panel from being scratched when removing the glass, place a plastic sheet between the piano wire and instrument panel.**

WS



(d) Place matchmarks over the glass and vehicle body on the locations indicated in the illustration.
HINT:
Matchmarks do not need to be placed if not reusing the glass.
(e) Cut through the adhesive by pulling the piano wire around the glass.
NOTICE:
Leave as much adhesive on the vehicle body as possible when cutting through the adhesive.
(f) Disengage the stoppers.
(g) Using suction cups, remove the glass.

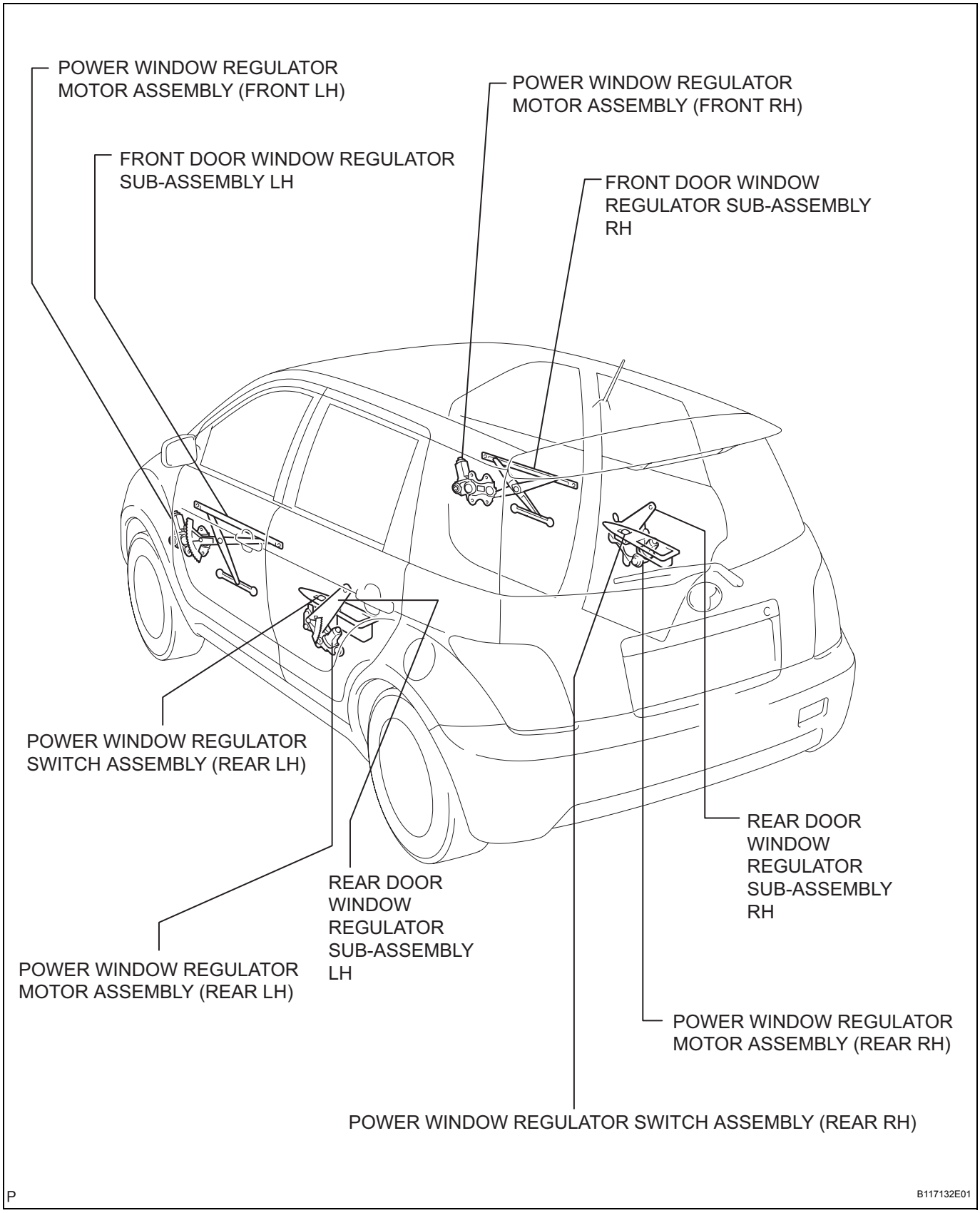
POWER WINDOW CONTROL SYSTEM

PRECAUTION

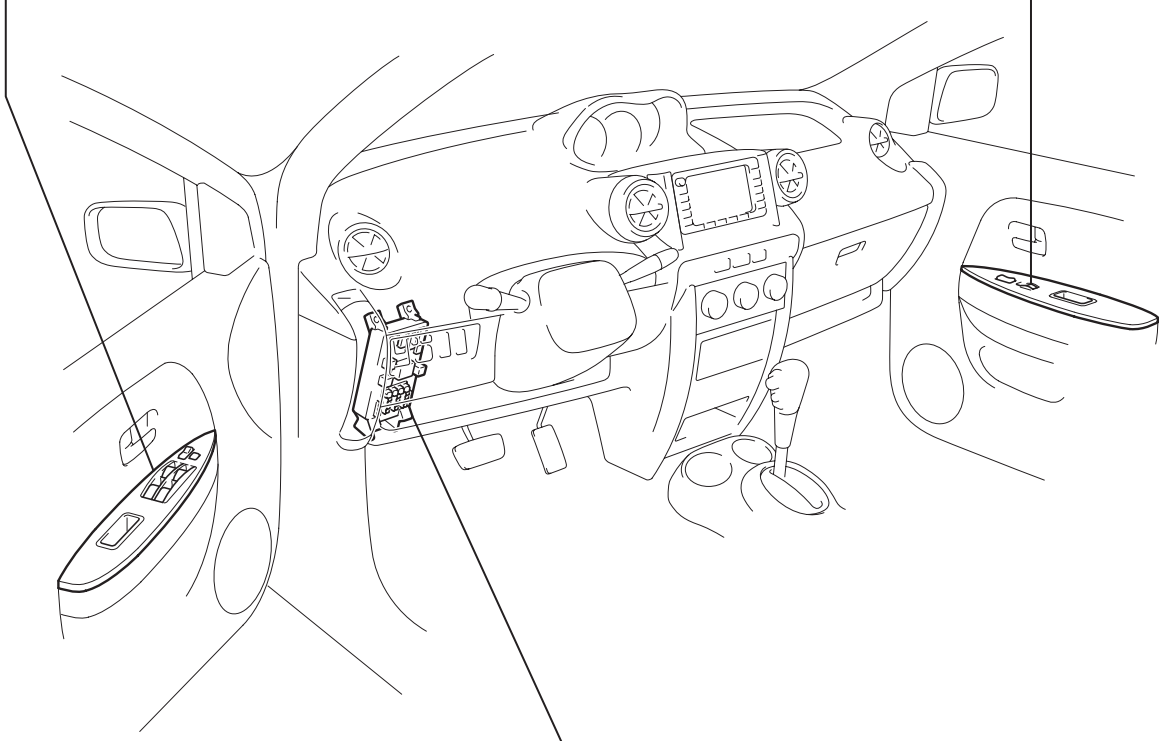
CAUTION:
When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

System Name	See procedure
Sliding Roof System	IN-23

PARTS LOCATION



WS

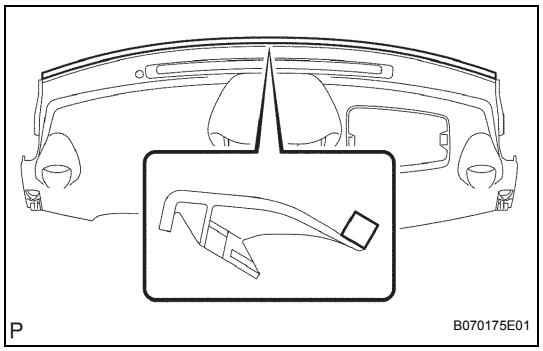


P

B117131E01

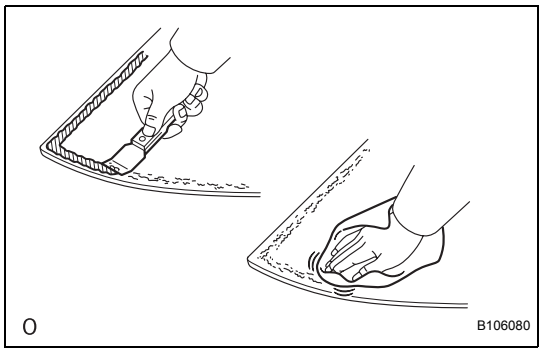
INSTALLATION

HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).



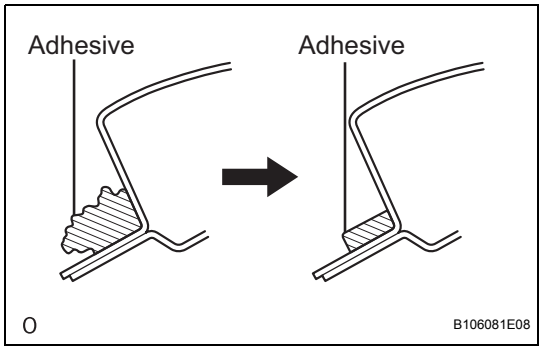
1. INSTALL NO. 1 INSTRUMENT PANEL CUSHION

(a) Remove the cushion.
(b) Clean the instrument panel with white gasoline.
(c) Install a new cushion to the instrument panel, as shown in the illustration.



2. CLEAN WINDSHIELD GLASS

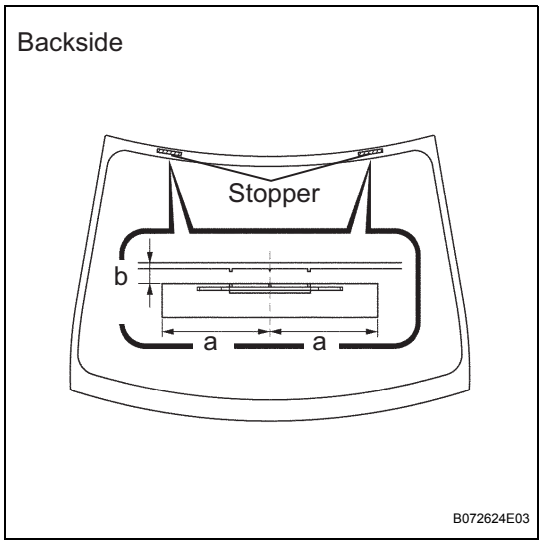
(a) Using a scraper, remove the damaged stoppers, dams and adhesive sticking to the glass.
(b) Clean the outer edges of the glass with white gasoline.
NOTICE:
Do not touch the glass surface after cleaning it. Even if using a new glass, clean it with white gasoline.



3. CLEAN VEHICLE BODY

(a) Clean and shape the contact surface of the vehicle body.
(1) On the contact surface of the vehicle body, use a knife to cut away excess adhesive as shown in the illustration.
HINT:
Leave as much adhesive on the vehicle body as possible.
NOTICE:
Be careful not to damage the vehicle body.
(b) Clean the contact surface of the vehicle body with cleaner.
HINT:
Even if all the adhesive has been removed, clean the vehicle body.

WS



4. INSTALL NO. 2 WINDSHIELD GLASS STOPPER

(a) Apply Primer G to the installation part of the stoppers.

HINT:

If primer G is applied to an area that is not is specified, wipe off the primer with white gasoline before it dries.

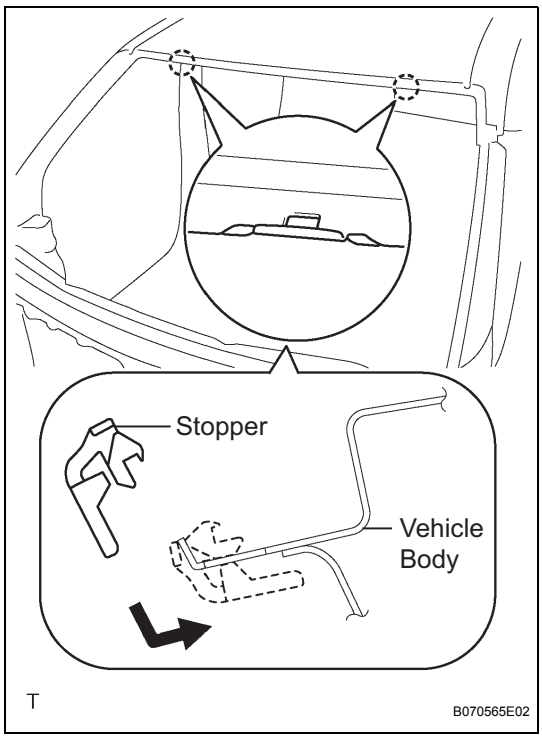
NOTICE:

- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

(b) Install 2 new stoppers onto the windshield glass as shown in the illustration.

Standard measurement

Area	Specified Condition
a	40.0 mm (1.575 in.)
b	7.7 mm (0.303 in.)



5. INSTALL NO. 1 WINDSHIELD GLASS STOPPER

(a) Install 2 new stoppers to the vehicle body as shown in the illustration.

6. INSTALL WINDSHIELD GLASS ADHESIVE DAM

(a) Apply Primer G to the glass where the glass adhesive dams will be installed.

HINT:

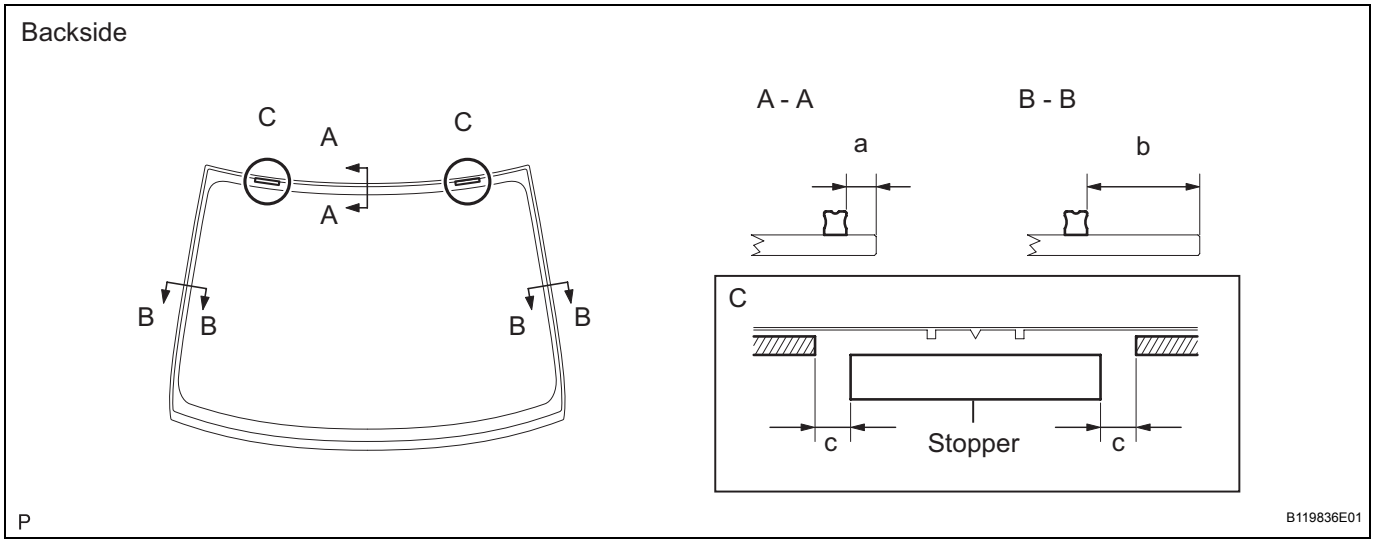
If primer G is applied to an area that is not specified, wipe off the primer with white gasoline before it dries.

NOTICE:

- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

WS

(b) Remove the peeling paper from the adhesive part of the dam. Install the dam (adhesive side) to the glass (Primer G area), but exclude the installation parts of the stopper (area c) as shown in the illustration.



Standard measurement

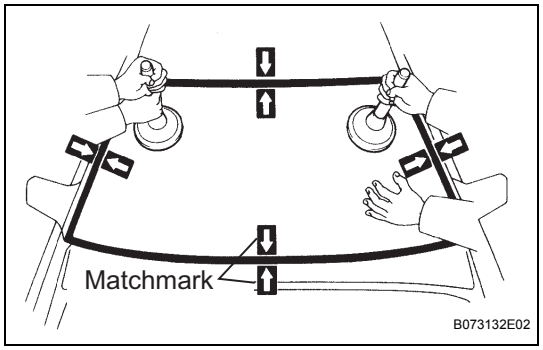
Area	Specified Condition
a	7.0 mm (0.276 in.)
b	22.0 mm (0.866 in.)
c	10.0 mm (0.394 in.)

WS

7. INSTALL WINDSHIELD MOULDING OUTSIDE

(a) Using a brush or sponge, apply Primer G to the contact surface of the windshield glass.
HINT:
If primer G is applied to an area that is not specified, wipe off the primer with white gasoline before it dries.
NOTICE:
- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

(b) Install a new windshield moulding.

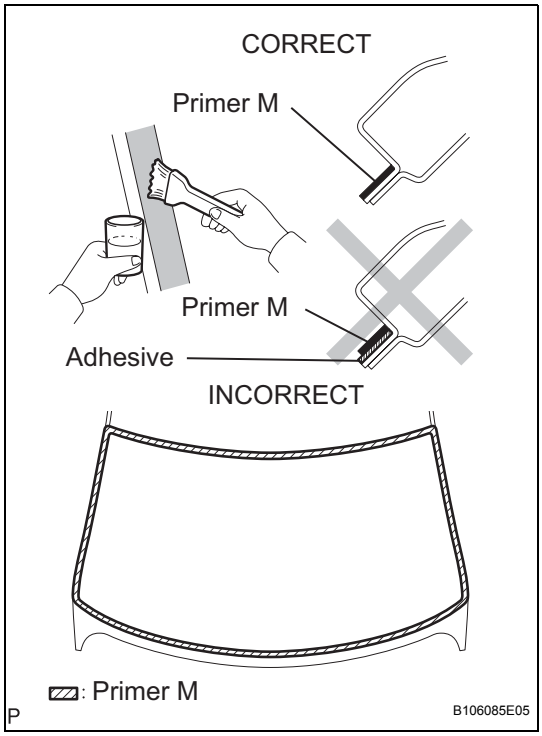


8. INSTALL WINDSHIELD GLASS

(a) Position the glass.
(1) Using suction cups, place the glass in the correct position.
(2) Check that the entire contact surface of the glass rim is perfectly even.
(3) Place matchmarks on the glass and vehicle body on the locations indicated in the illustration.
HINT:
- Placing matchmarks is only necessary when installing new glass. If it is the reused glass, matchmarks should already be present.
- When reusing the glass, check and correct the matchmark positions.

NOTICE:
Check that the stoppers are attached to the vehicle body correctly.

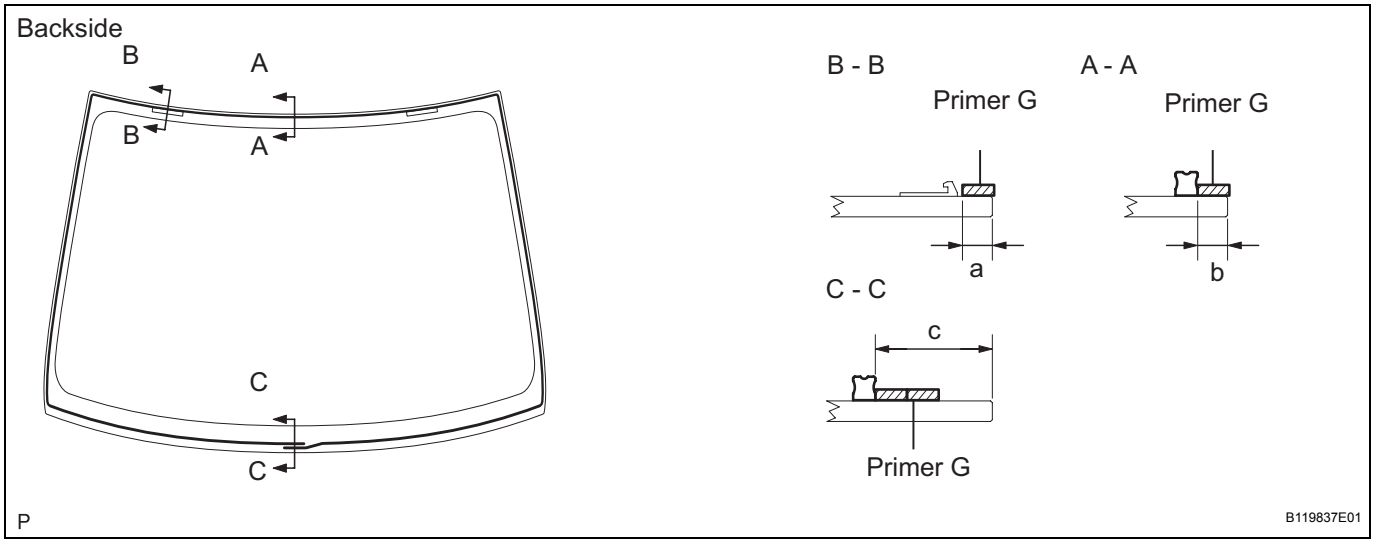
(4) Using suction cups, remove the glass.



(b) Using a brush, apply Primer M to the exposed part of the vehicle body.

NOTICE:
- **Allow the primer to dry for 3 minutes or more.**
- **Do not apply primer to the adhesive.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

(c) Using a brush or sponge, apply Primer G to the contact surface of the glass.



Standard measurement

Area	Specified Condition
a	7.0 mm (0.276 in.)
b	7.0 mm (0.276 in.)
c	26.5 mm (1.043 in.)

HINT:
If the primer is applied to an area that is not specified, apply white gasoline to a clean cloth and wipe off the excess primer.

NOTICE:
- **Allow the primer to dry for 3 minutes or more.**

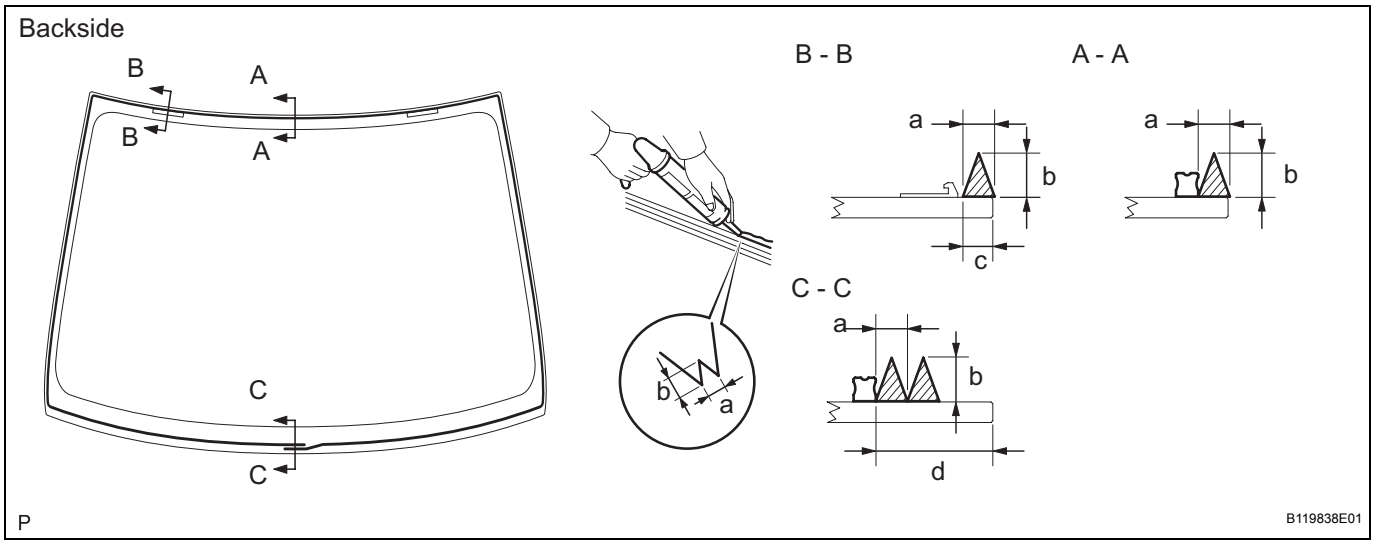
WS

- **Throw away any leftover primer.**
- **Do not apply too much primer.**

(d) Apply adhesive to the glass.

Adhesive:

Part No. 08850-00801 or equivalent



(1) Cut off the tip of the cartridge nozzle as shown in the illustration.

HINT:

After cutting off the tip, use all adhesive within the time written in the table below.

Usage time frame

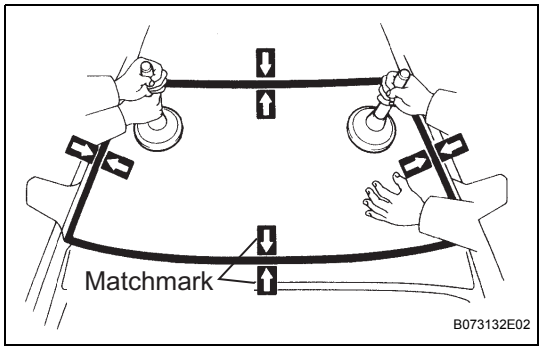
Temperature	Usage Time Frame
35°C (95°F)	15 minutes
20°C (68°F)	1 hour 40 minutes
5°C (41°F)	8 hours

(2) Load the sealer gun with the cartridge.

(3) Apply adhesive to the glass as shown in the illustration.

Standard measurement

Area	Specified Condition
a	8.0 mm (0.315 in.)
b	12.0 mm (0.472 in.)
c	7.0 mm (0.276 in.)
d	26.5 mm (1.043 in.)

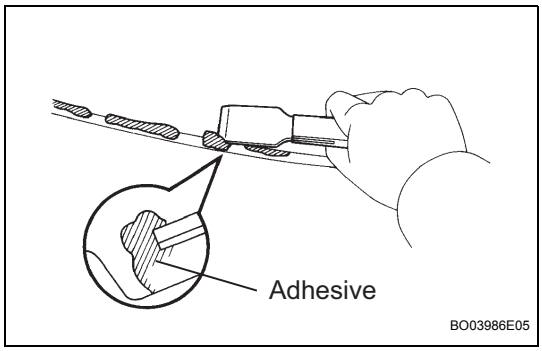


(e) Install the glass to the vehicle body.

(1) Using suction cups, position the glass so that the matchmarks are aligned. Press it in gently along the rim.

NOTICE:

- **Allow the primer to dry for 3 minutes or more.**
- **Check that the stoppers are attached to the vehicle body correctly.**
- **Check the clearance between the vehicle body and glass.**



(2) Lightly press the outer surface of the glass to ensure that it is securely fit to the vehicle body.

(3) Using a scraper, remove any excess or protruding adhesive.
HINT:
Apply adhesive onto the glass rim.
NOTICE:
Do not drive the vehicle within the time written in the table below.
Usage time frame

Temperature	Usage Time Frame
35°C (95°F)	1 hour 30 minutes
20°C (68°F)	5 hours
5°C (41°F)	24 hours

9. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH**
10. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH**
11. **INSTALL COWL TOP VENTILATOR LOUVER RH (See page WW-10)**
12. **INSTALL COWL TOP VENTILATOR LOUVER LH (See page WW-10)**
13. **INSTALL HOOD TO COWL TOP SEAL (See page WW-10)**
14. **INSTALL FRONT WIPER ARM LH (See page WW-11)**
15. **INSTALL FRONT WIPER ARM RH (See page WW-11)**
16. **INSTALL FRONT WIPER ARM HEAD CAP**
17. **INSTALL ROOF HEADLINING ASSEMBLY (See page IR-12)**
18. **INSTALL VISOR HOLDER LH (See page IR-12)**
19. **INSTALL VISOR HOLDER RH (See page IR-12)**
20. **INSTALL VISOR ASSEMBLY LH (See page IR-13)**
21. **INSTALL VISOR ASSEMBLY RH (See page IR-13)**
22. **INSTALL FRONT PILLAR GARNISH LH (See page IR-14)**
23. **INSTALL FRONT PILLAR GARNISH RH (See page IR-13)**
24. **INSTALL MAP LIGHT ASSEMBLY (See page IR-13)**
25. **INSTALL ASSIST GRIP SUB-ASSEMBLY (See page IR-13)**
26. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
27. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
28. **INSTALL INNER REAR VIEW MIRROR ASSEMBLY (See page MI-5)**

29. **CHECK FOR LEAKS AND REPAIR**
    (a) Conduct a leak test after the adhesive has completely hardened.
    (b) Seal any leaks with auto glass sealer.

30. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

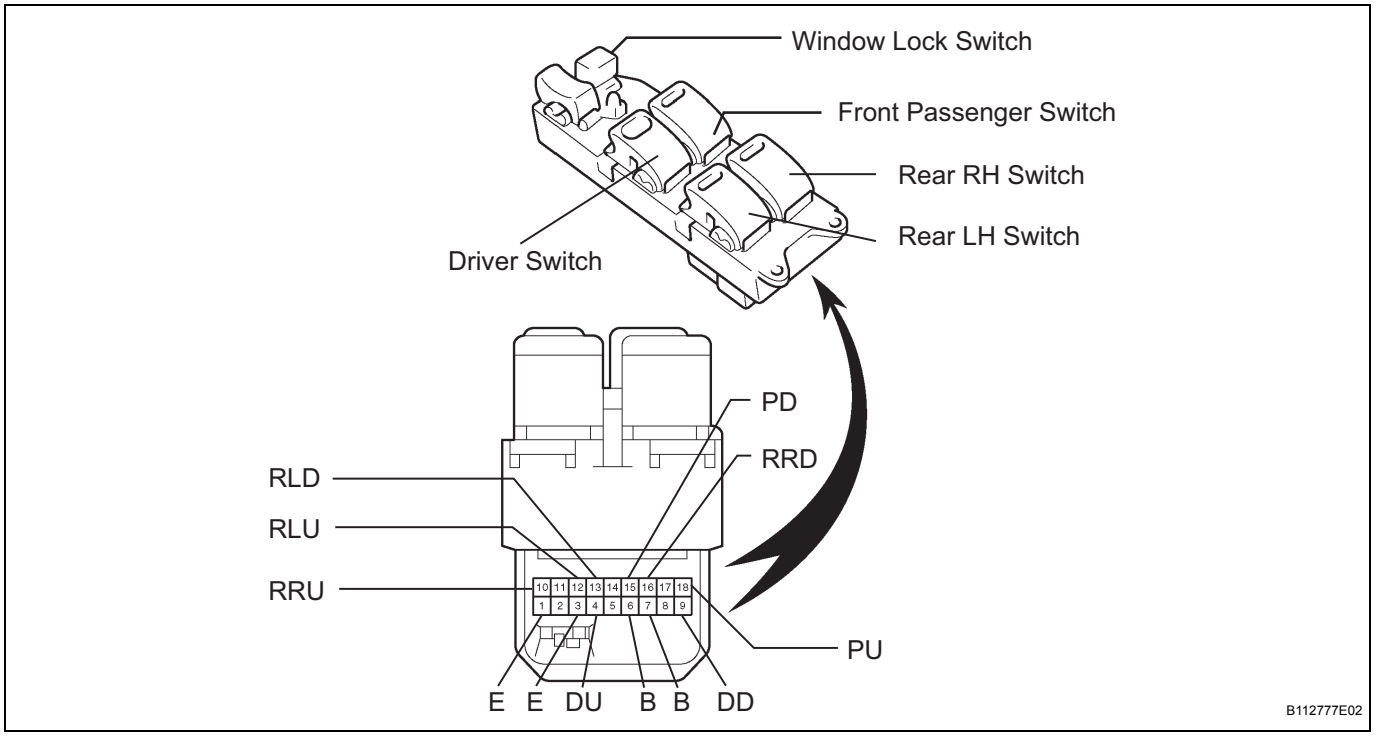
31. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

POWER WINDOW MASTER SWITCH

INSPECTION

1. INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY

(a) Measure the resistance between each terminal of the connector when the switch is operated.



Standard resistance:
Driver switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
Always (ON / OFF)	UP	1 (E) - 9 (DD) 3 (E) - 9 (DD) 4 (DU) - 6 (B) 4 (DU) - 7 (B)	Below 1 Ω
Always (ON / OFF)	OFF	1 (E) - 4 (DU) 3 (E) - 4 (DU) 1 (E) - 9 (DD) 3 (E) - 9 (DD)	Below 1 Ω
Always (ON / OFF)	DOWN	1 (E) - 4 (DU) 3 (E) - 4 (DU) 6 (B) - 9 (DD) 7 (B) - 9 (DD)	Below 1 Ω
Always (ON / OFF)	AUTO DOWN	1 (E) - 4 (DU) 3 (E) - 4 (DU) 6 (B) - 9 (DD) 7 (B) - 9 (DD)	Below 1 Ω

Front passenger switch

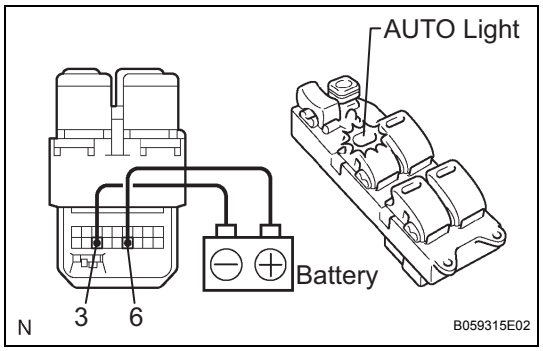
Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF	UP	1 (E) - 15 (PD) 3 (E) - 15 (PD) 6 (B) - 18 (PU) 7 (B) - 18 (PU)	Below 1 Ω
OFF	OFF	1 (E) - 15 (PD) 3 (E) - 15 (PD) 1 (E) - 18 (PU) 3 (E) - 18 (PU)	Below 1 Ω
OFF	DOWN	1 (E) - 18 (PU) 3 (E) - 18 (PU) 6 (B) - 15 (PD) 7 (B) - 15 (PD)	Below 1 Ω
ON	UP	6 (B) - 18 (PU) 7 (B) - 18 (PU)	Below 1 Ω
ON	OFF	15 (PD) - 18 (PU)	Below 1 Ω
ON	DOWN	6 (B) - 15 (PD) 7 (B) - 15 (PD)	Below 1 Ω

Rear LH switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF	UP	1 (E) - 13 (RLD) 3 (E) - 13 (RLD) 6 (B) - 12 (RLU) 7 (B) - 12 (RLU)	Below 1 Ω
OFF	OFF	1 (E) - 12 (RLU) 3 (E) - 12 (RLU) 1 (E) - 13 (RLD) 3 (E) - 13 (RLD)	Below 1 Ω
OFF	DOWN	1 (E) - 12 (RLU) 3 (E) - 12 (RLU) 6 (B) - 13 (RLD) 7 (B) - 13 (RLD)	Below 1 Ω
ON	UP	6 (B) - 12 (RLU) 7 (B) - 12 (RLU)	Below 1 Ω
ON	OFF	12 (RLU) - 13 (RLD)	Below 1 Ω
ON	DOWN	6 (B) - 13 (RLD) 7 (B) - 13 (RLD)	Below 1 Ω

Rear RH switch

Window Lock Switch Condition	Power Window Switch Condition	Tester Connection	Specified Condition
OFF	UP	1 (E) - 16 (RRD) 3 (E) - 16 (RRD) 6 (B) - 10 (RRU) 7 (B) - 10 (RRU)	Below 1 Ω
OFF	OFF	1 (E) - 10 (RRU) 3 (E) - 10 (RRU) 1 (E) - 16 (RRD) 3 (E) - 16 (RRD)	Below 1 Ω
OFF	DOWN	1 (E) - 10 (RRU) 3 (E) - 10 (RRU) 6 (B) - 16 (RRD) 7 (B) - 16 (RRD)	Below 1 Ω
ON	UP	6 (B) - 10 (RRU) 7 (B) - 10 (RRU)	Below 1 Ω
ON	OFF	10 (RRU) - 16 (RRD)	Below 1 Ω
ON	DOWN	6 (B) - 16 (RRD) 7 (B) - 16 (RRD)	Below 1 Ω



If the result is not as specified, replace the master switch assembly.

(b) Apply battery voltage to the master switch terminals and check the AUTO light.

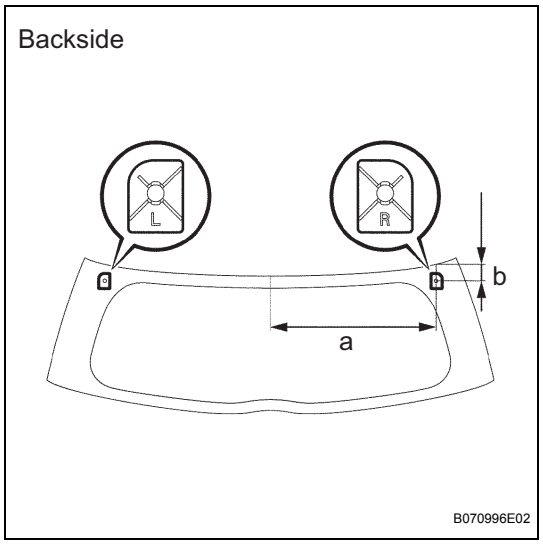
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 6 (B) Battery negative (-) → Terminal 3 (E)	AUTO light illuminates

If the result is not as specified, replace the master switch assembly.

(2) Clean the contact surface of the vehicle body with cleaner.
HINT:
Even if all the adhesive has been removed, clean the vehicle body.

INSTALLATION



1. INSTALL BACK WINDOW GLASS CLIP

(a) Apply Primer G to the installation part of the clips.
HINT:
If primer G is applied to an area that is not specified, wipe off the primer with white gasoline before it dries.

(b) Install the new clips.
NOTICE:
- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

Standard measurement

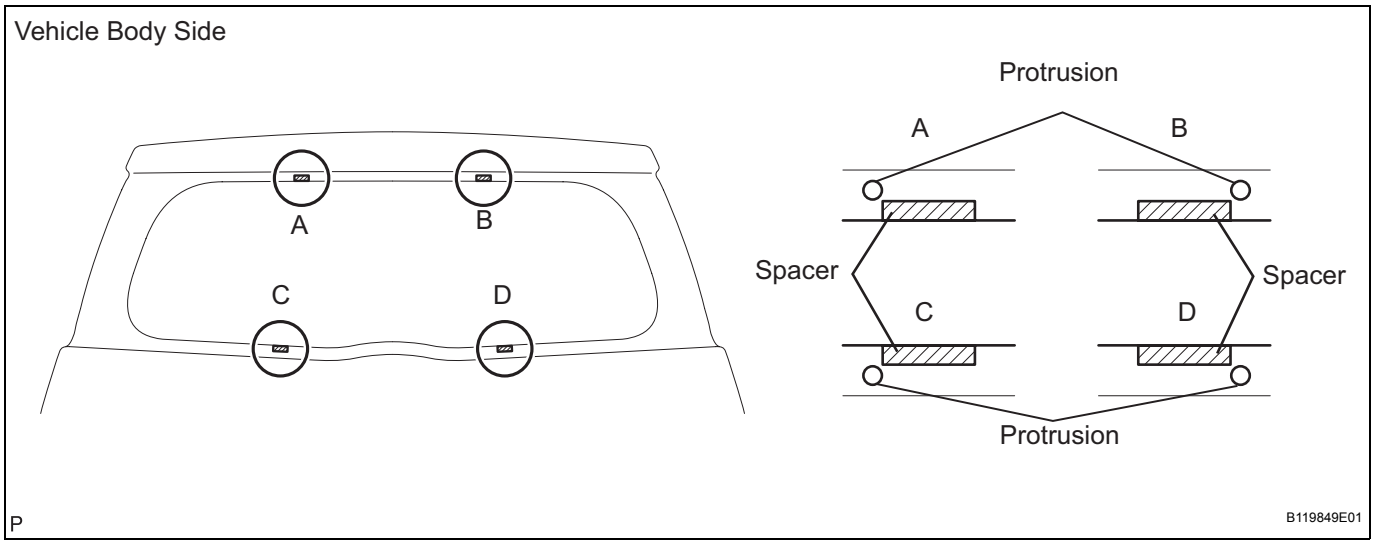
Area	Specified Condition
a	465.4 mm (18.323 in.)
b	44.8 mm (1.764 in.)

WS

2. INSTALL BACK WINDOW GLASS SPACER

(a) Apply Primer G to the glass where the spacers will be installed.
HINT:
If primer G is applied to an area that is not specified, wipe off the primer with white gasoline before it dries.

(b) Install 4 new spacers.



NOTICE:
- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

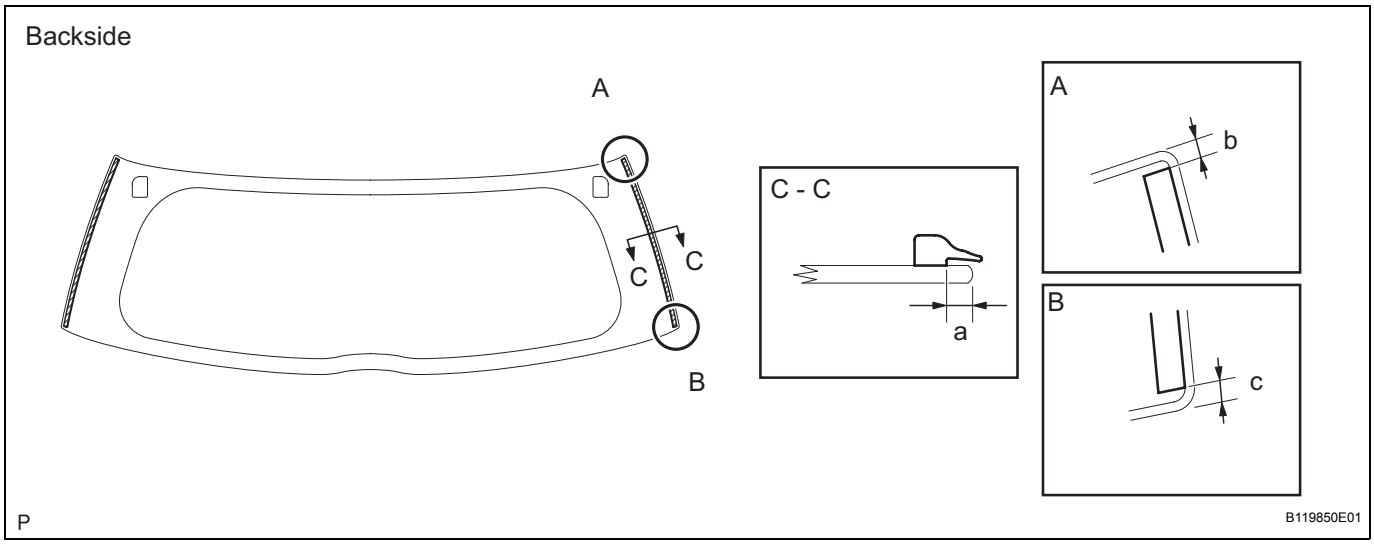
3. INSTALL BACK DOOR WINDOW MOULDING

(a) Apply Primer G to the installation part of the window moulding.

NOTICE:

- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

(b) Install the new moulding LH and RH as shown in the illustration.



Standard measurement

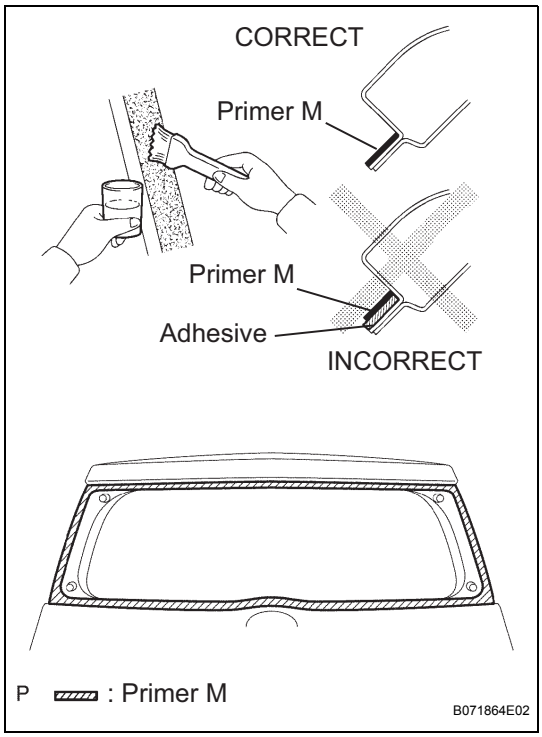
Area	Specified Condition
a	4.7 mm (0.185 in.)
b	3.0 to 7.0 mm (0.118 to 0.276 in.)
c	5.0 to 7.0 mm (0.197 to 0.276 in.)

4. INSTALL BACK DOOR GLASS

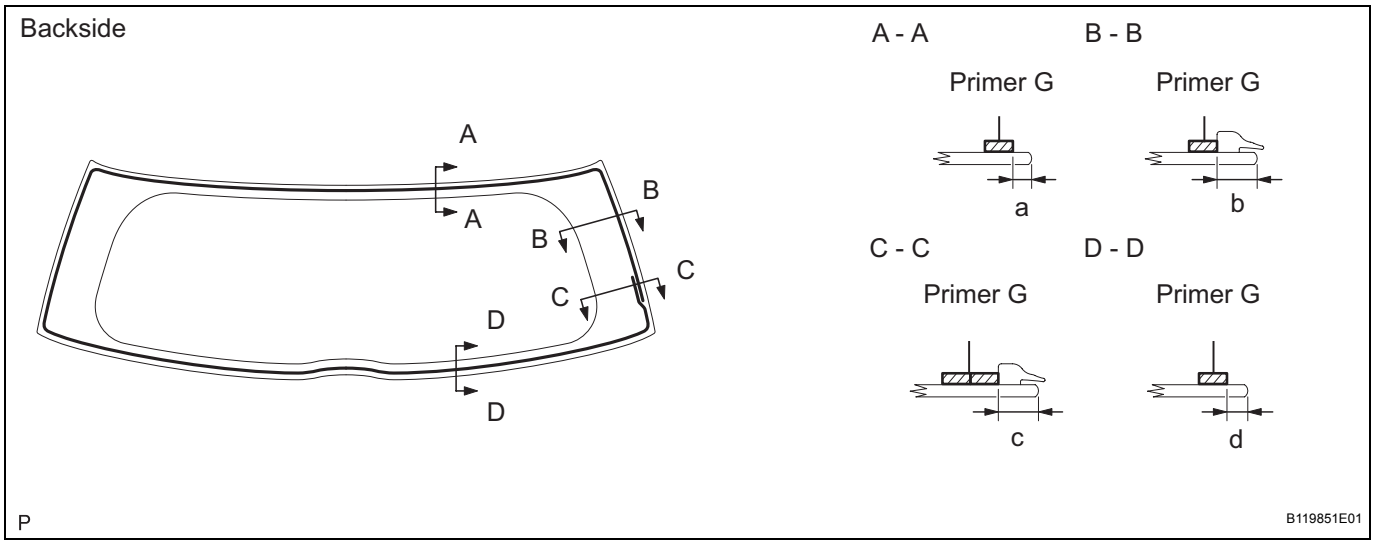
(a) Using a brush or sponge, apply Primer M to the exposed part of the vehicle body.

NOTICE:

- **Allow the primer to dry for 3 minutes or more.**
- **Do not apply primer to the adhesive.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**



(b) Using a brush or sponge, apply Primer G to the contact surface of the back door glass.



Standard measurement

Area	Specified Condition
a	3.0 mm (0.118 in.)
b	10.7 mm (0.421 in.)
c	10.7 mm (0.421 in.)
d	5.8 mm (0.228 in.)

WS

HINT:
If Primer G is applied to an area that is not specified, wipe off the primer with white gasoline before it dries.

NOTICE:
- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

(c) Apply adhesive to the back door glass.

Adhesive:
Part No. 08850-00801 or equivalent

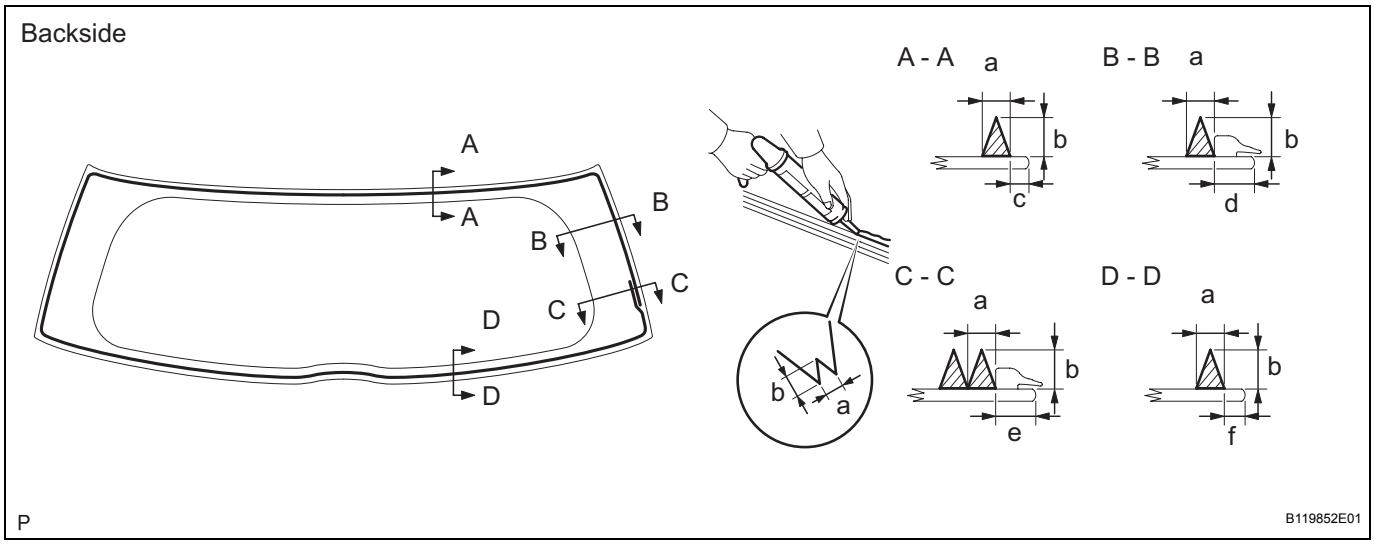
(1) Cut off the tip of the cartridge nozzle as shown in the illustration below.
HINT:
After cutting off the tip, use all adhesive within the time written in the table below.

Usage time frame

Temperature	Usage Time Frame
35°C (95°F)	15 minutes
20°C (68°F)	1 hour 40 minutes
5°C (41°F)	8 hours

(2) Load the sealer gun with the cartridge.

(3) Apply adhesive to the back door glass as shown in the illustration.



Standard measurement

Area	Specified Condition
a	8.0 mm (0.315 in.)
b	12.0 mm (0.472 in.)
c	6.0 mm (0.236 in.)
d	10.7 mm (0.421 in.)
e	10.7 mm (0.421 in.)
f	8.8 mm (0.346 in.)

(d) Install the back door glass to the vehicle body.

(1) Hold the back window glass in place securely with tape or equivalent until the adhesive has hardened.

NOTICE:

- **Allow the primer coating to dry for 3 minutes or more.**
- **Check that the clips are attached to the vehicle body correctly.**
- **Check the clearance between the vehicle body and glass.**

(2) Lightly press the front surface of the back door glass to ensure that the back door glass is securely fit to the vehicle body.

(3) Using a scraper, remove any excess or protruding adhesive.

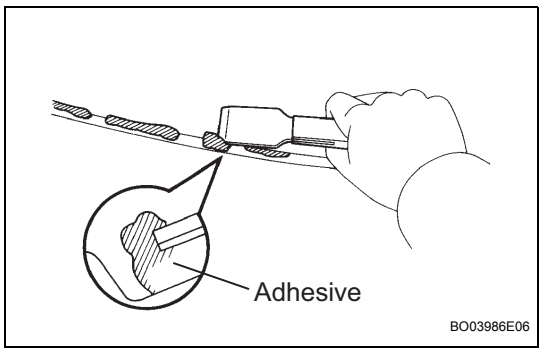
HINT:

Apply adhesive onto the glass rim.

NOTICE:

Do not drive the vehicle within the time written in the table below.

Minimum time



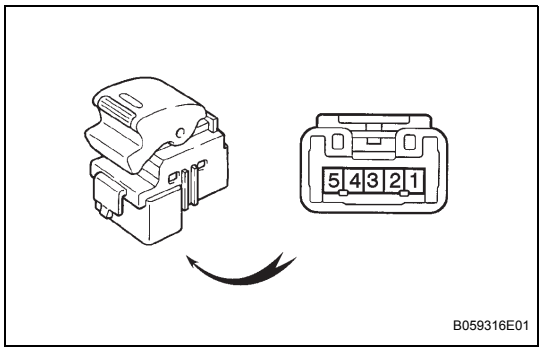
Temperature	Minimum time prior to driving vehicle
35°C (95°F)	1 hour 30 minutes
20°C (68°F)	5 hours

Temperature	Minimum time prior to driving vehicle
5°C (41°F)	24 hours

5. **CHECK FOR LEAKS AND REPAIR**
   (a) Conduct a leak test after the adhesive has completely hardened.
   (b) Seal any leaks with auto glass sealer.

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.



FRONT PASSENGER SIDE POWER WINDOW SWITCH

INSPECTION

1. INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY

(a) Measure the resistance between each terminal of the connector when the switch is operated.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 (D) - 2 (SD) 3 (U) - 4 (B)	UP	Below 1 Ω
1 (D) - 2 (SD) 3 (U) - 5 (SU)	OFF	Below 1 Ω
1 (D) - 4 (B) 3 (U) - 5 (SU)	DOWN	Below 1 Ω

If the result is not as specified, replace the regulator switch assembly.

SYSTEM DESCRIPTION

1. GENERAL

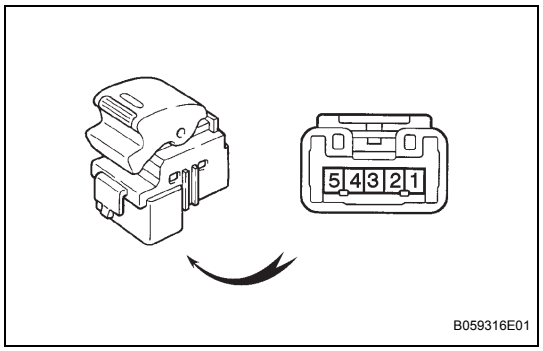
The defogger system's thin heater wires are attached to the inside of the rear window and defog the window surface quickly. The indicator light illuminates while the system is operating. The system automatically turns off after approximately 15 minutes.

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Window defogger system

Symptom	Suspected area	See page
Rear window defogger does not operate (Indicator ON)	1. DEF fuse	WS-34
	2. Defogger relay	WS-40
	3. Rear window defogger wire	WS-41
	4. Wire harness	
Rear window defogger does not operate (Indicator OFF)	1. DEF fuse	WS-34
	2. Defogger relay	WS-40
	3. Center cluster module switch	WS-37
	4. Rear window defogger wire	WS-41
	5. Wire harness	



REAR POWER WINDOW SWITCH

INSPECTION

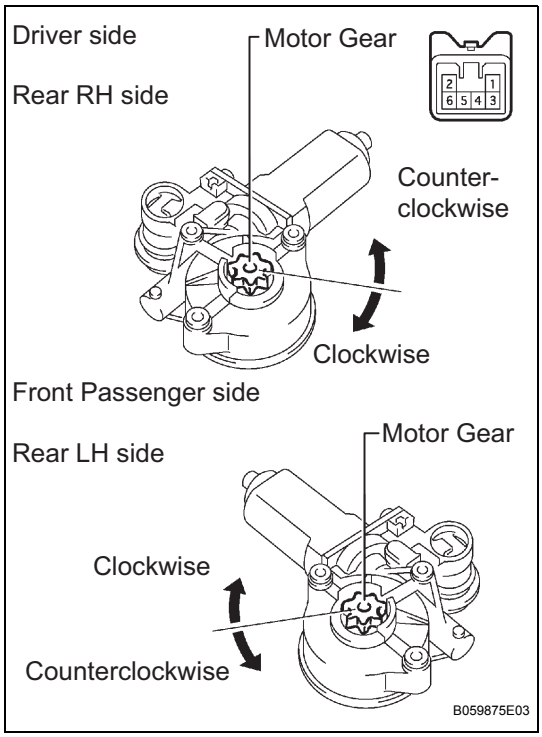
1. INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (REAR LH AND REAR RH)

(a) Measure the resistance between each terminal of the connector when the switch is operated.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 (D) - 2 (SD) 3 (U) - 4 (B)	UP	Below 1 Ω
1 (D) - 2 (SD) 3 (U) - 5 (SU)	OFF	Below 1 Ω
1 (D) - 4 (B) 3 (U) - 5 (SU)	DOWN	Below 1 Ω

If the result is not as specified, replace the regulator switch assembly.



POWER WINDOW REGULATOR MOTOR

INSPECTION

1. INSPECT POWER WINDOW REGULATOR MOTOR ASSEMBLY

(a) Check operation of the regulator motor.
HINT:
- The driver side and rear RH regulator motors should be inspected using the same procedure.
- The passenger side and rear LH regulator motors should be inspected using the same procedure.

(1) Apply battery voltage to the motor terminals.
(2) Check that the motor operates smoothly.
OK:
Driver side and rear RH

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery positive (-) → Terminal 5	Motor gear rotates clockwise
Battery positive (+) → Terminal 5 Battery positive (-) → Terminal 4	Motor gear rotates counterclockwise

Front passenger side and rear LH

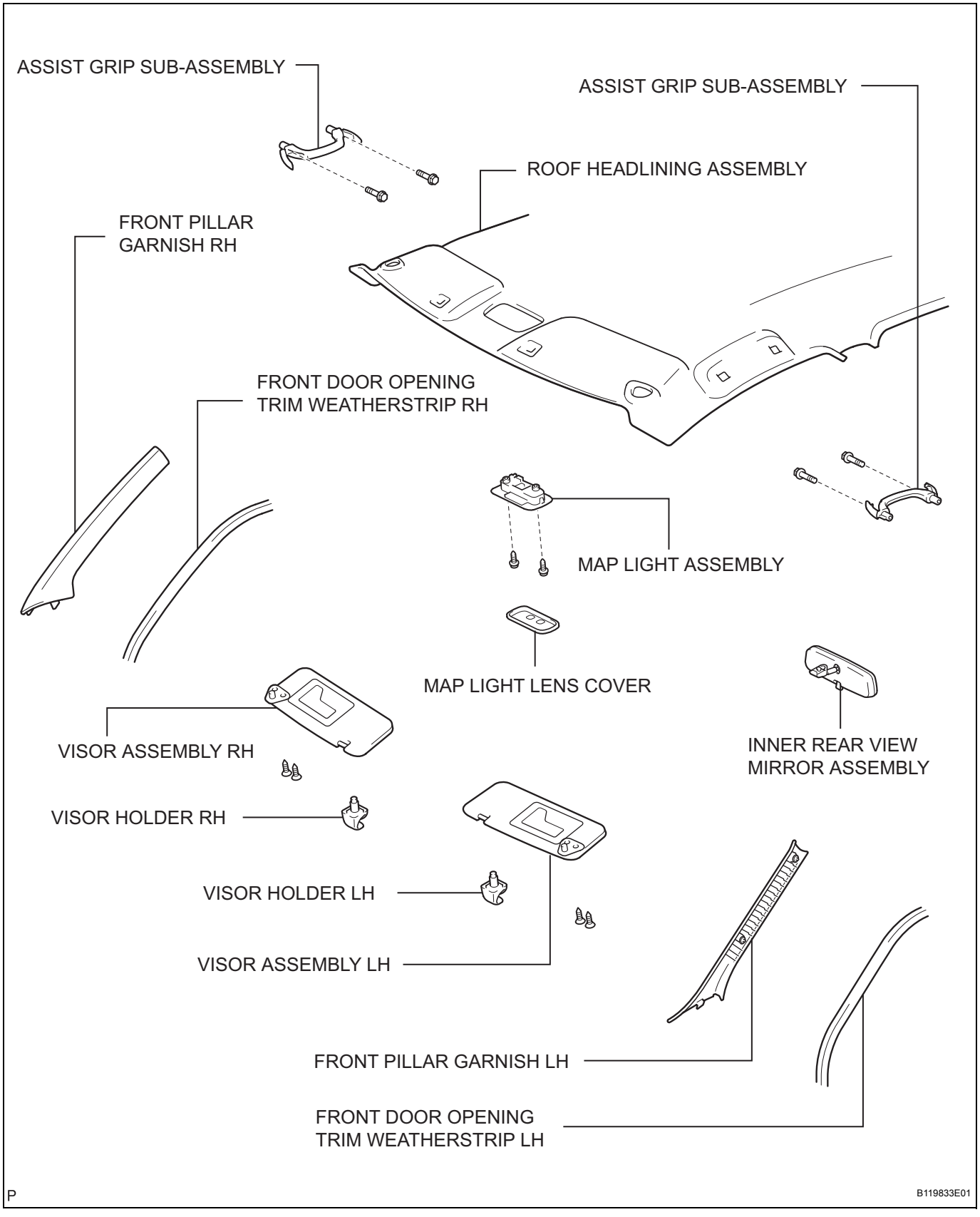
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 5 Battery positive (-) → Terminal 4	Motor gear rotates clockwise
Battery positive (+) → Terminal 4 Battery positive (-) → Terminal 5	Motor gear rotates counterclockwise

If the result is not as specified, replace the motor assembly.

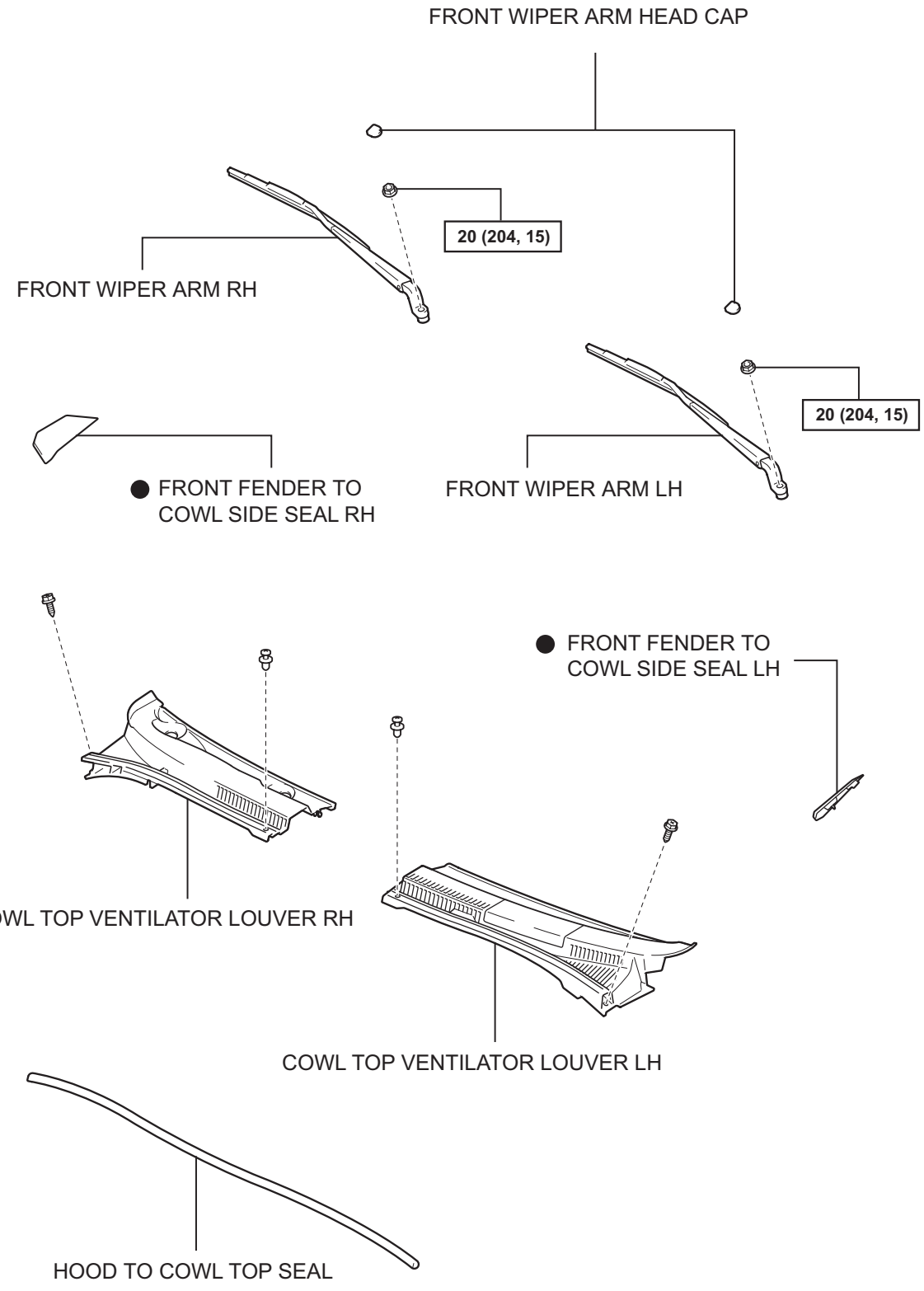
WS

WINDSHIELD GLASS

COMPONENTS



WS



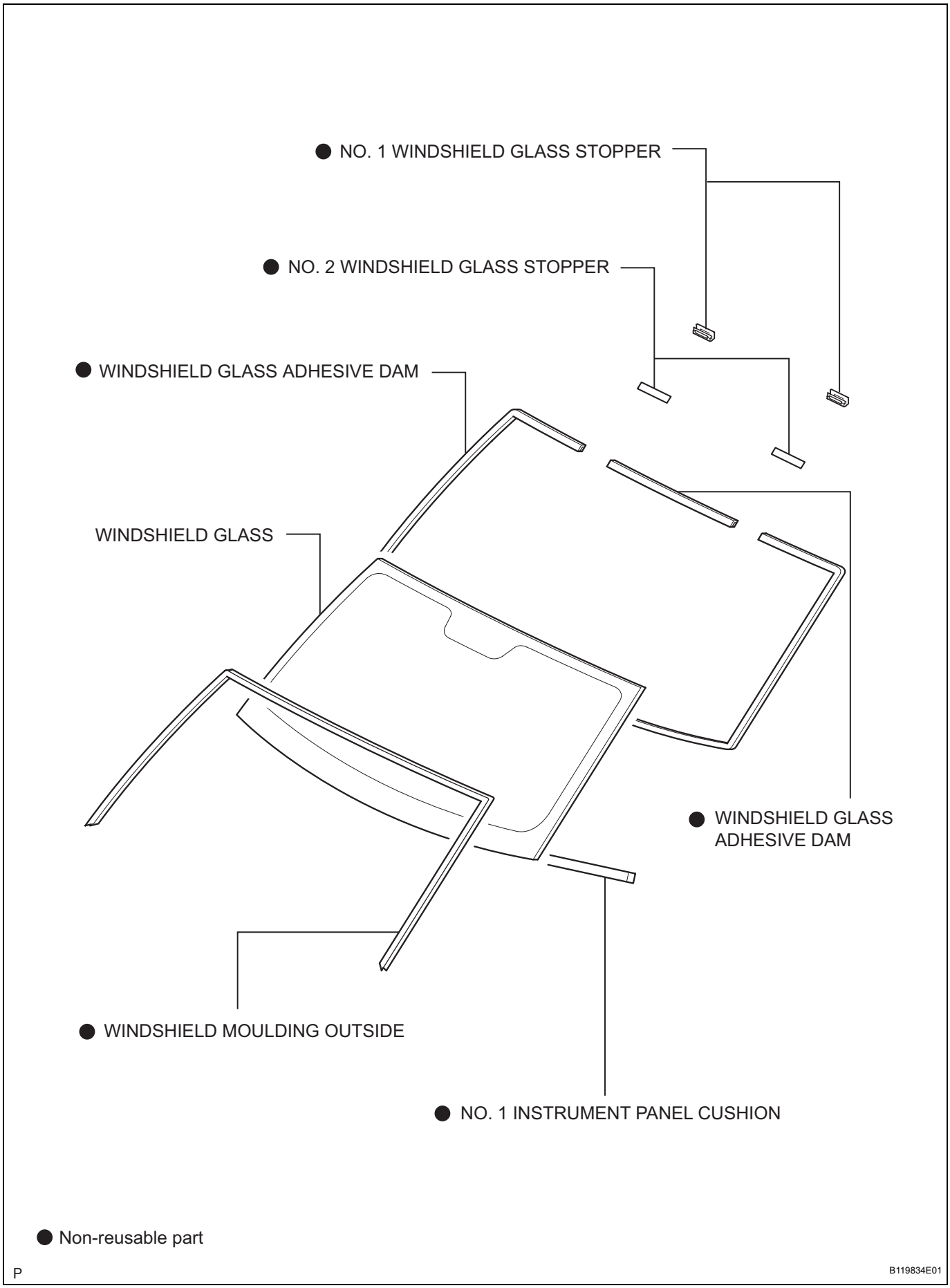
WS

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

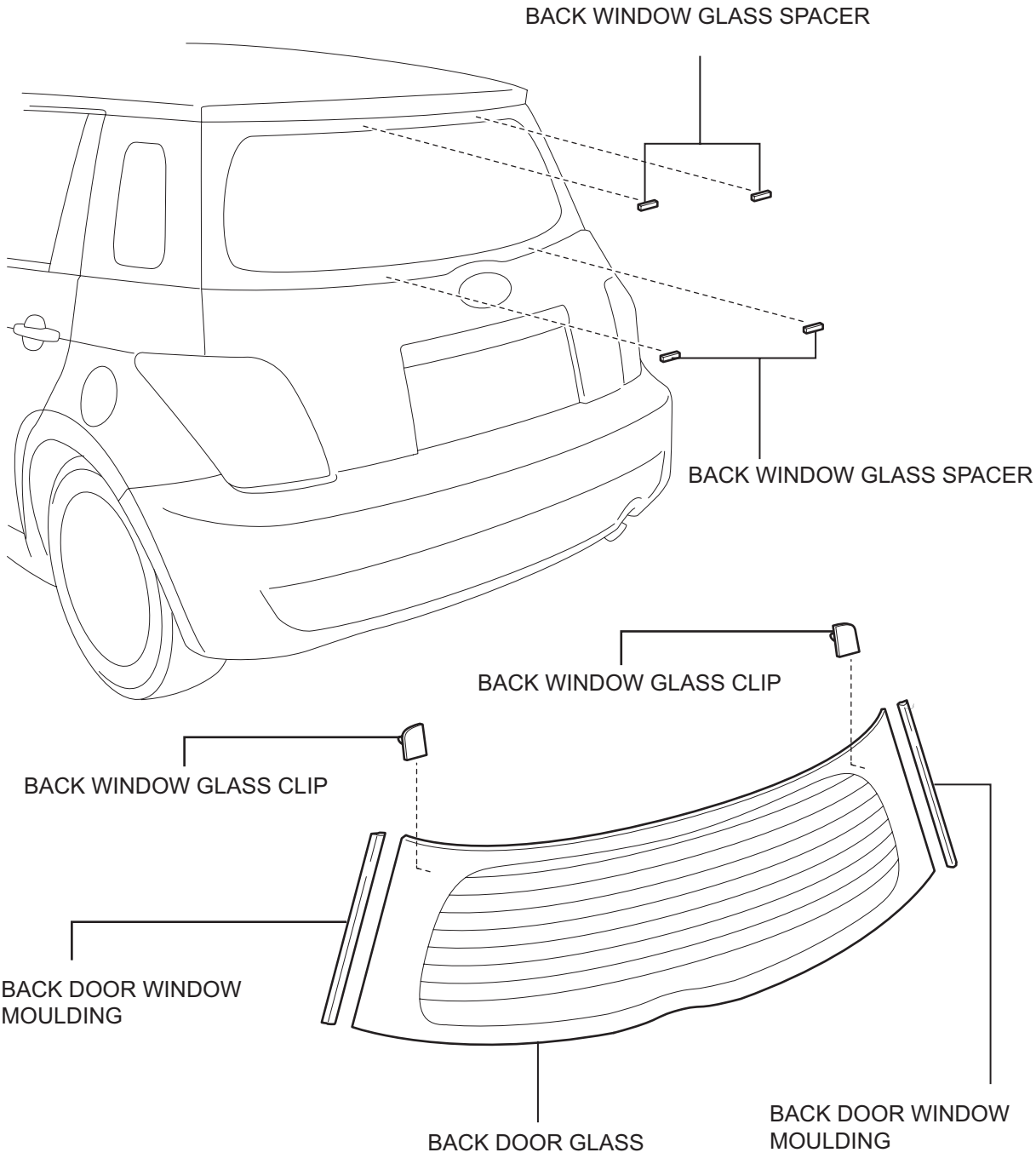
P

B119835E01


● NO. 1 WINDSHIELD GLASS STOPPER
● NO. 2 WINDSHIELD GLASS STOPPER
● WINDSHIELD GLASS ADHESIVE DAM
WINDSHIELD GLASS
● WINDSHIELD GLASS ADHESIVE DAM
● WINDSHIELD MOULDING OUTSIDE
● NO. 1 INSTRUMENT PANEL CUSHION
● Non-reusable part
P
B119834E01

BACK DOOR GLASS

COMPONENTS

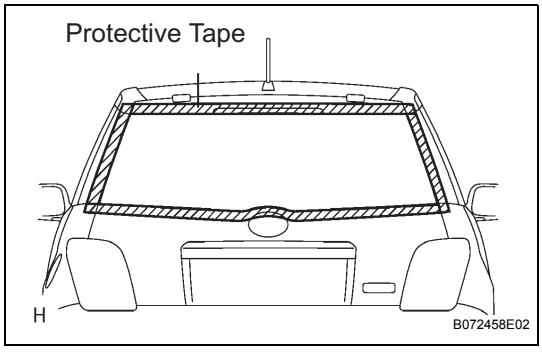


REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

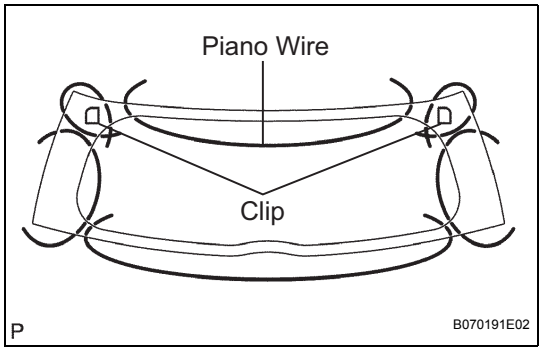


2. REMOVE BACK DOOR GLASS

(a) Apply protective tape to the outer surface of the vehicle body to prevent scratches.

NOTICE:

When separating the back door glass from the vehicle, be careful not to damage the vehicle's paint or interior/exterior ornaments.



(b) From the interior, insert piano wires between the vehicle body and back door glass as shown in the illustration.

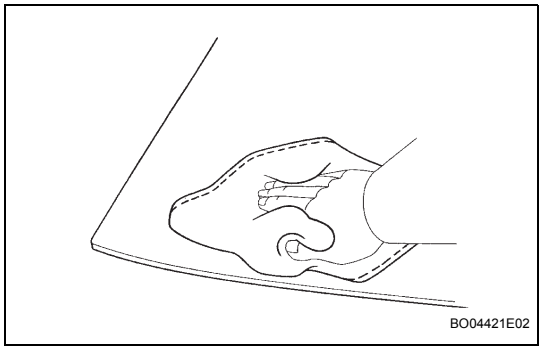
(c) Tie objects that can serve as handles (for example, wooden blocks) to all wire ends.

(d) Cut through the adhesive by pulling the piano wire around the back door glass.

NOTICE:

Leave as much adhesive on the vehicle body as possible when removing the back door glass.

(e) Using suction cups, remove the back door glass.

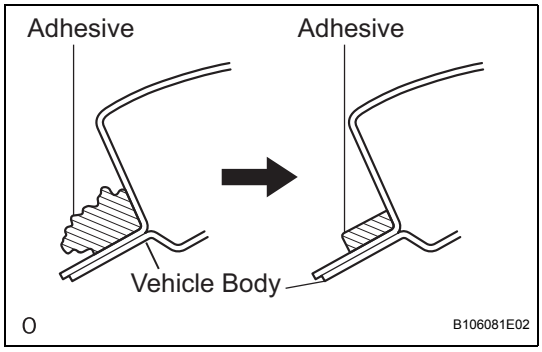


3. CLEAN BACK DOOR GLASS

(a) Clean the outer edge of the back door glass with white gasoline.

NOTICE:

- **Do not touch the back door glass surface after cleaning it.**
- **Be careful not to damage the glass.**
- **Even if using new back door glass, clean the back door glass with white gasoline.**



4. CLEAN VEHICLE BODY

(a) Using a scraper, remove the moulding and adhesive from the back door glass.

(b) Clean and shape the contact surface of the vehicle body.

(1) On the contact surface of the vehicle body, use a knife to cut away excess adhesive as shown in the illustration.

HINT:

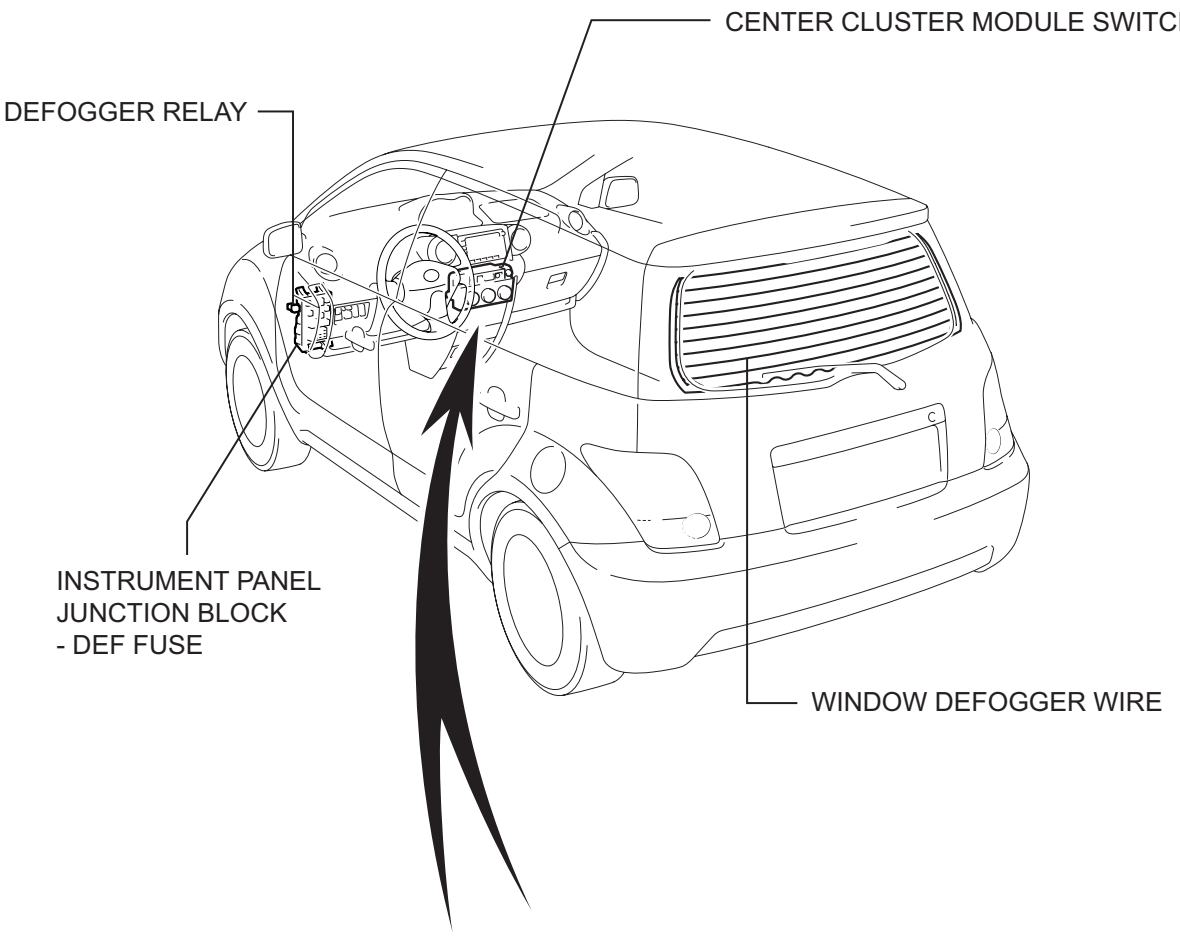
Leave as much adhesive on the vehicle body as possible.

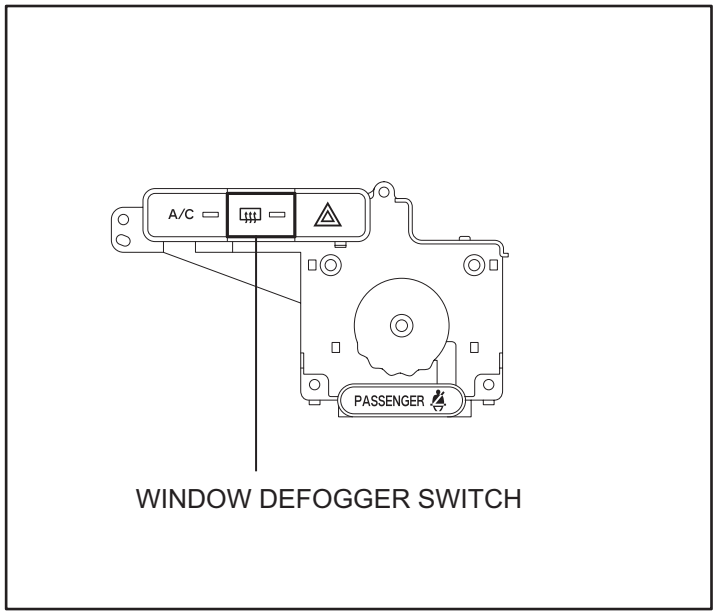
NOTICE:

Be careful not to damage the vehicle body.

WINDOW DEFOGGER SYSTEM

PARTS LOCATION

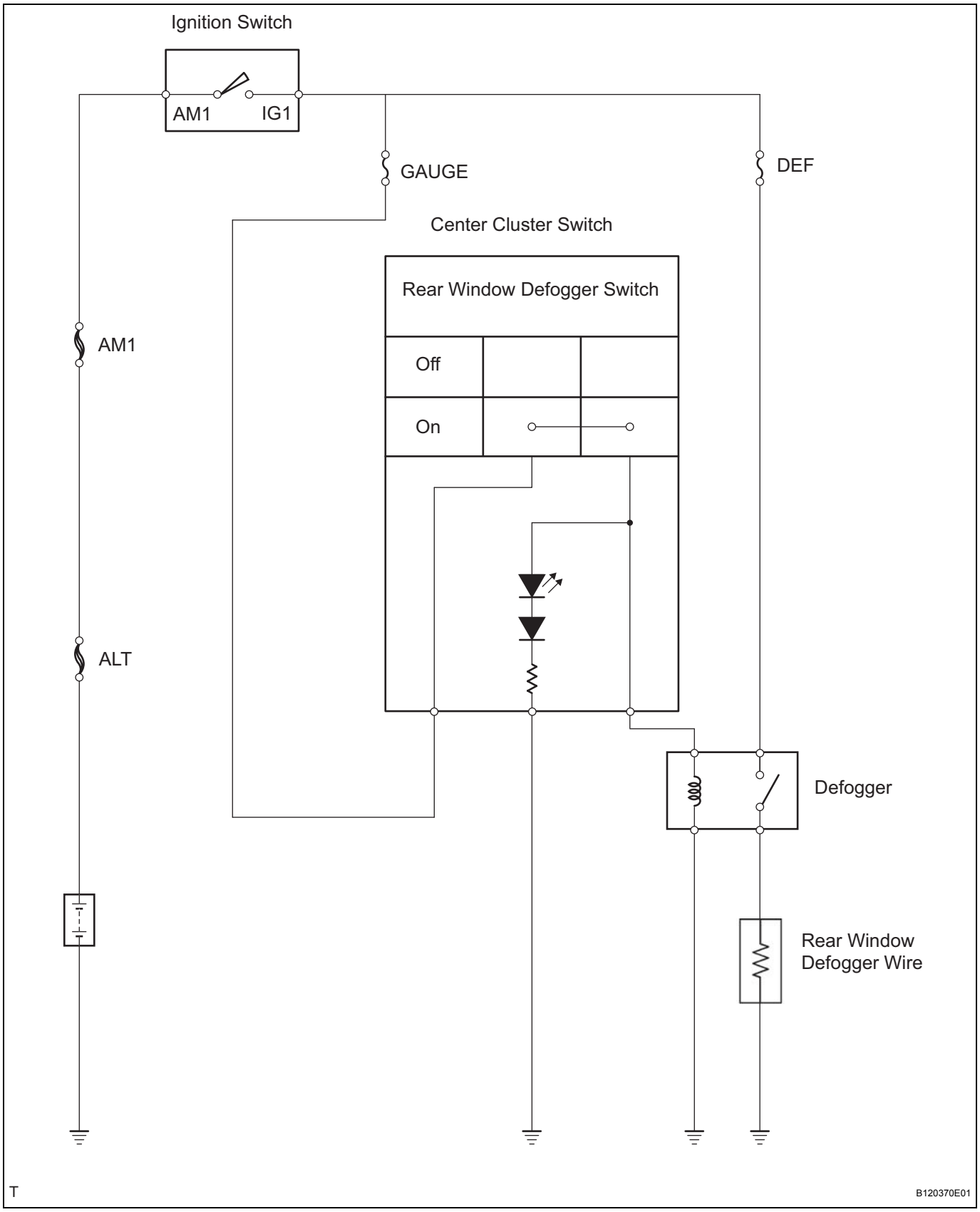




P

B119839E01

SYSTEM DIAGRAM

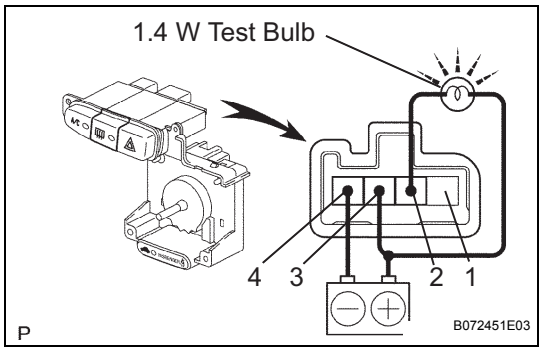


WINDOW DEFOGGER SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-5)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
4. **REMOVE HEATER CONTROL KNOB**
5. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER (See page IP-6)**
6. **REMOVE CENTER CLUSTER MODULE SWITCH**

INSPECTION



1. **INSPECT CENTER CLUSTER MODULE SWITCH (DEFOGGER SWITCH)**
   (a) Check operation of the defogger timer.
      (1) Connect the battery's positive (+) lead to terminal 3 and the negative (-) lead to terminal 4.
      (2) Connect the 1.4 W test bulb, as shown in the illustration.
      (3) Push the rear window defogger switch ON, check that the switch and test bulb illuminate for 12 to 18 minutes, and then they go off.
      If the result is not as specified, replace the switch.

INSTALLATION

1. **INSTALL CENTER CLUSTER MODULE SWITCH**
2. **INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER**
3. **INSTALL HEATER CONTROL KNOB**
4. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
5. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

REMOVAL

HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the RH side.

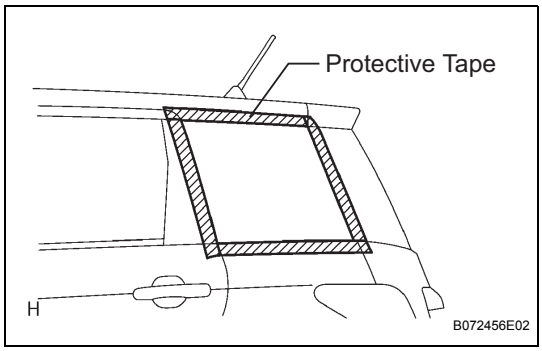
1. **REMOVE REAR SEATBACK ASSEMBLY LH (See page SE-12)**
2. **REMOVE REAR SEATBACK ASSEMBLY RH (See page SE-12)**
3. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-12)**
4. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY (See page SE-12)**
5. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-7)**
6. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
7. **REMOVE TONNEAU COVER ASSEMBLY**
8. **REMOVE NO. 1 DECK BOARD**
9. **REMOVE DECK FLOOR BOX RH (See page IR-8)**
10. **REMOVE SPARE WHEEL COVER ASSEMBLY**
11. **REMOVE REAR DECK TRIM COVER (See page IR-8)**
12. **REMOVE COMPARTMENT TRIM HOOK**
13. **REMOVE REAR SEAT 3 POINT TYPE BELT ASSEMBLY OUTER RH (See page SB-23)**
14. **REMOVE REAR SEATBACK HINGE SUB-ASSEMBLY RH (See page SE-12)**
15. **REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (See page IR-9)**
16. **REMOVE ROOF SIDE GARNISH INNER RH (See page IR-9)**
17. **REMOVE QUARTER WINDOW ASSEMBLY**

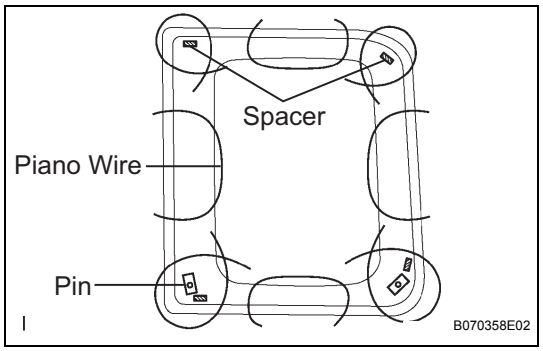
    HINT:

    Apply protective tape to the outer surface of the vehicle body to prevent scratches.

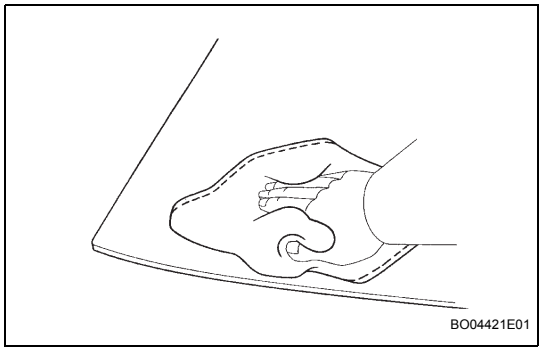
    NOTICE:

    When separating the quarter window glass from the vehicle, be careful not to damage the vehicle's paint or interior/exterior ornaments.

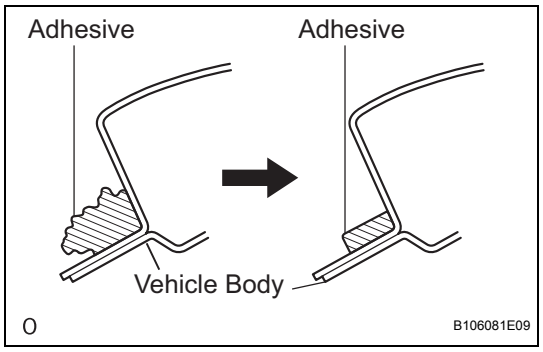




(a) From the interior, insert piano wires between the vehicle body and the quarter window glass as shown in the illustration.
(b) Tie objects that can serve as handles (for example, wooden blocks) to all wire ends.
(c) Cut through the adhesive by pulling the piano wire around the quarter window glass.
NOTICE:
Leave as much adhesive on the vehicle body as possible when removing the quarter window glass.
(d) Using suction cups, remove the quarter window glass.



18. CLEAN QUARTER WINDOW ASSEMBLY
(a) Clean the outer edges of the glass with white gasoline.
NOTICE:
- **Do not touch the glass surface after cleaning it.**
- **Be careful not to damage the glass.**
- **Ever if using new glass, clean the glass with white gasoline.**



19. CLEAN VEHICLE BODY
(a) Clean and shape the contact surface of the vehicle body.
(1) On the contact surface of the vehicle body, use a knife to cut away excess adhesive as shown in the illustration.
HINT:
Leave as much adhesive on the vehicle body as possible.
NOTICE:
Be careful not to damage the vehicle body.
(2) Clean the contact surface of the vehicle body with cleaner.
HINT:
Even if all the adhesive has been removed, clean the vehicle body.

WS

INSTALLATION

HINT:

- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the RH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

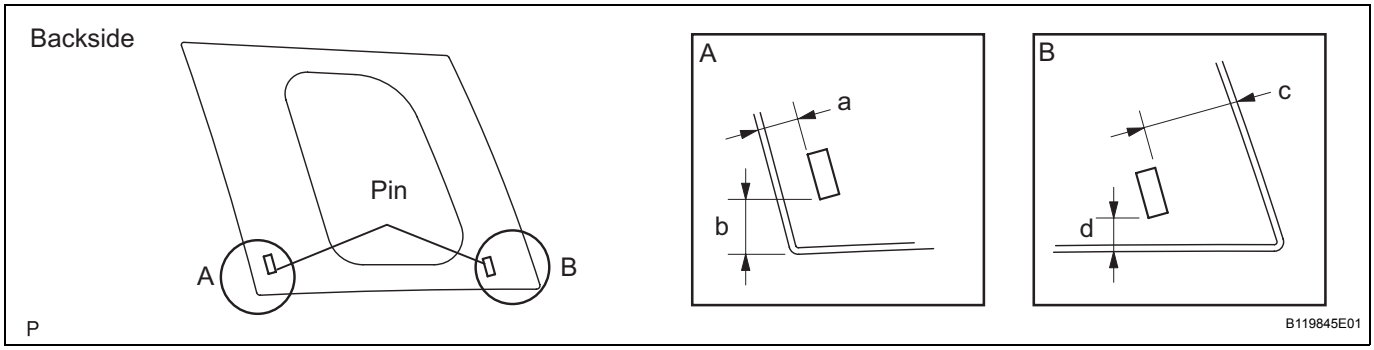
1. INSTALL NO. 1 QUARTER WINDOW GUIDE PIECE PIN

(a) Using a brush or sponge, apply Primer G to the installation part of the pins.

(b) Install new pins.

NOTICE:

- **Allow the primer coating to dry for 3 minutes or more.**
- **Throw away any leftover Primer G.**
- **Do not apply too much primer.**



Standard measurement

Area	Specified Condition
a	21.5 mm (0.846 in.)
b	29.0 mm (1.142 in.)
c	55.8 mm (2.197 in.)
d	18.5 mm (0.728 in.)

2. INSTALL QUARTER WINDOW GLASS SPACER

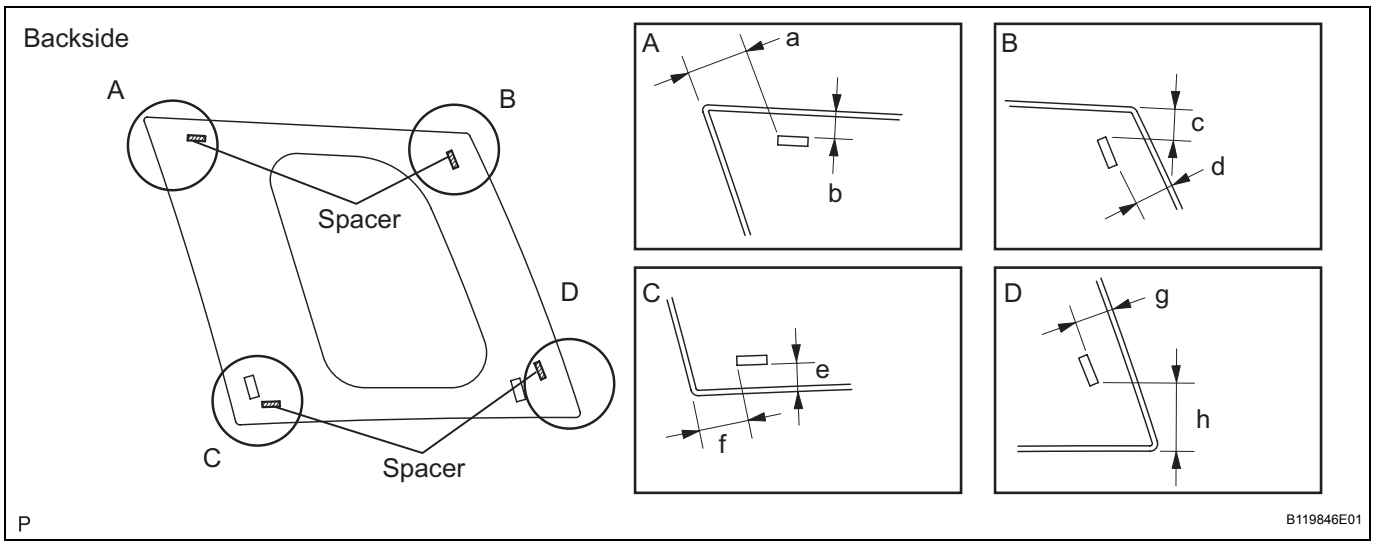
(a) Using a brush or sponge, apply Primer G to the installation part of the spacers.

(b) Install new spacers.

NOTICE:

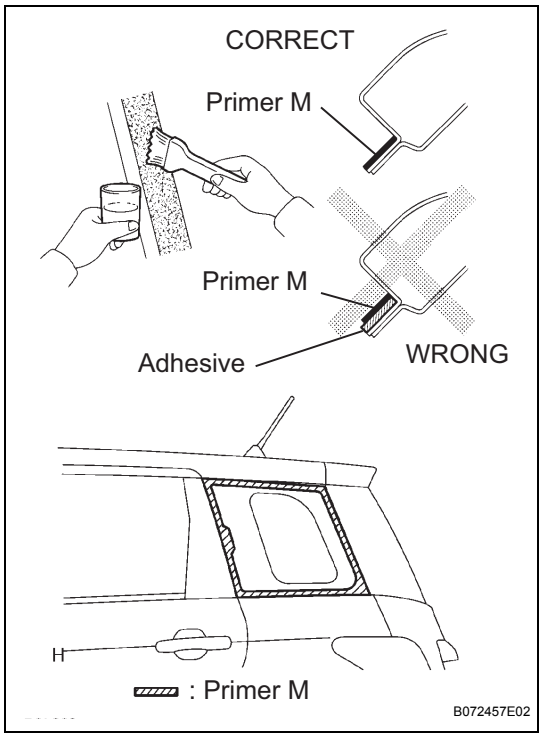
- **Allow the primer coating to dry for 3 minutes or more.**
- **Throw away any leftover Primer G.**

- **Do not apply too much primer.**



Standard measurement

Area	Specified Condition
a	42.7 mm (1.681 in.)
b	16.9 mm (0.665 in.)
c	21.3 mm (0.839 in.)
d	26.1 mm (1.028 in.)
e	19.1 mm (0.752 in.)
f	32.8 mm (1.291 in.)
g	27.4 mm (1.079 in.)
h	42.4 mm (1.669 in.)



3. INSTALL QUARTER WINDOW ASSEMBLY RH

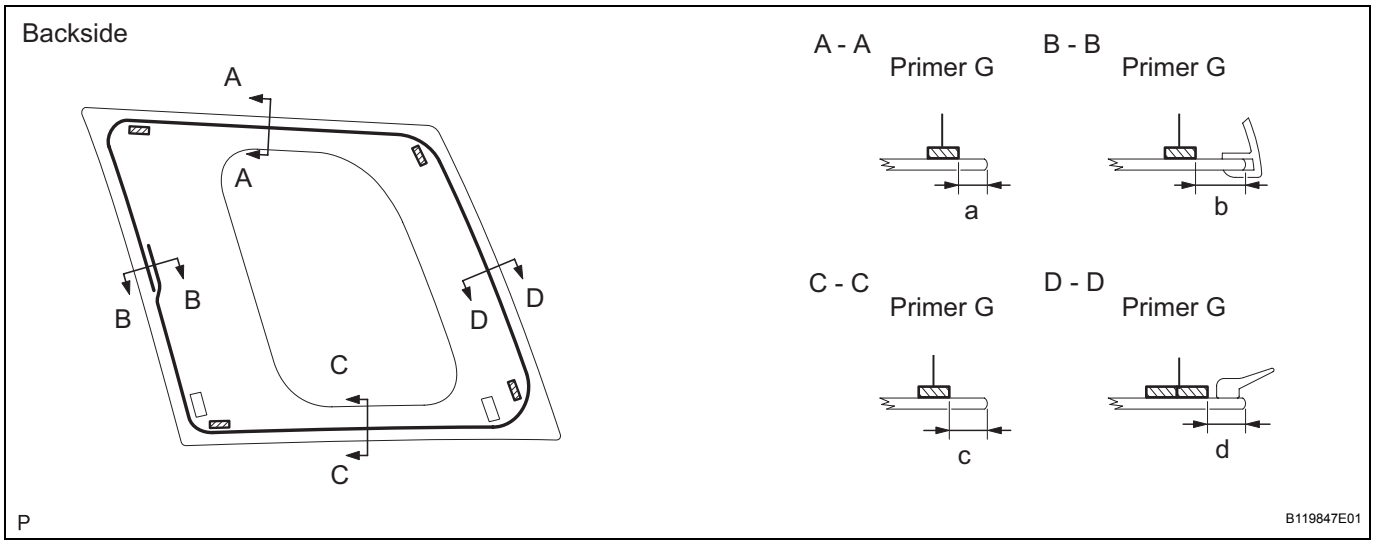
(a) Using a brush, apply Primer M to the exposed part of the vehicle body.

NOTICE:

- **Allow the primer to dry for 3 minutes or more.**
- **Do not apply primer to the adhesive.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

WS

(b) Using a brush or sponge, apply Primer G to the contact surface of the quarter window glass.



HINT:
If Primer G is applied to an area that is not specified, wipe off the primer with white gasoline before it dries.

NOTICE:

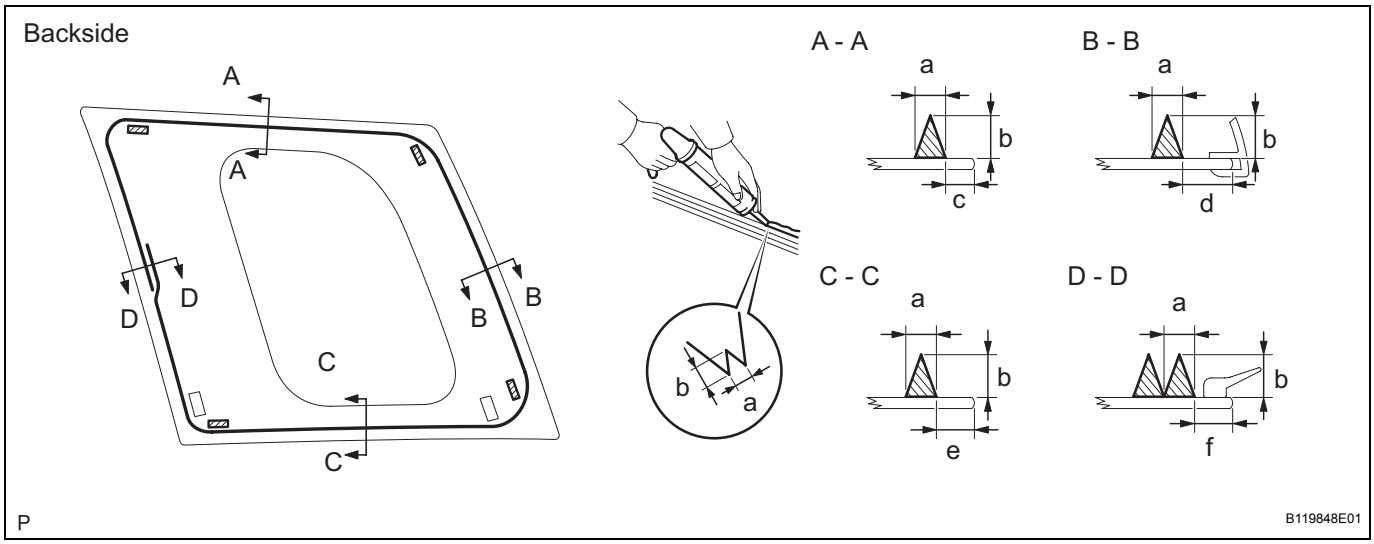
- **Allow the primer to dry for 3 minutes or more.**
- **Throw away any leftover primer.**
- **Do not apply too much primer.**

(c) Apply adhesive to the quarter window glass.

Adhesive:

Part No. 08850-00801 or equivalent

(1) Cut off the tip of the cartridge nozzle as shown in the illustration.



Standard measurement

Area	Specified Condition
a	8.0 mm (0.315 in.)
b	12.0 mm (0.472 in.)
c	8.0 mm (0.315 in.)
d	13.4 mm (0.528 in.)

Area	Specified Condition
e	10.0 mm (0.394 in.)
f	10.7 mm (0.421 in.)

HINT:
After cutting off the tip, use all adhesive within the time written in the table below.

Usage time frame

Temperature	Usage Time Frame
35°C (95°F)	15 minutes
20°C (68°F)	1 hour 40 minutes
5°C (41°F)	8 hours

(2) Load the sealer gun with the cartridge.
(3) Apply adhesive to the quarter window glass as shown in the illustration.

(d) Install the quarter window glass to the vehicle body.
(1) Hold the quarter window glass in place securely with protective tape or equivalent until the adhesive hardens.

NOTICE:
- **Allow the primer coating to dry for 3 minutes or more.**
- **Check that the clips are attached to the body correctly.**
- **Check the clearance between the body and glass.**

(2) Lightly press the front surface of the glass to ensure a close fit.
(3) Using a scraper, remove any excess or protruding adhesive.

HINT:
Apply adhesive onto the glass rim.

NOTICE:
Do not drive the vehicle within the time written in the table below.

Minimum time

Temperature	Minimum time prior to driving vehicle
35°C (95°F)	1 hour 30 minutes
20°C (68°F)	5 hours
5°C (41°F)	24 hours

4. **INSTALL ROOF SIDE GARNISH INNER RH (See page IR-14)**
5. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH (See page IR-15)**
6. **INSTALL REAR SEATBACK HINGE SUB-ASSEMBLY RH (See page SE-16)**
7. **INSTALL REAR SEAT 3 POINT TYPE BELT ASSEMBLY OUTER RH (See page SB-25)**
8. **INSTALL COMPARTMENT TRIM HOOK**

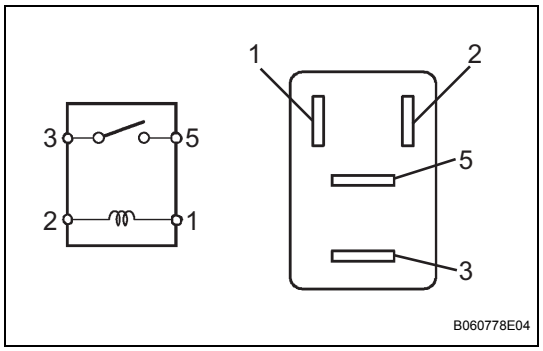
9. **INSTALL REAR DECK TRIM COVER (See page IR-15)**
10. **INSTALL SPARE WHEEL COVER ASSEMBLY**
11. **INSTALL DECK FLOOR BOX RH (See page IR-15)**
12. **INSTALL NO. 1 DECK BOARD**
13. **INSTALL TONNEAU COVER ASSEMBLY**
14. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**
15. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-17)**
16. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY (See page SE-16)**
17. **INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-17)**
18. **INSTALL REAR SEATBACK ASSEMBLY RH (See page SE-17)**
19. **INSTALL REAR SEATBACK ASSEMBLY LH (See page SE-17)**
20. **CHECK FOR LEAKS AND REPAIR**
    (a) Conduct a leak test after the adhesive has completely hardened.
    (b) Seal any leaks with auto glass sealer.

POWER RELAY

ON-VEHICLE INSPECTION

1. REMOVE POWER RELAY (Marking: POWER)

(a) Remove the power relay from the instrument panel junction block.



2. INSPECT POWER RELAY

(a) Measure the resistance of the relay.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

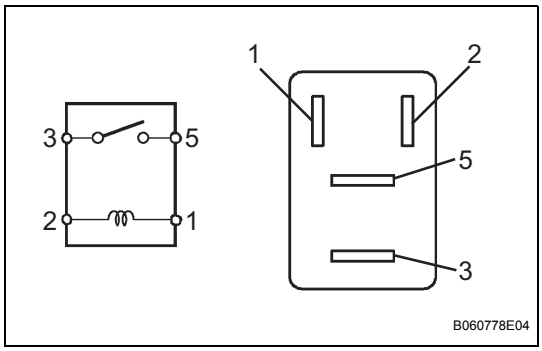
3. INSTALL POWER RELAY

DEFOGGER RELAY

ON-VEHICLE INSPECTION

1. REMOVE DEFOGGER RELAY

(a) Remove the defogger relay from the instrument panel junction block.



2. INSPECT DEFOGGER RELAY

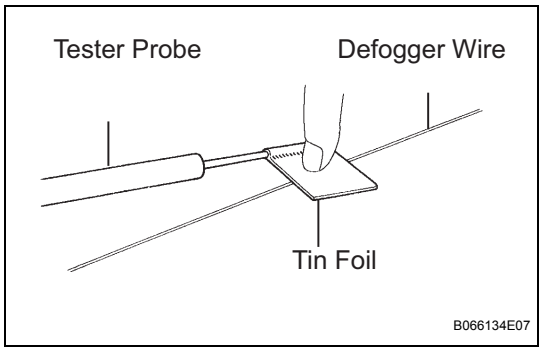
(a) Measure the resistance of the relay.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

3. INSTALL DEFOGGER RELAY



WINDOW DEFOGGER WIRE

ON-VEHICLE INSPECTION

1. INSPECT BACK DOOR GLASS (DEFOGGER WIRE)

NOTICE:

- **When cleaning the glass, wipe the glass along the wire using a soft, dry cloth. Take care not to damage the defogger wires.**
- **Do not use detergents or glass cleaners that have abrasive ingredients.**
- **When measuring voltage, wrap a piece of tin foil around the tip of the negative (-) tester probe and press the foil against the wire with your finger, as shown in the illustration.**

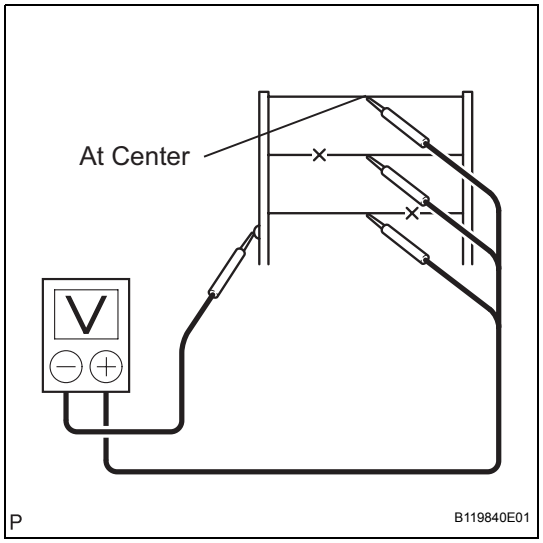
(a) Turn the ignition switch ON.

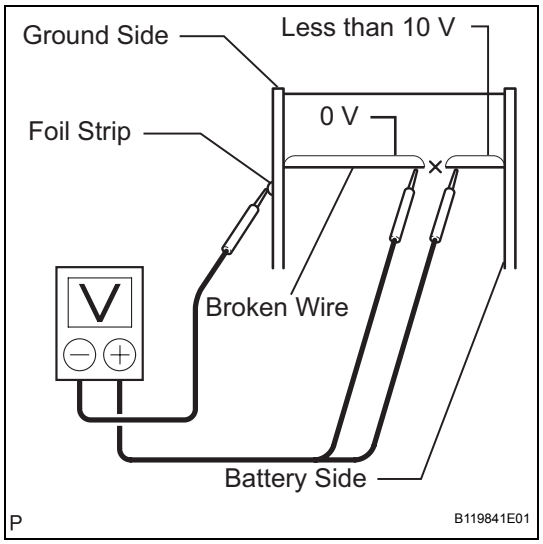
(b) Turn the defogger switch ON.

(c) Measure the voltage at the center of each defogger wire as shown in the illustration.

Standard voltage

Voltage	Criteria
Approx. 5 V	Wire is not broken
Approx. 10 or 0 V	Wire is broken





HINT:

If there is approximately 10 V, the wire may be faulty between the center of the wire and the wire end on the battery side. If there is no voltage, the wire may be faulty between the center of the wire end and the wire end on the ground side.

(d) Place the voltmeter's positive (+) lead against the defogger wire on the battery side.

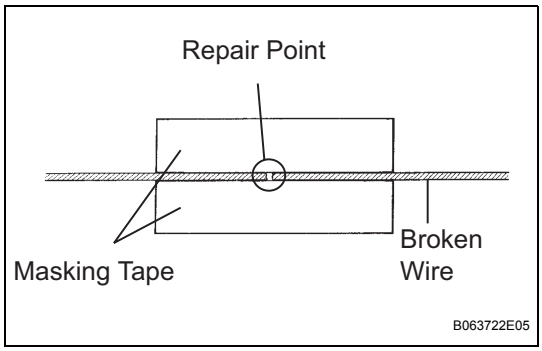
(e) Place the voltmeter's negative (-) lead with the foil strip against the wire on the ground side.

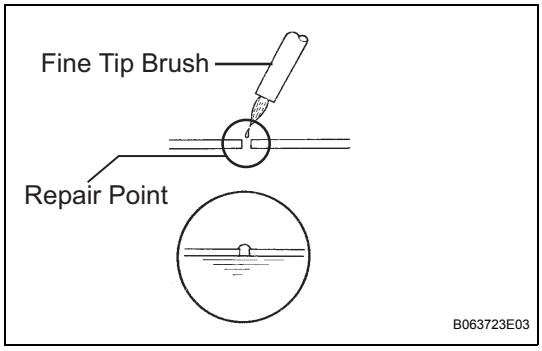
(f) Slide the positive (+) lead from the battery side to the ground side.

(g) The point where the voltage drops from approximately 10 V to 0 V is where the defogger wire is broken.

HINT:

If the defogger wire is not broken, the voltmeter indicates 0 V at the positive (+) end of the defogger wire and gradually increases to approximately 12 V as the meter probe moves to the other end.





REPAIR

1. REPAIR DEFOGGER WIRE

(a) Clean the broken wire tips with grease, wax and silicone remover.

(b) Place masking tape along both sides of the wire.

(c) Thoroughly mix the repair agent (Dupont paste No. 4817).

Dupont paste:
No. 4817 or equivalent

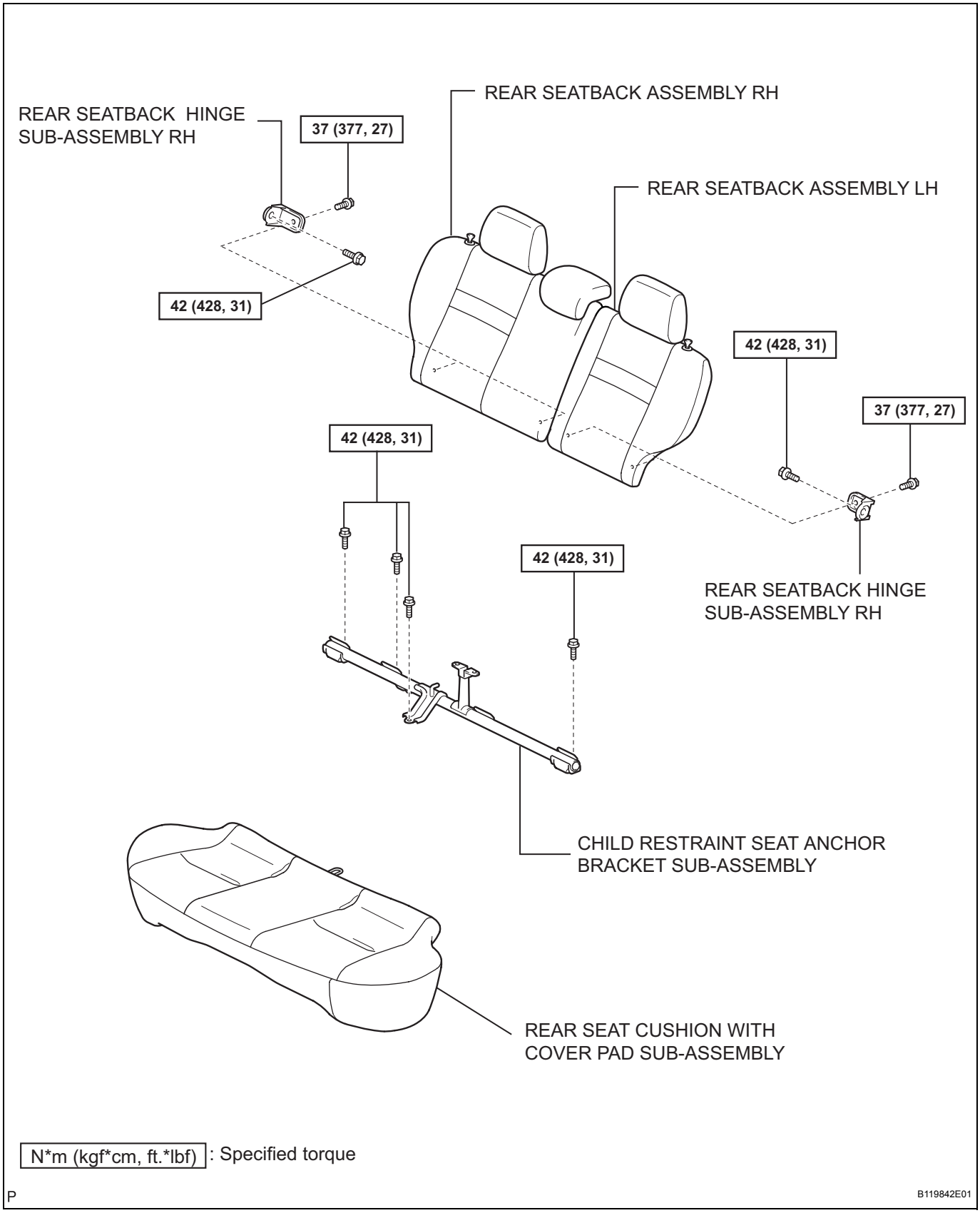
(d) Using a fine tip brush, apply a small amount of the agent to the wire.

(e) After a few minutes, remove the masking tape.

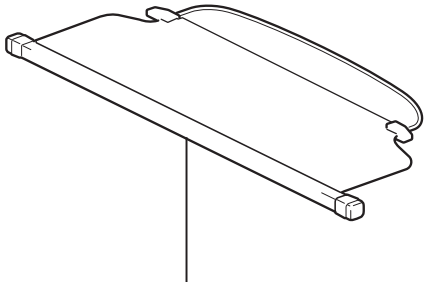
NOTICE:
Do not repair the defogger wire again for at least 24 hours.

QUARTER WINDOW GLASS

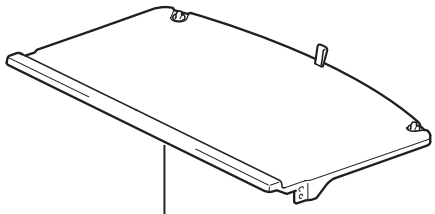
COMPONENTS



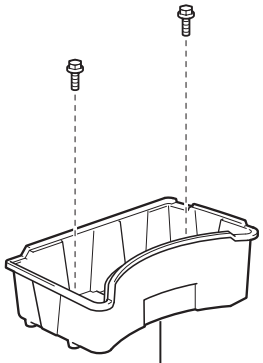
WS



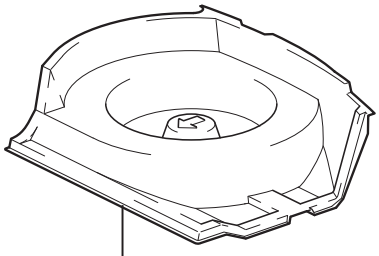
TONNEAU COVER ASSEMBLY



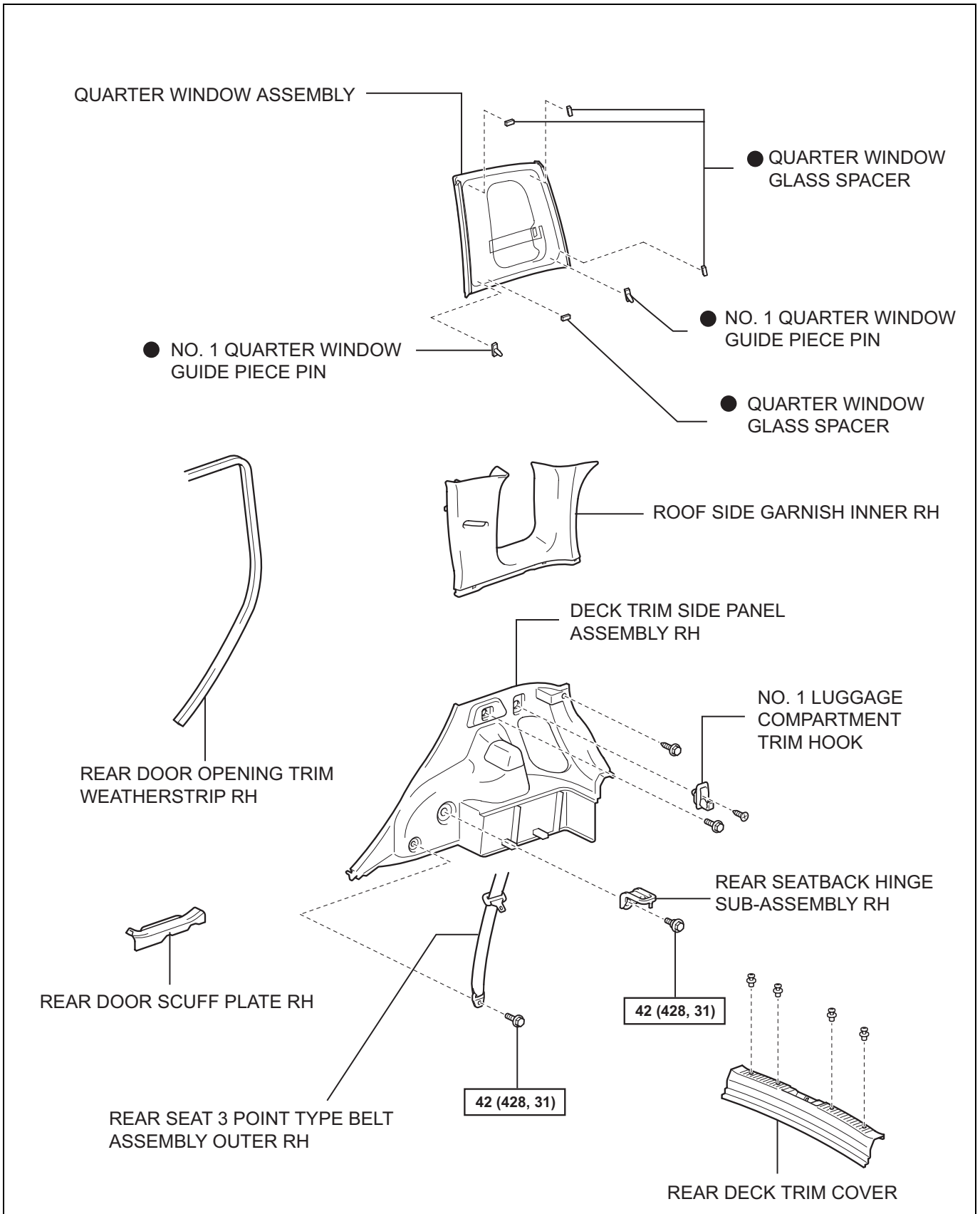
NO. 1 DECK BOARD



DECK FLOOR BOX RH



SPARE WHEEL COVER ASSEMBLY



WS

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

B119843E01

PROBLEM SYMPTOMS TABLE

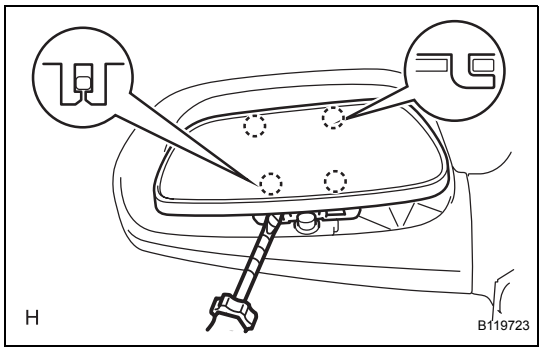
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Power mirror control system

Symptom	Suspected area	See page
Mirror does not operate	1. ACC fuse	MI-1
	2. Outer mirror switch assembly	MI-10
	3. Outer rear view mirror assembly	MI-8
	4. Wire harness	
Mirror operates abnormally	1. Outer mirror switch assembly	MI-10
	2. Outer rear view mirror assembly	MI-8
	3. Wire harness	

DISASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

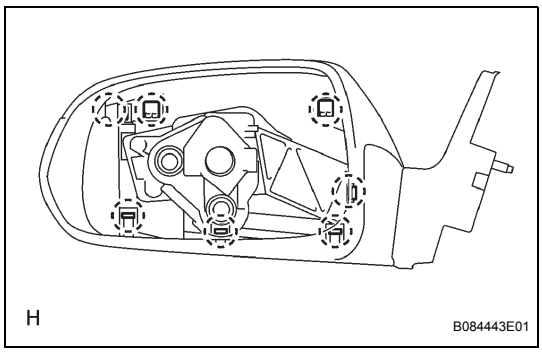


1. DISCONNECT MIRROR

(a) Face the mirror holder upward and look at the bottom of the mirror. Find the 2 grooves between the mirror holder and holder base. Insert a screwdriver into a groove and twist it to release the claw. Then repeat for the other groove.
HINT:
Tape the screwdriver tip before use.
CAUTION:
To prevent the mirror from shattering and causing flying debris, apply tape to the front of the mirror.
NOTICE:
To prevent damage to the vehicle, apply protective tape on the mirror holder base near the lower edge of the mirror. A piece of cloth can also be used.

(b) Lift up the lower part of the mirror holder and then release the 2 claws on the top of the mirror.

(c) Remove the mirror holder.



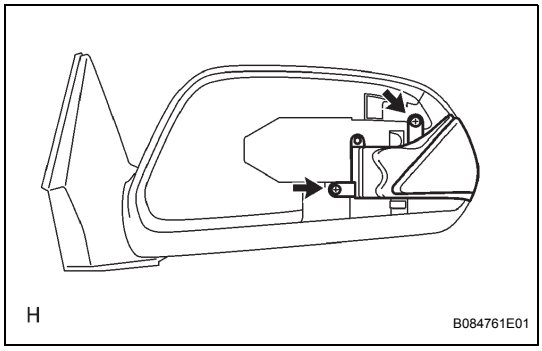
2. REMOVE MIRROR GARNISH

(a) Detach the 7 claws.

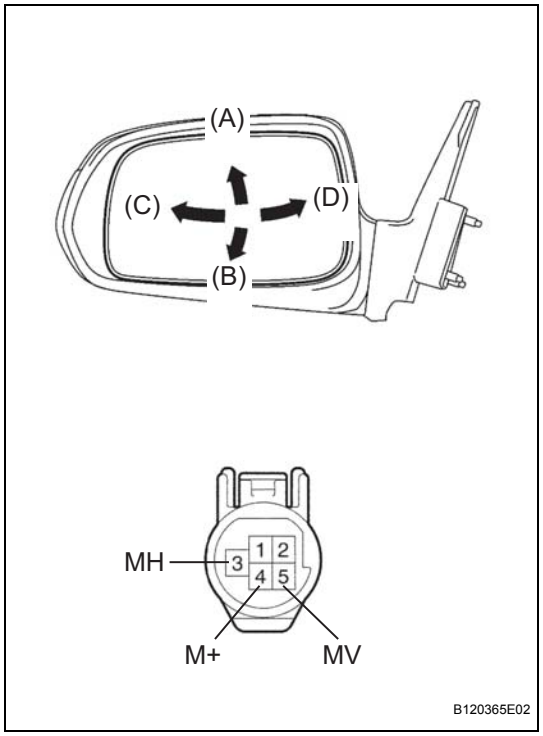
(b) Remove the garnish.

3. REMOVE SIDE TURN SIGNAL LIGHT LENS LH

(a) Disconnect the connector.



(b) Remove the 2 screws and lens.



INSPECTION

1. INSPECT OUTER REAR VIEW MIRROR ASSEMBLY LH

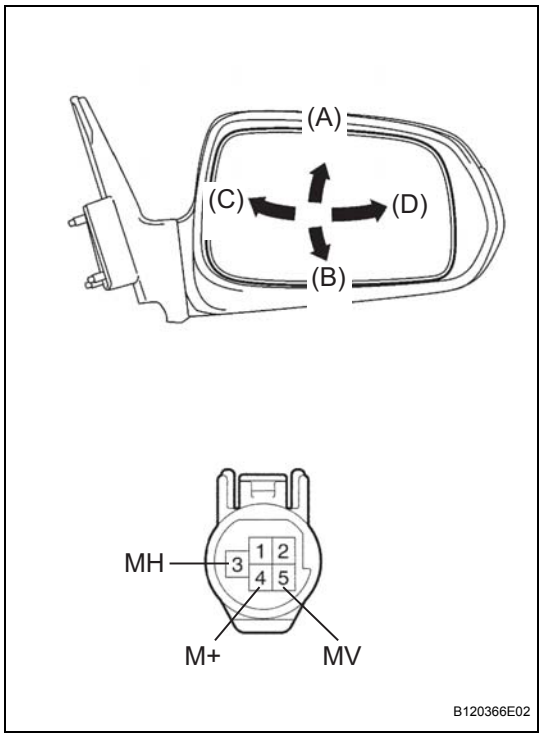
(a) Disconnect the mirror connector.

(b) Apply battery voltage to the mirror and check the operation of the mirror.

OK

Measurement Condition	Mirror Condition
Battery positive (+) → 5 (MV) Battery negative (-) → 4 (M+)	Turns upward (A)
Battery positive (+) → 4 (M+) Battery negative (-) → 5 (MV)	Turns downward (B)
Battery positive (+) → 3 (MH) Battery negative (-) → 4 (M+)	Turns left (C)
Battery positive (+) → 4 (M+) Battery negative (-) → 3 (MH)	Turns right (D)

If the result is not as specified, replace the mirror assembly.



2. INSPECT OUTER REAR VIEW MIRROR ASSEMBLY RH

(a) Disconnect the mirror connector.

(b) Apply battery voltage to the mirror and check the operation of the mirror.

OK

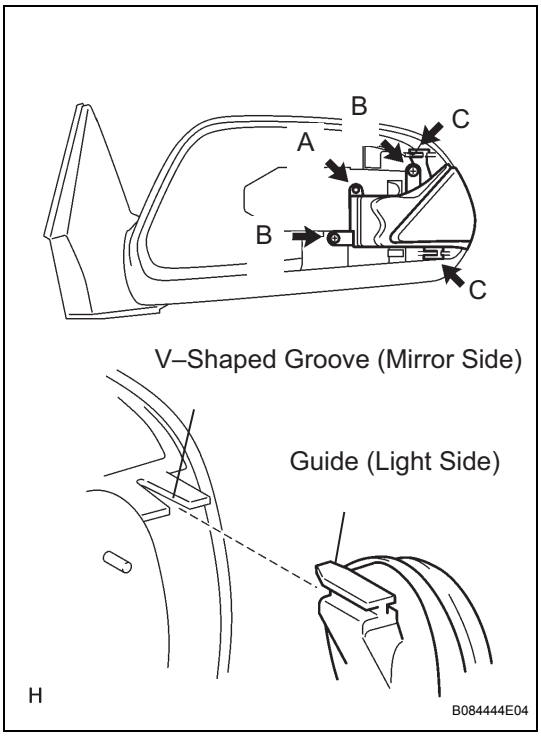
Measurement Condition	Mirror Condition
Battery positive (+) → 5 (MV) Battery negative (-) → 4 (M+)	Turns upward (A)
Battery positive (+) → 4 (M+) Battery negative (-) → 5 (MV)	Turns downward (B)
Battery positive (+) → 3 (MH) Battery negative (-) → 4 (M+)	Turns left (C)
Battery positive (+) → 4 (M+) Battery negative (-) → 3 (MH)	Turns right (D)

If the result is not as specified, replace the mirror assembly.

MI

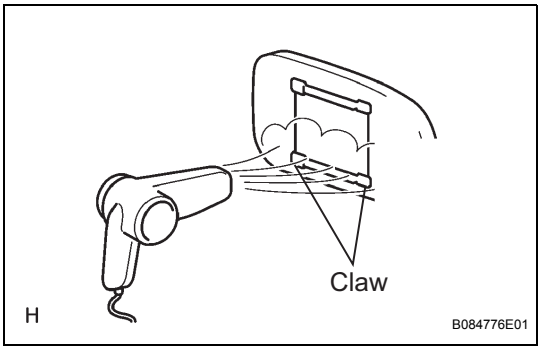
REASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. INSTALL SIDE TURN SIGNAL LIGHT LENS LH
(a) First set the lens by inserting the lens peg to the location labeled A in the illustration. Then insert the lens guide to the V-shaped grooves shown in C in the illustration.
(b) Install the lens with the 2 screws labeled B.
(c) Connect the connector.

2. INSTALL MIRROR GARNISH
(a) Attach the 7 claws to install the mirror garnish.

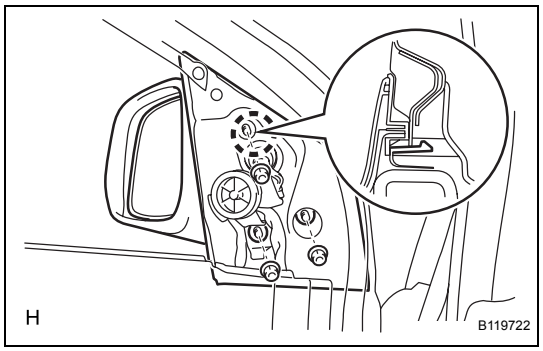


3. CONNECT MIRROR
HINT:
Before connecting the mirror holder, use a dryer to sufficiently heat the backside of the mirror holder where the claws are located.
NOTICE:
If the ambient temperature is low and the claws are not heated before installing, the claws may break.

MI

INSTALLATION

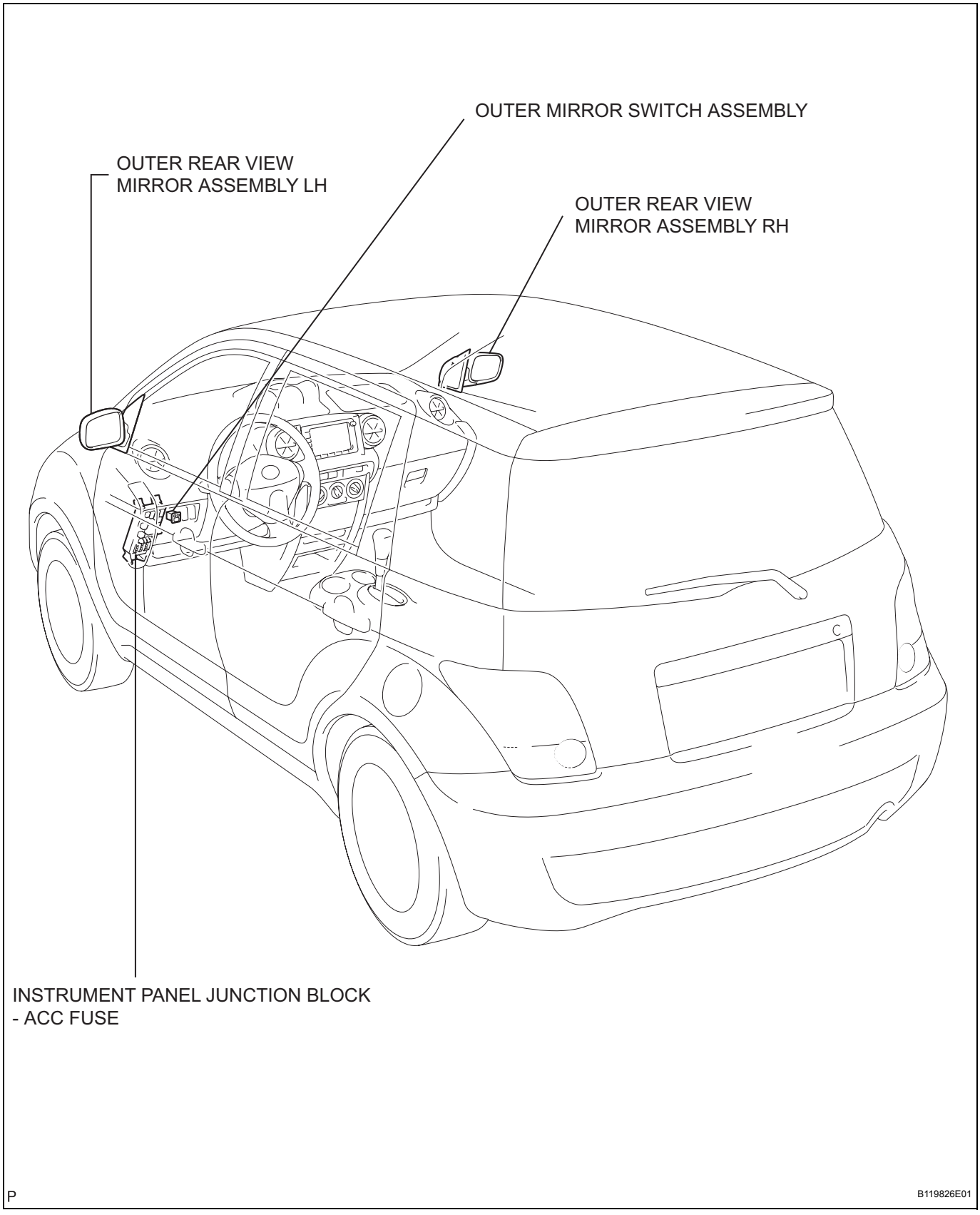
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



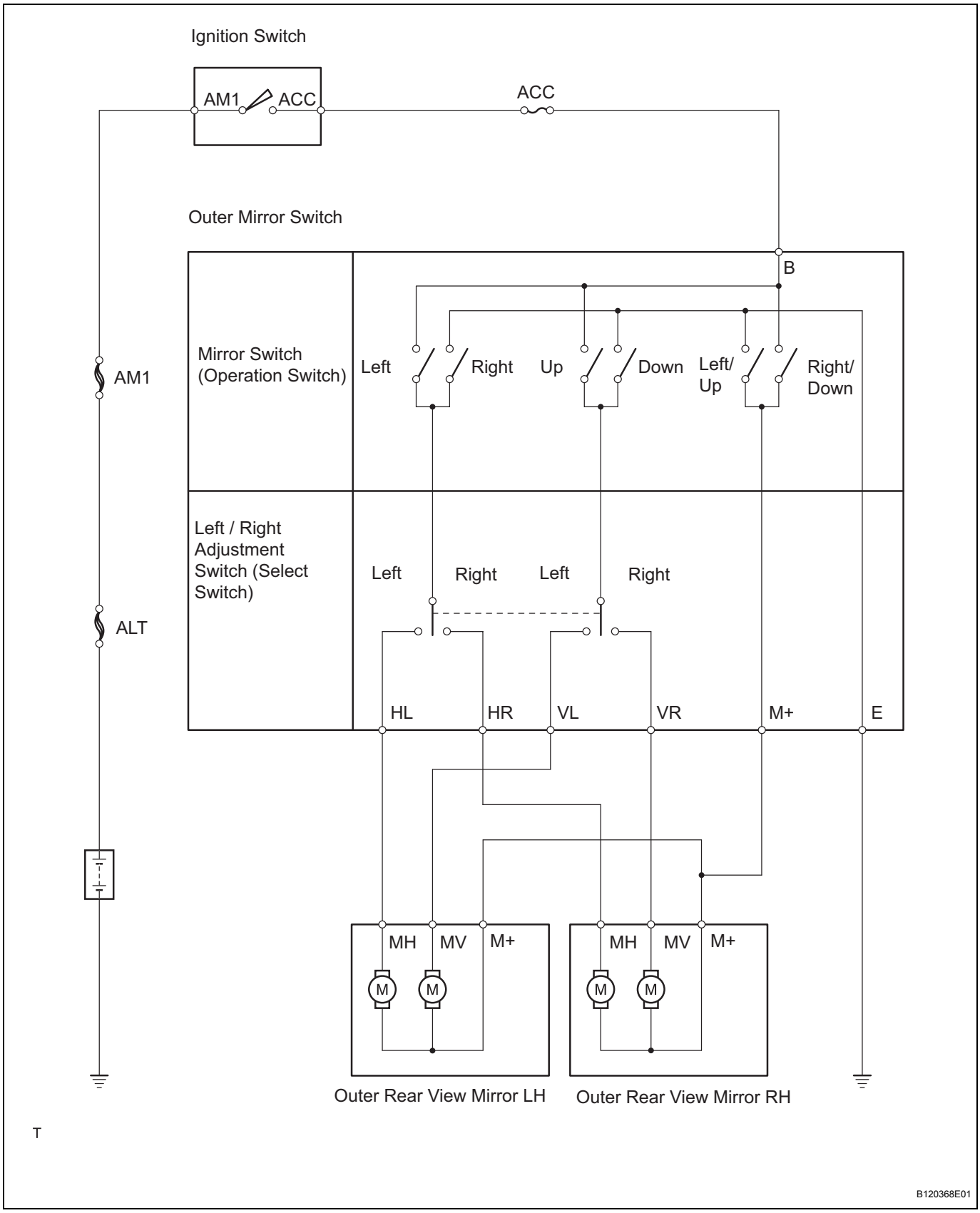
1. **INSTALL OUTER REAR VIEW MIRROR ASSEMBLY LH**
   (a) Install the mirror with the 3 nuts.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   (b) Connect the connector.
2. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-18)**

POWER MIRROR CONTROL SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM

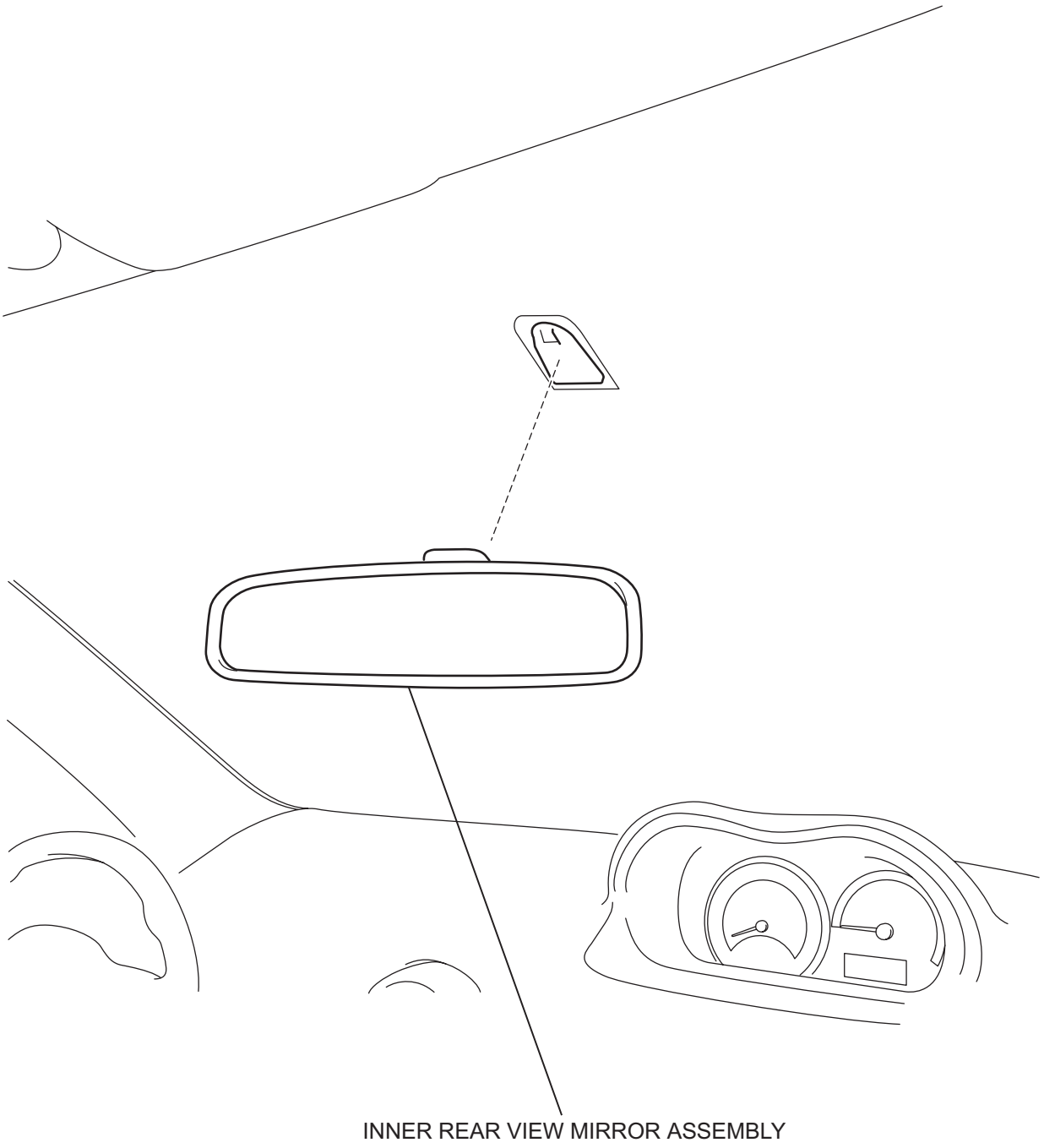


MI

T

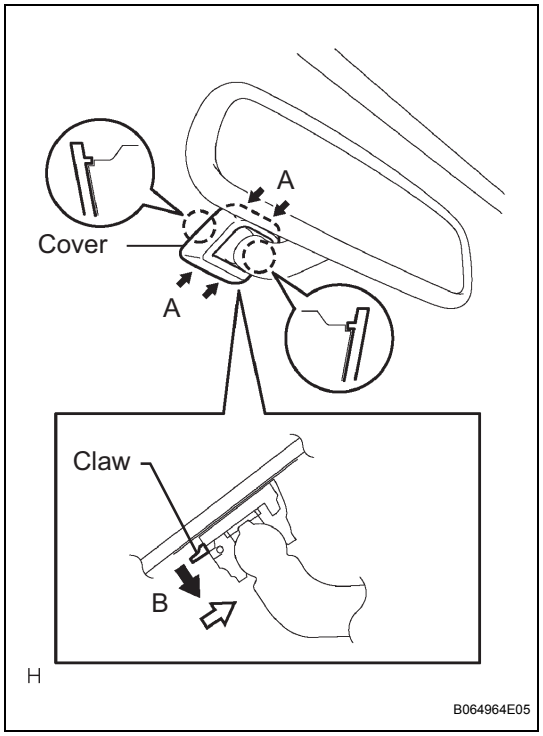
INNER REAR VIEW MIRROR

COMPONENTS



H

B119724E01

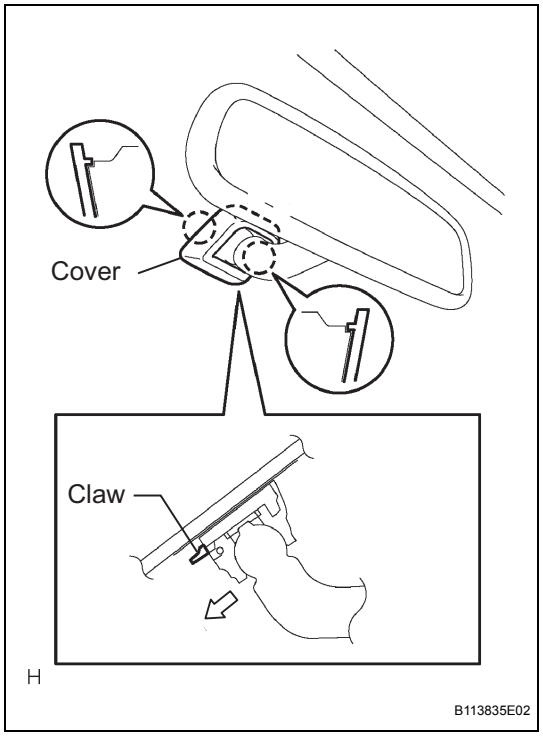


REMOVAL

1. REMOVE INNER REAR VIEW MIRROR ASSEMBLY

(a) Push the cover in the direction indicated by the arrows labeled A and remove it.

(b) While holding down the claw in the direction of the black arrow labeled B, slide the mirror in the direction of the white arrow and remove it.



INSTALLATION

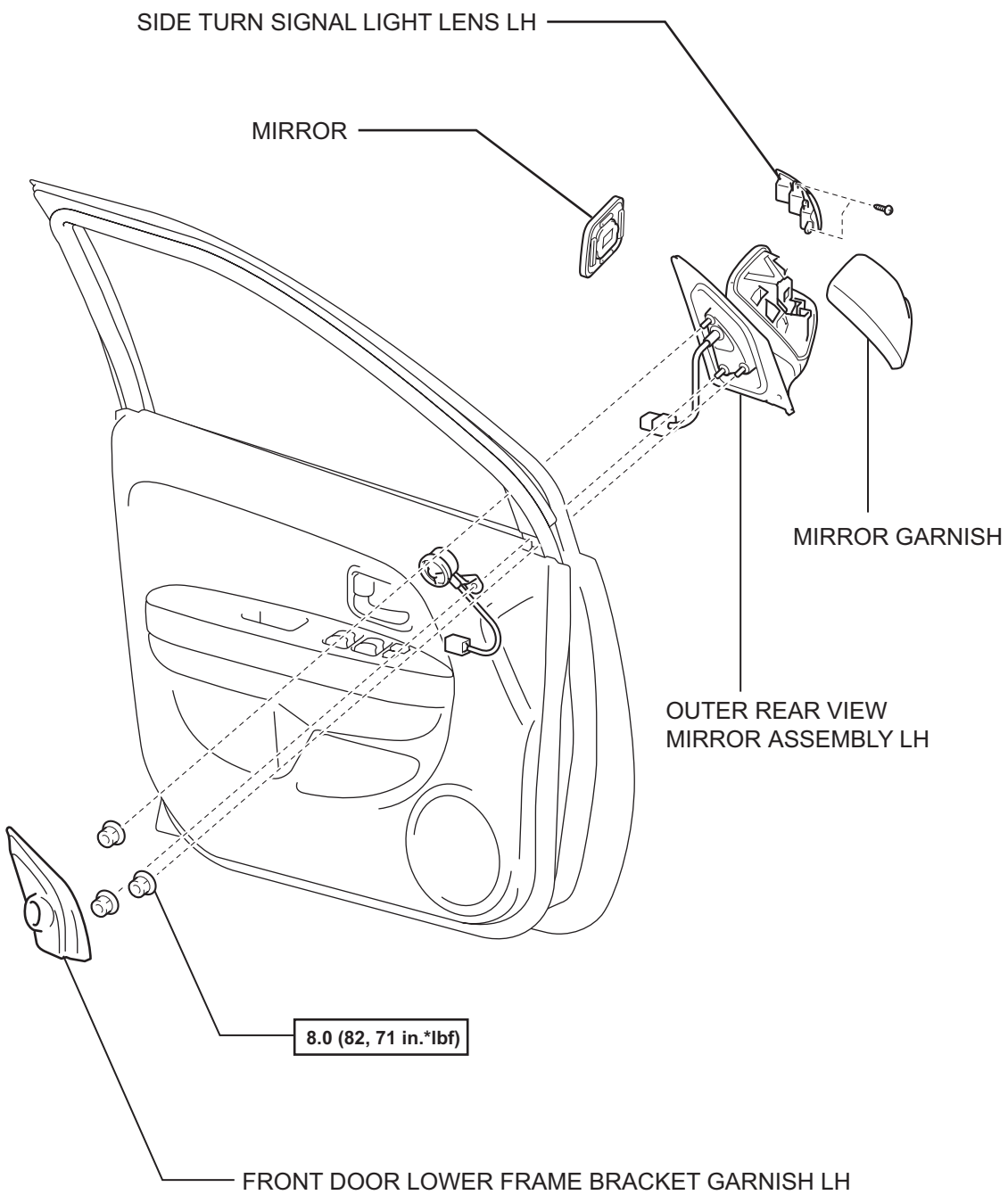
1. INSTALL INNER REAR VIEW MIRROR ASSEMBLY

(a) Install the mirror in the direction of the white arrow.

(b) Install the cover as shown in the illustration.

OUTER REAR VIEW MIRROR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

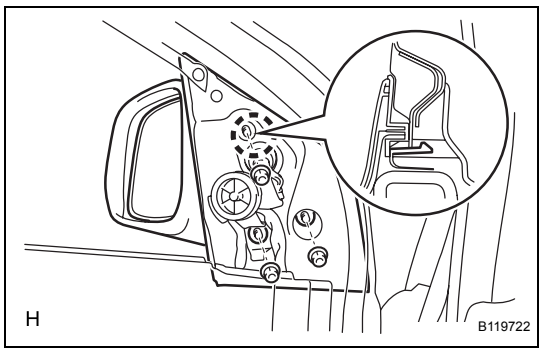
B119721E01

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

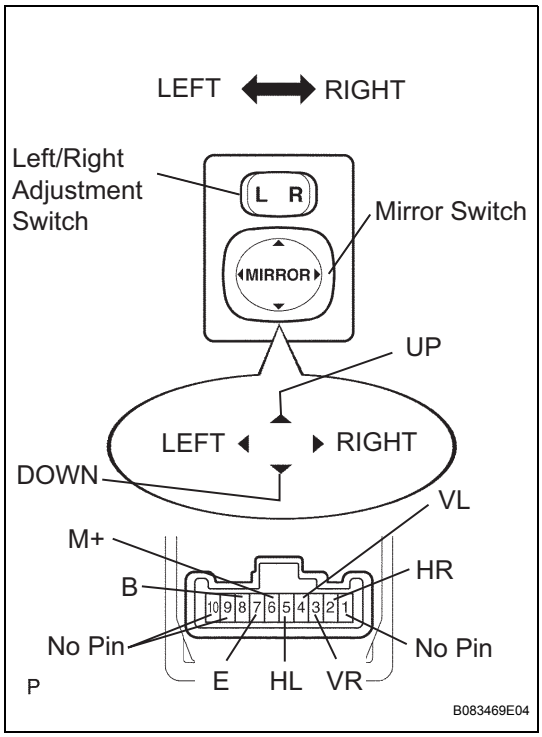
1. REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-8)



2. REMOVE OUTER REAR VIEW MIRROR ASSEMBLY LH

(a) Disconnect the connector.

(b) Remove the 3 nuts and mirror.



OUTER MIRROR SWITCH

INSPECTION

1. INSPECT OUTER MIRROR SWITCH ASSEMBLY

(a) Select L on the left/right adjustment switch:
Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
4 (VL) - 8 (B) 6 (M+) - 7 (E)	UP	Below 1 Ω
4 (VL) - 7 (E) 6 (M+) - 8 (B)	DOWN	
5 (HL) - 8 (B) 6 (M+) - 7 (E)	LEFT	
5 (HL) - 7 (E) 6 (M+) - 8 (B)	RIGHT	

If the result is not as specified, replace the switch assembly.

(b) Select R on the left/right adjustment switch:
Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
3 (VR) - 8 (B) 6 (M+) - 7 (E)	UP	Below 1 Ω
3 (VR) - 7 (E) 6 (M+) - 8 (B)	DOWN	
2 (HR) - 8 (B) 6 (M+) - 7 (E)	LEFT	
2 (HR) - 7 (E) 6 (M+) - 8 (B)	RIGHT	

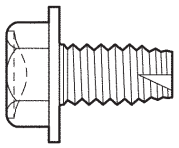
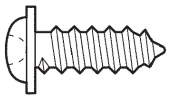
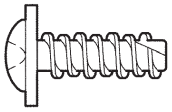
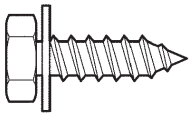
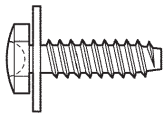
If the result is not as specified, replace the switch assembly.

REMOVAL

1. BOLT, SCREW AND NUT TABLE

HINT:

All bolts, screws and nuts relevant to installing and removing the instrument panel are shown along with their alphabet codes in the table below.

Code	Shape	Code	Shape	Code	Shape
<A>	 φ = 8 (0.31) L = 15 (0.59) 90105-08120	<B>	 φ = 4 (0.16) L = 14 (0.55) 93560-14014	<C>	 φ = 5 (0.20) L = 14 (0.55) 93568-15014
<D>	 φ = 6 (0.24) L = 16 (0.63) 90159-60200	<E>	 φ = 5 (0.20) L = 16 (0.63) 90159-50068		

mm (in.) (L = Length)

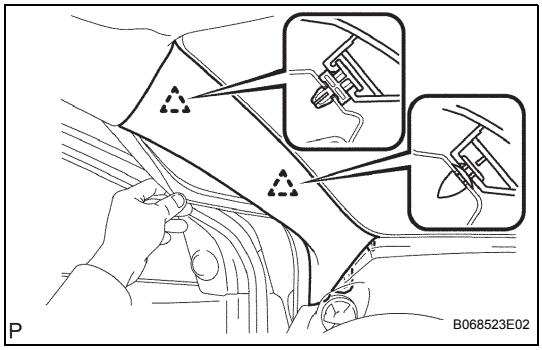
P B069911E04

IP

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



P B068523E02

3. REMOVE FRONT PILLAR GARNISH LH

(a) Using a screwdriver, detach the 2 clips and remove the front pillar garnish.

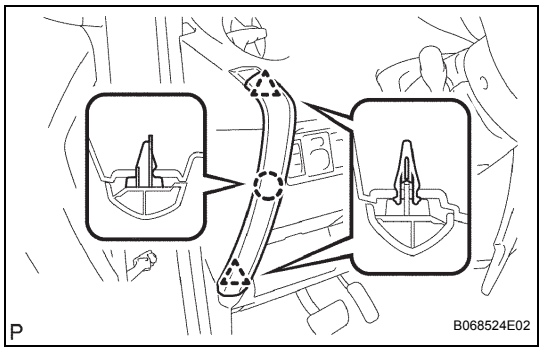
HINT:

Tape the screwdriver tip before use.

4. REMOVE FRONT PILLAR GARNISH RH

HINT:

Use the same procedures for the RH side and LH side.

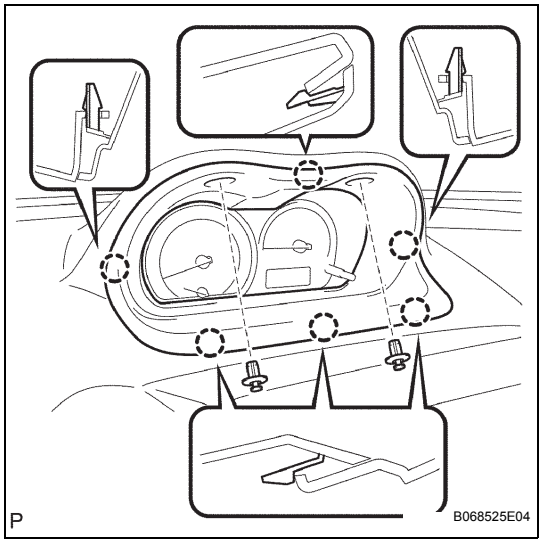


5. REMOVE INSTRUMENT PANEL FINISH LOWER PANEL LH

(a) Using a screwdriver, detach the 2 clips and claw, and remove the instrument panel finish lower panel.
HINT:
Tape the screwdriver tip before use.

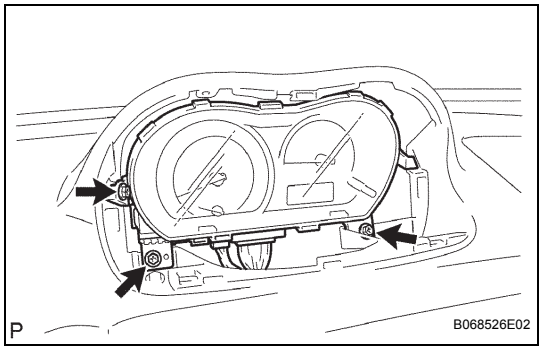
6. REMOVE INSTRUMENT PANEL FINISH LOWER PANEL RH

HINT:
Use the same procedures for the RH side and LH side.



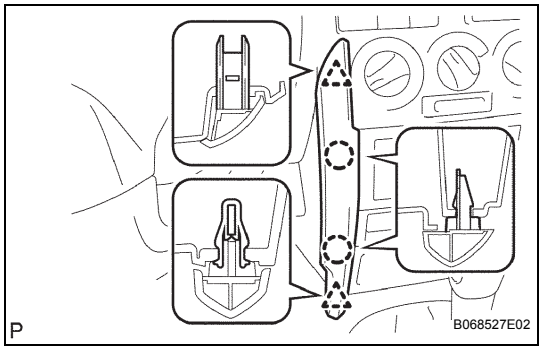
7. REMOVE INSTRUMENT CLUSTER FINISH PANEL

(a) Remove the 2 clips.
(b) Using a screwdriver, detach the 6 claws and remove the instrument cluster finish panel.
HINT:
Tape the screwdriver tip before use.



8. REMOVE COMBINATION METER ASSEMBLY

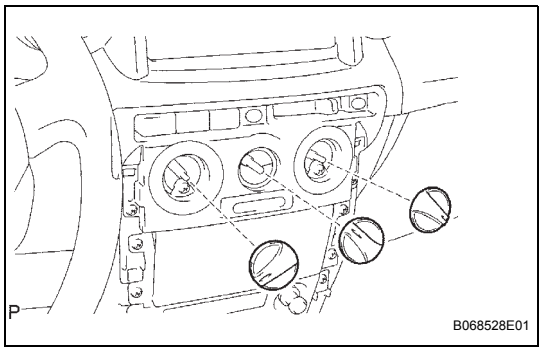
(a) Remove the 3 screws.
(b) Disconnect the connectors and remove the combination meter.



9. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

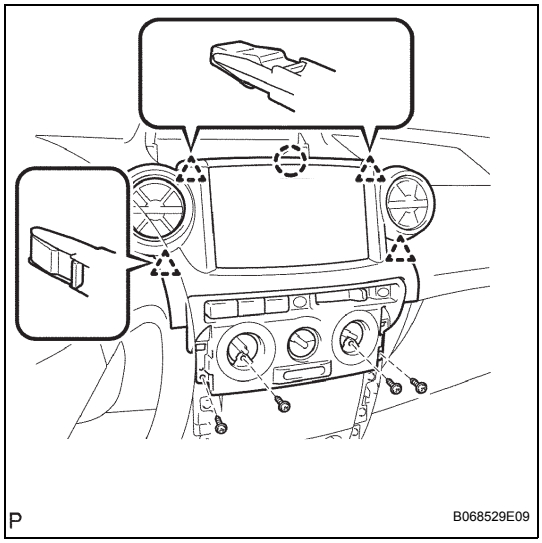
(a) Using a screwdriver, detach the 2 clips and 2 claws, and remove the instrument cluster finish panel garnish.
HINT:
Tape the screwdriver tip before use.

10. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH



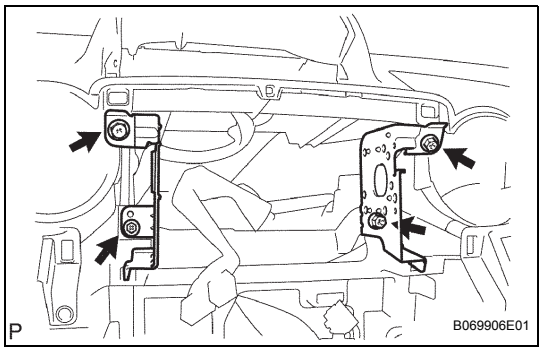
11. REMOVE HEATER CONTROL KNOB

(a) Remove the 3 heater control knobs.



12. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER

(a) Remove the 4 screws.
(b) Detach the 4 clips and claw, and remove the instrument cluster finish panel.
(c) Disconnect the connectors.

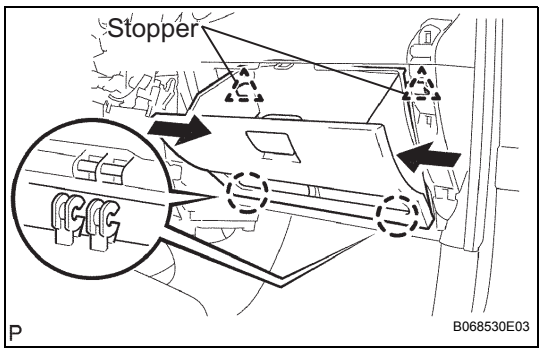


13. REMOVE NO. 1 RADIO BRACKET

(a) Remove the 2 screws and radio bracket.

14. REMOVE NO. 2 RADIO BRACKET

(a) Remove the 2 screws and radio bracket.



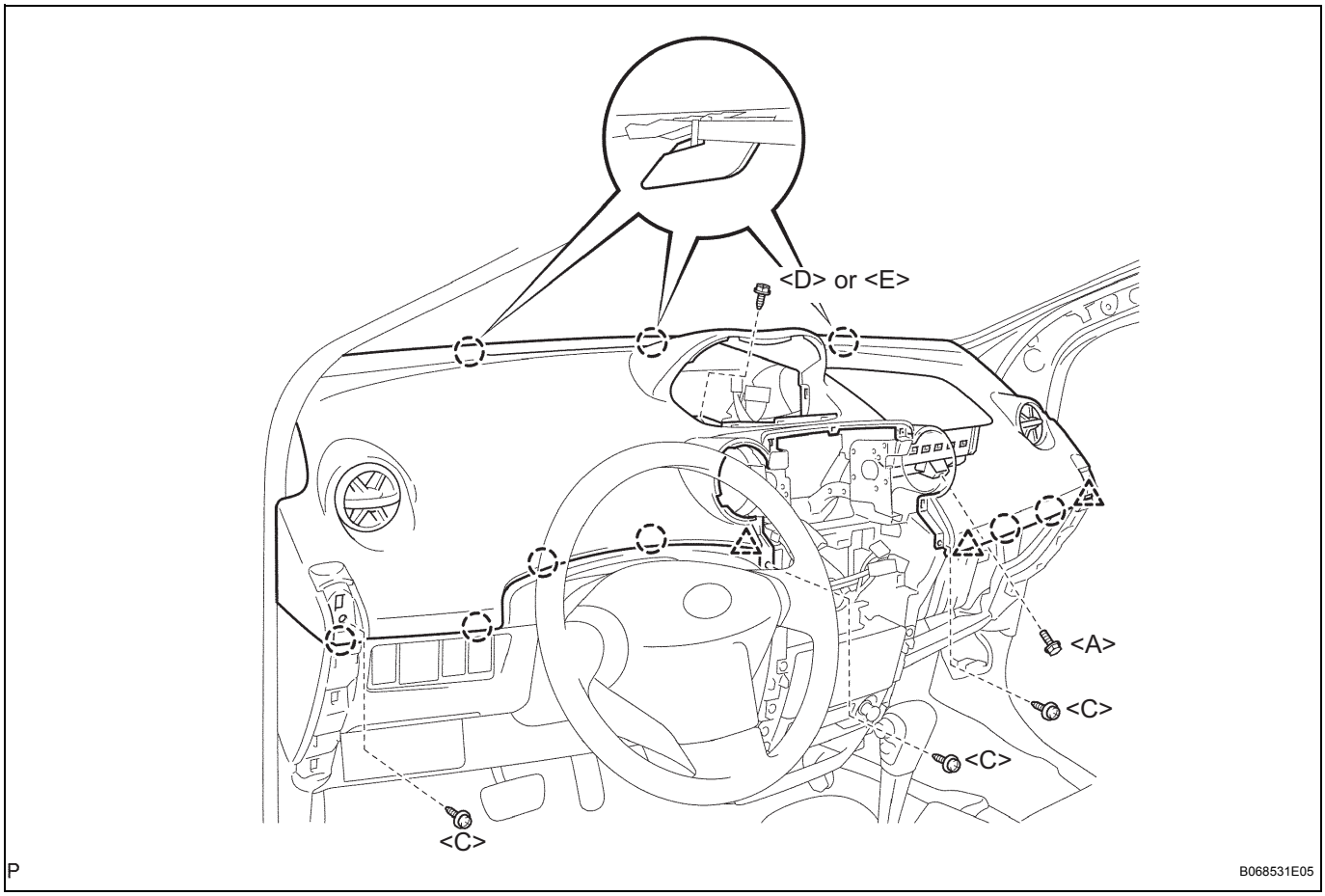
15. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY

(a) Push in the sides of the upper part of the glove compartment door to release the stoppers.
(b) Pull the glove compartment door and remove it.

16. DISCONNECT PASSENGER AIRBAG CONNECTOR

17. REMOVE INSTRUMENT PANEL SUB-ASSEMBLY

(a) Remove the 4 screws and bolt.
(b) Detach the 3 clips and 9 claws.
(c) Disconnect the connectors.
(d) Pull the instrument panel and remove it.

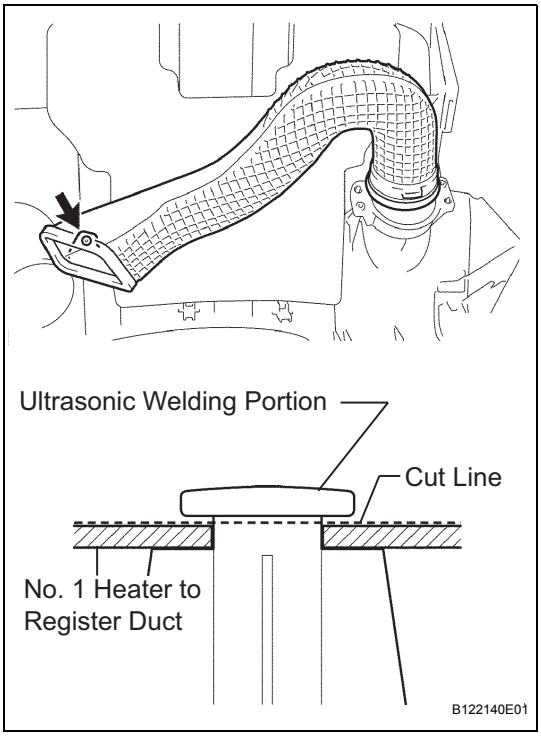

<D> or <E>
<A>
<C>
<C>
<C>
P
B068531E05

DISASSEMBLY

1. **REMOVE FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-302)**

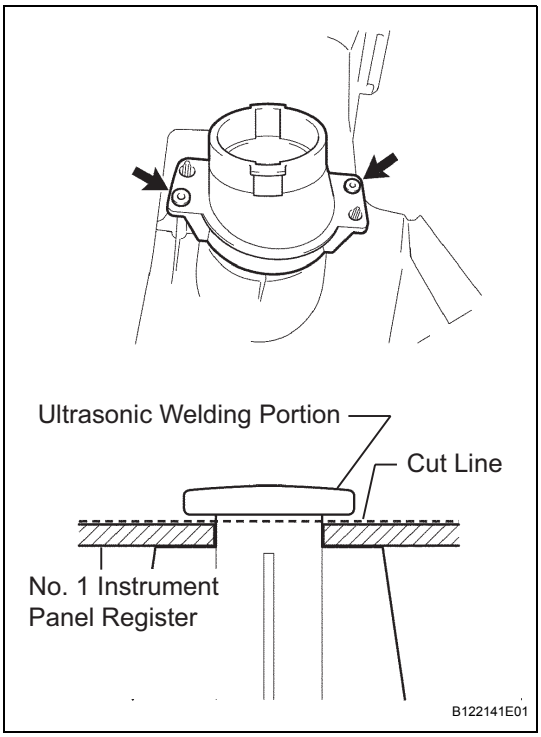
2. **REMOVE NO. 1 HEATER TO REGISTER DUCT**
   (a) Using nippers, cut off the ultrasonic welding portion as shown in the illustration to remove the No. 1 heater to register duct from the instrument panel.

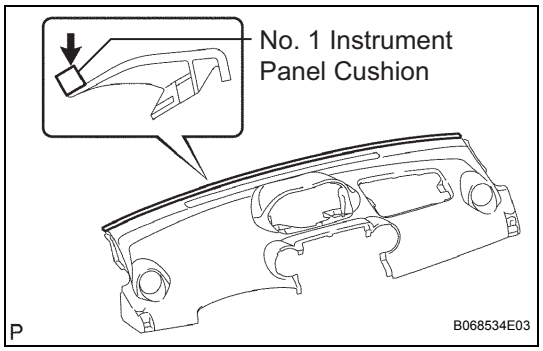
3. **REMOVE NO. 3 HEATER TO REGISTER DUCT**
   HINT:
   Use the same procedures described for the No. 1 heater to register duct.



IP

4. **REMOVE NO. 1 INSTRUMENT PANEL REGISTER ASSEMBLY**
   (a) Using nippers, cut off the ultrasonic welding portion as shown in the illustration to remove the No. 1 instrument panel register assembly from the instrument panel.

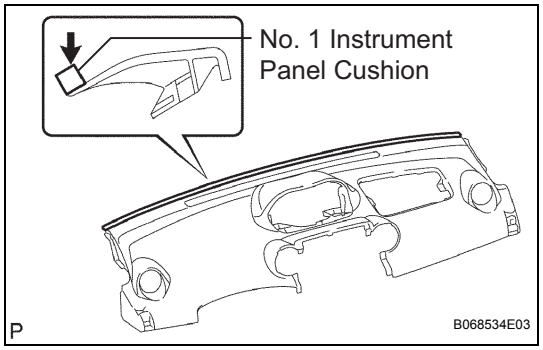




5. REMOVE NO. 1 INSTRUMENT PANEL CUSHION

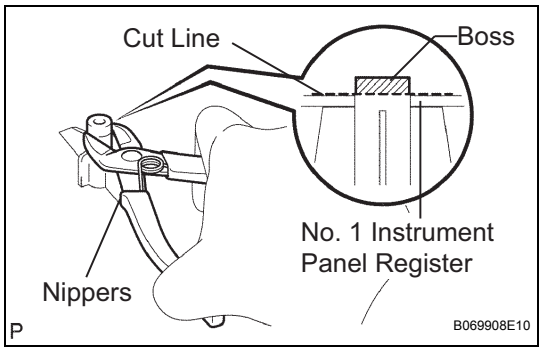
(a) Remove the No. 1 instrument panel cushion from the instrument panel.

REASSEMBLY



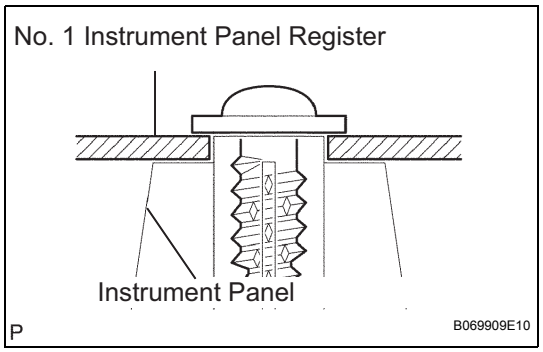
1. INSTALL NO. 1 INSTRUMENT PANEL CUSHION

(a) Install the No. 1 instrument panel cushion to the instrument panel.

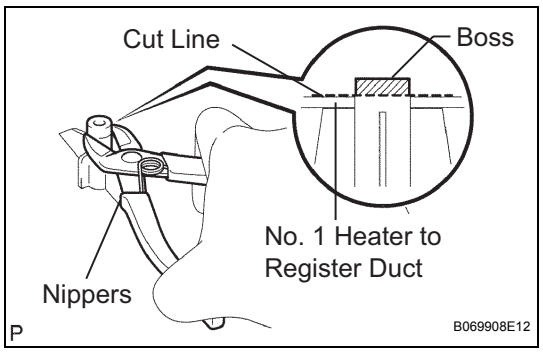


2. INSTALL NO. 1 INSTRUMENT PANEL REGISTER ASSEMBLY

(a) When replacing the instrument panel with a new one:
Cut the boss off using nippers, as shown in the illustration.



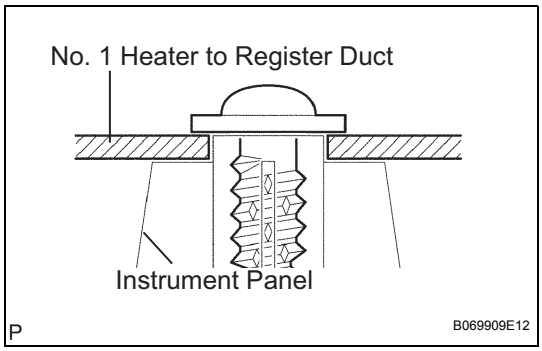
(b) Install the No. 1 instrument panel register to the instrument panel with a screw.



3. INSTALL NO. 1 HEATER TO REGISTER DUCT

(a) When replacing the instrument panel with a new one:
Cut the boss off using nippers, as shown in the illustration.

IP



(b) Install the No. 1 heater to register duct to the instrument panel with a screw.

4. INSTALL NO. 3 HEATER TO REGISTER DUCT

HINT:
Use the same procedures described for the No. 1 heater to register duct.

5. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-302)

INSTALLATION

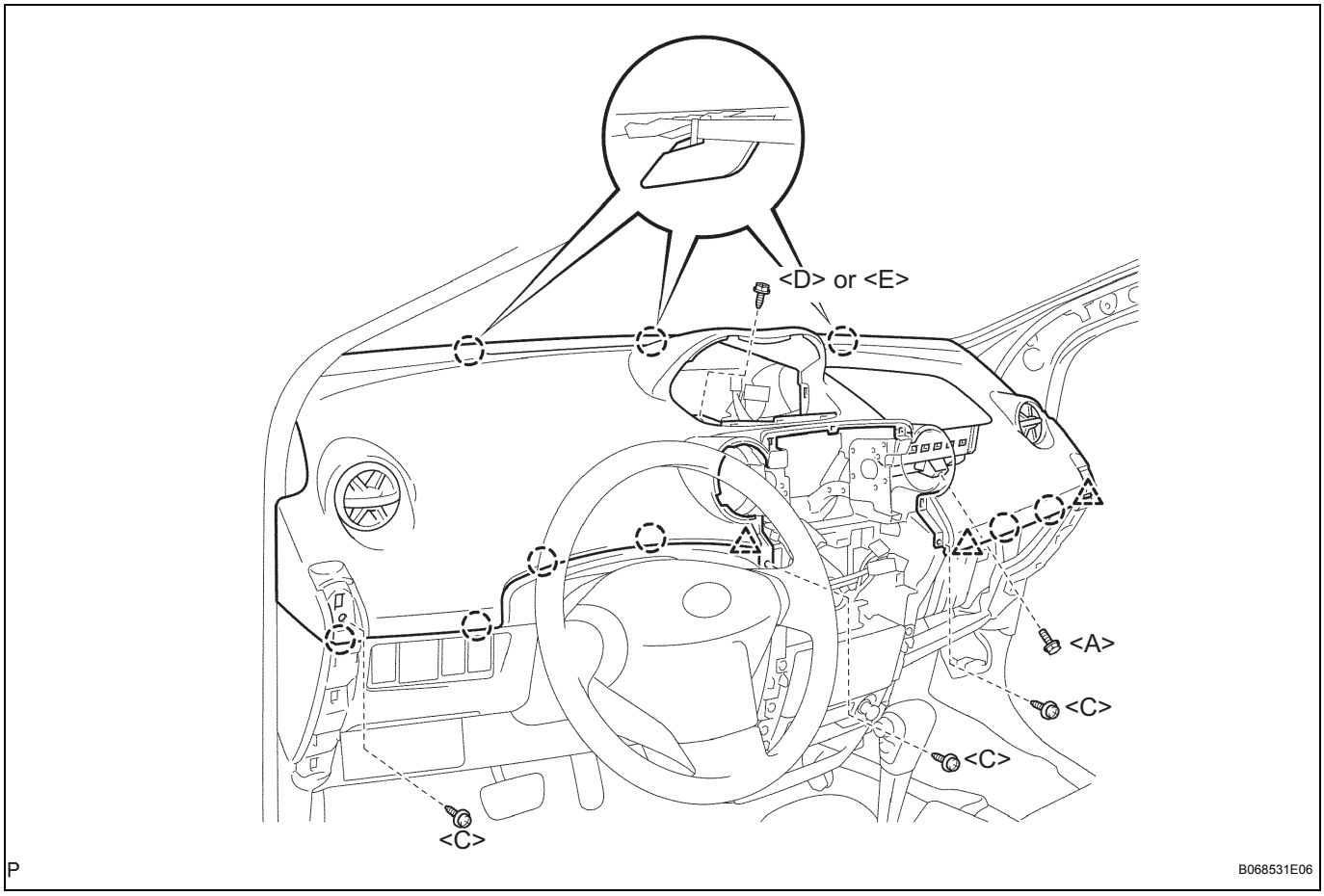
1. INSTALL INSTRUMENT PANEL SUB-ASSEMBLY

(a) Set the instrument panel.

(b) Connect the connectors.

(c) Attach the 3 clips and 9 claws to install the instrument panel.

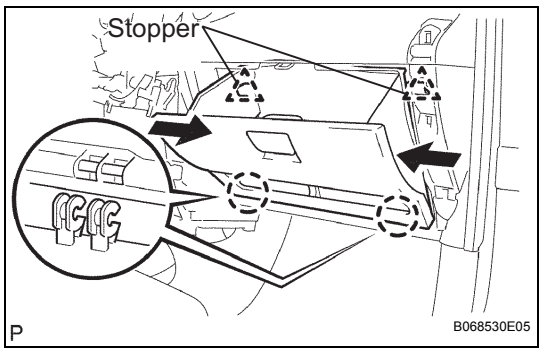
(d) Install the 4 screws and bolt.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



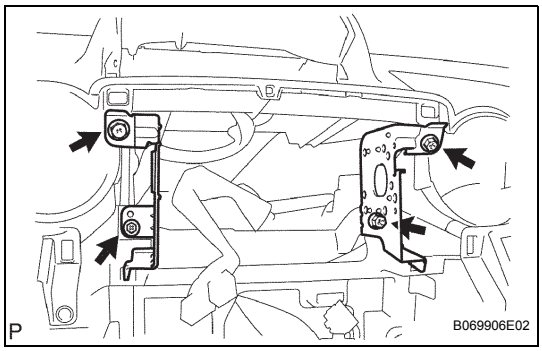
2. CONNECT PASSENGER AIRBAG CONNECTOR

3. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY

(a) Push in the sides of the glove compartment door, as indicated by the arrows in the illustration. Then close the door to engage it to the 2 stoppers.

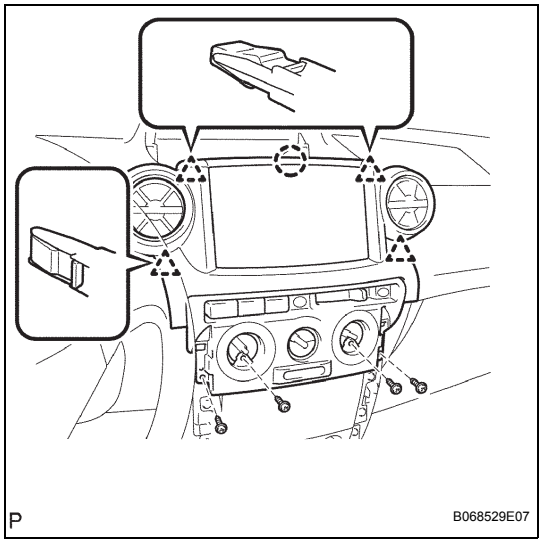


IP

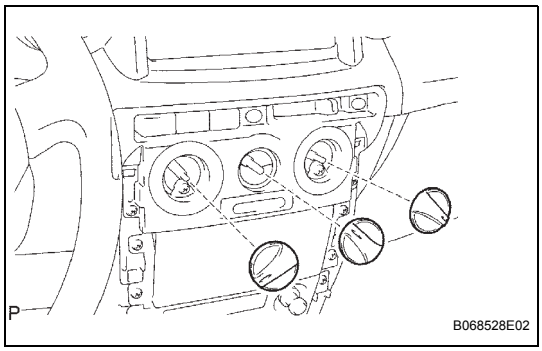


4. **INSTALL NO. 1 RADIO BRACKET**
   (a) Install the radio bracket with the 2 screws.

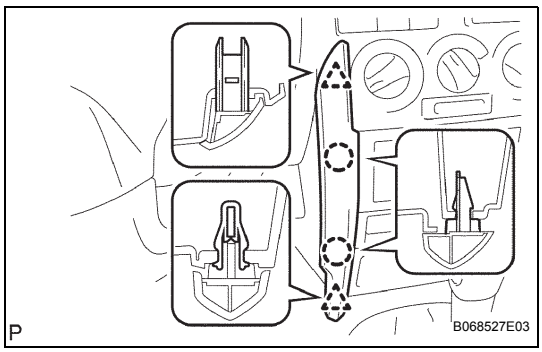
5. **INSTALL NO. 2 RADIO BRACKET**
   (a) Install the radio bracket with the 2 screws.



6. **INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY CENTER**
   (a) Connect the connectors.
   (b) Attach the 4 clips and claw to install the instrument panel cluster finish panel.
   (c) Install the 4 screws.

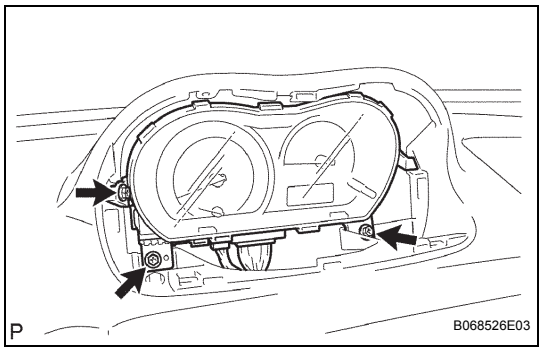


7. **INSTALL HEATER CONTROL KNOB**
   (a) Install the 3 heater control knobs.



8. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH**
   (a) Attach the 2 clips and 2 claws to install the instrument cluster finish panel garnish.

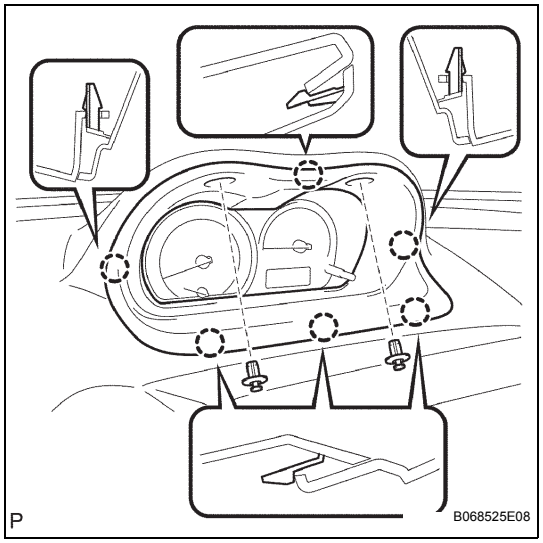
9. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH**



10. INSTALL COMBINATION METER ASSEMBLY

(a) Connect the connectors.

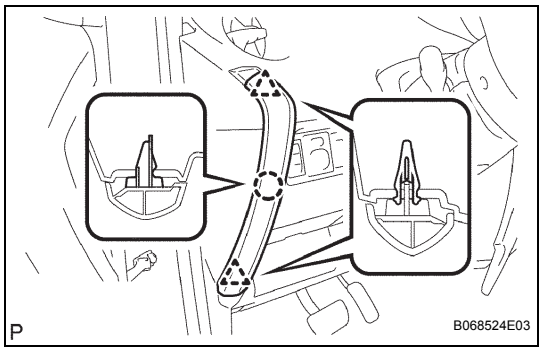
(b) Install the combination meter with the 3 screws.



11. INSTALL INSTRUMENT CLUSTER FINISH PANEL

(a) Attach the 6 claws to install the instrument cluster finish panel.

(b) Install the 2 clips.



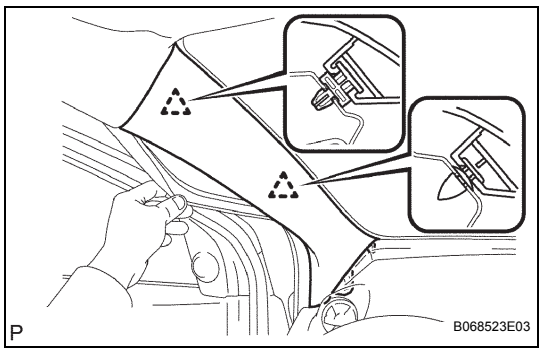
12. INSTALL INSTRUMENT PANEL FINISH LOWER PANEL LH

(a) Attach the 2 clips and claw to install the instrument panel finish lower panel.

13. INSTALL INSTRUMENT PANEL FINISH LOWER PANEL RH

HINT:

Use the same procedures for the RH side and LH side.



14. INSTALL FRONT PILLAR GARNISH LH

(a) Attach the 2 clips to install the front pillar garnish.

15. INSTALL FRONT PILLAR GARNISH RH

HINT:

Use the same procedures for the RH side and LH side.

16. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

17. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

18. CHECK SRS WARNING LIGHT

(a) Check the SRS warning light (see page RS-28).

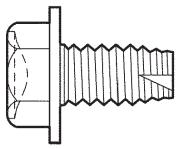
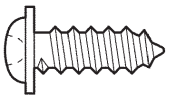
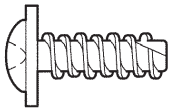
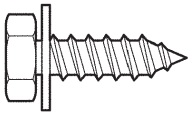
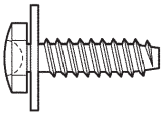
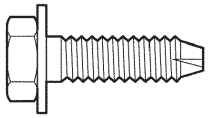
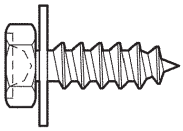
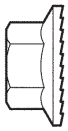
REMOVAL

1. BOLT, SCREW AND NUT TABLE

HINT:

All bolts, screws and nuts relevant to installing and removing the instrument panel are shown along with their alphabet codes in the table below.

mm (in.) (L = Length)

Code	Shape	Code	Shape	Code	Shape
<A>	 φ = 8 (0.31) L = 15 (0.59) 90105-08120	<B>	 φ = 4 (0.16) L = 14 (0.55) 93560-14014	<C>	 φ = 5 (0.20) L = 14 (0.55) 93568-15014
<D>	 φ = 6 (0.24) L = 16 (0.63) 90159-60200	<E>	 φ = 5 (0.20) L = 16 (0.63) 90159-50068	<F>	 φ = 6 (0.24) L = 22 (0.87) 90119-06022
<G>	 φ = 6 (0.24) L = 19 (0.75) 90159-60431	<H>	 φ = 6 (0.24) 90179-06115		

P B069912E03

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

3. REMOVE INSTRUMENT PANEL SUB-ASSEMBLY

(a) Remove the instrument panel (see page IP-4).

4. REMOVE STEERING PAD ASSEMBLY (See page RS-288)

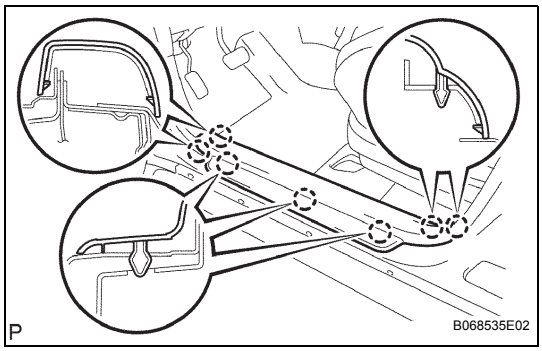
5. REMOVE STEERING WHEEL ASSEMBLY (See page SR-7)

6. REMOVE STEERING COLUMN COVER (See page SR-7)

7. REMOVE HEADLIGHT DIMMER SWITCH ASSEMBLY (See page LI-31)

IP

8. REMOVE WINDSHIELD WIPER SWITCH ASSEMBLY (See page WW-21)

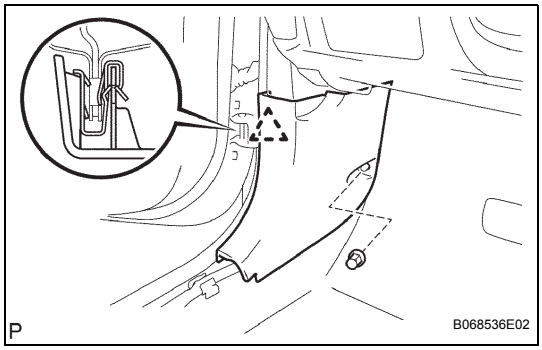


9. REMOVE FRONT DOOR SCUFF PLATE LH

(a) Using a screwdriver, detach the 7 claws and remove the front door scuff plate.
HINT:
Tape the screwdriver tip before use.

10. REMOVE FRONT DOOR SCUFF PLATE RH

HINT:
Use the same procedures for the RH side and LH side.



11. REMOVE COWL SIDE TRIM BOARD LH

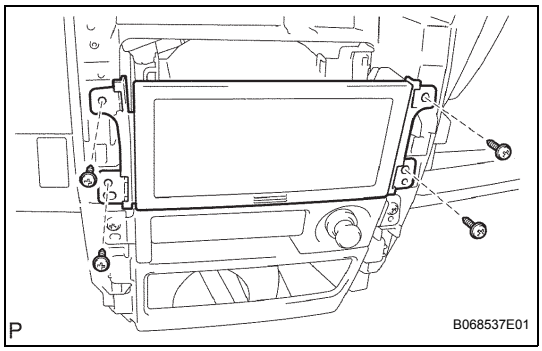
(a) Remove the clip.
(b) Using a screwdriver, detach the clip and remove the cowl side trim board.

12. REMOVE COWL SIDE TRIM BOARD RH

HINT:
Use the same procedures for the RH side and LH side.

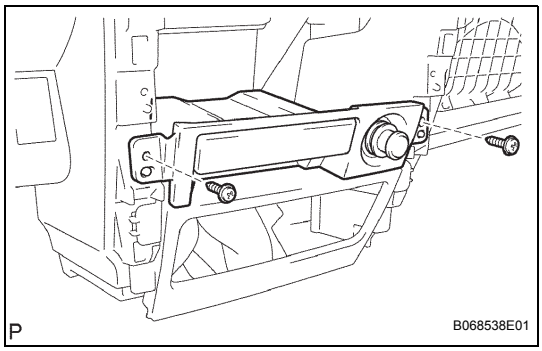
13. REMOVE HEATER CONTROL AND ACCESSORY ASSEMBLY (See page AC-100)

IP



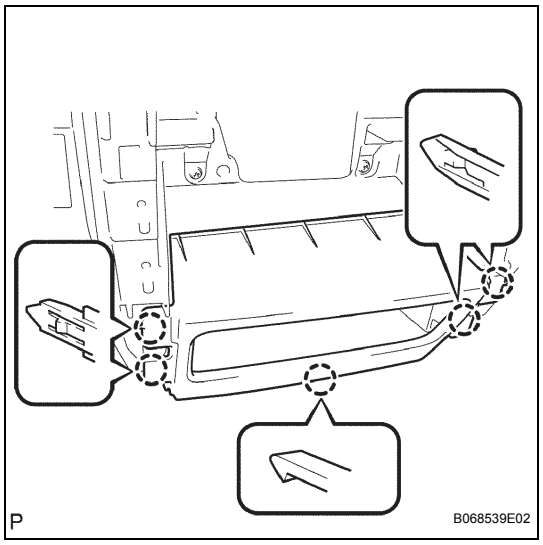
14. REMOVE INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER

(a) Remove the 4 screws and instrument cluster finish panel assembly center.
(b) Disconnect the connectors.



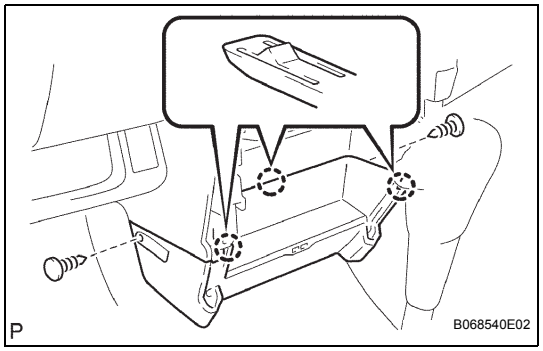
15. REMOVE FRONT ASH RECEPTACLE ASSEMBLY

(a) Remove the 2 screws and front ash receptacle.
(b) Disconnect the connectors.



16. REMOVE INSTRUMENT COVER LOWER CENTER

(a) Using a screwdriver, detach the 5 claws and remove the instrument cover lower center.
HINT:
Tape the screwdriver tip before use.



17. REMOVE INSTRUMENT PANEL FINISH PANEL LOWER CENTER

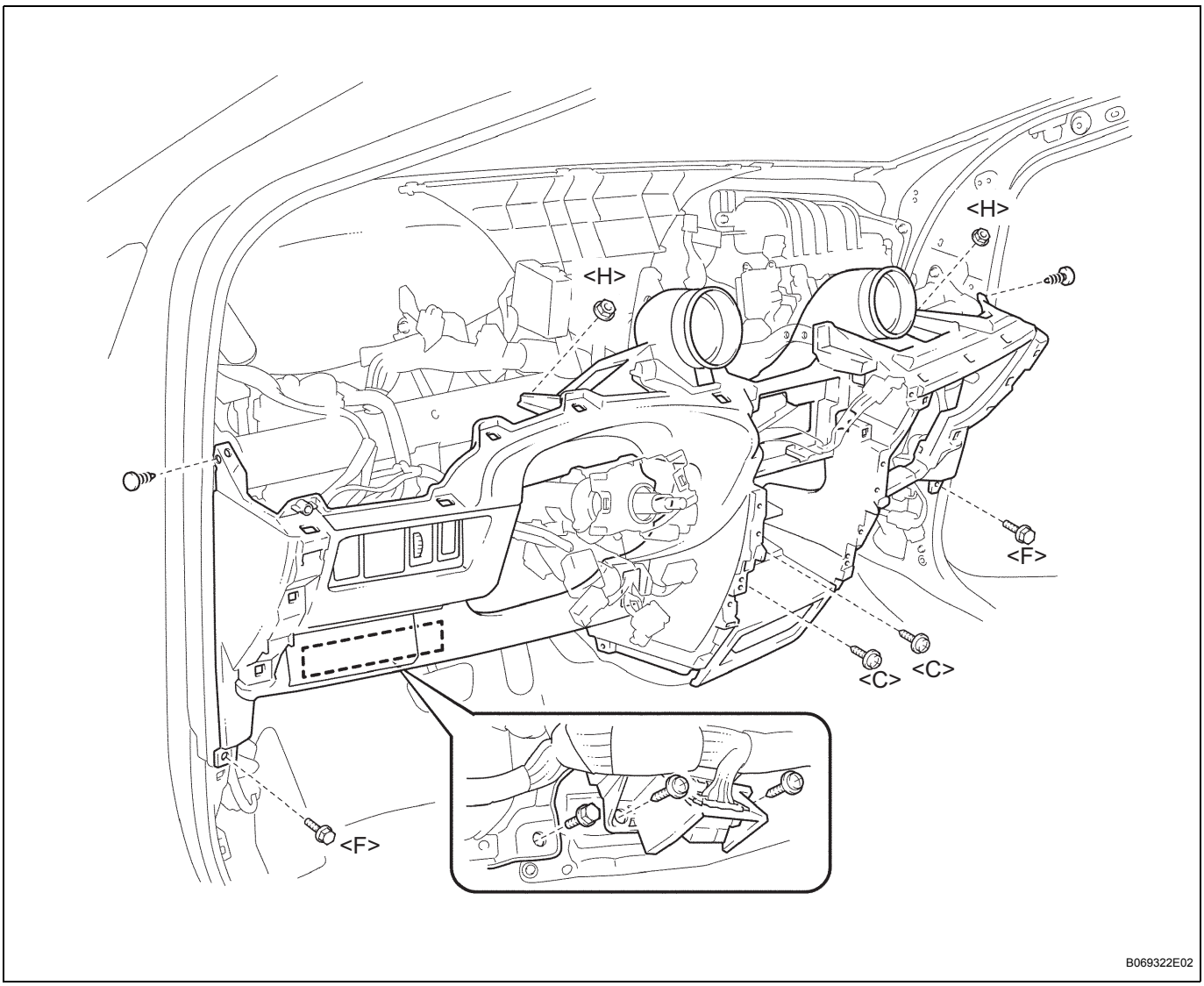
(a) Using a clip remover, remove the 2 clips.
(b) Using a screwdriver, detach the 3 claws and remove the instrument panel finish panel lower center.
HINT:
Tape the screwdriver tip before use.

18. REMOVE FUSE BOX OPENING COVER

19. REMOVE LOWER INSTRUMENT PANEL ASSEMBLY

(a) Disconnect the hood lock control cable.
(b) Using a clip remover, remove the 2 clips.
(c) Remove the 2 bolts, 2 nuts and 2 screws.
(d) Remove the 2 screws and bolt, and separate the instrument panel junction block.

(e) Remove the instrument panel.



UPPER INSTRUMENT PANEL

PRECAUTION

1. PRECAUTION FOR VEHICLE WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

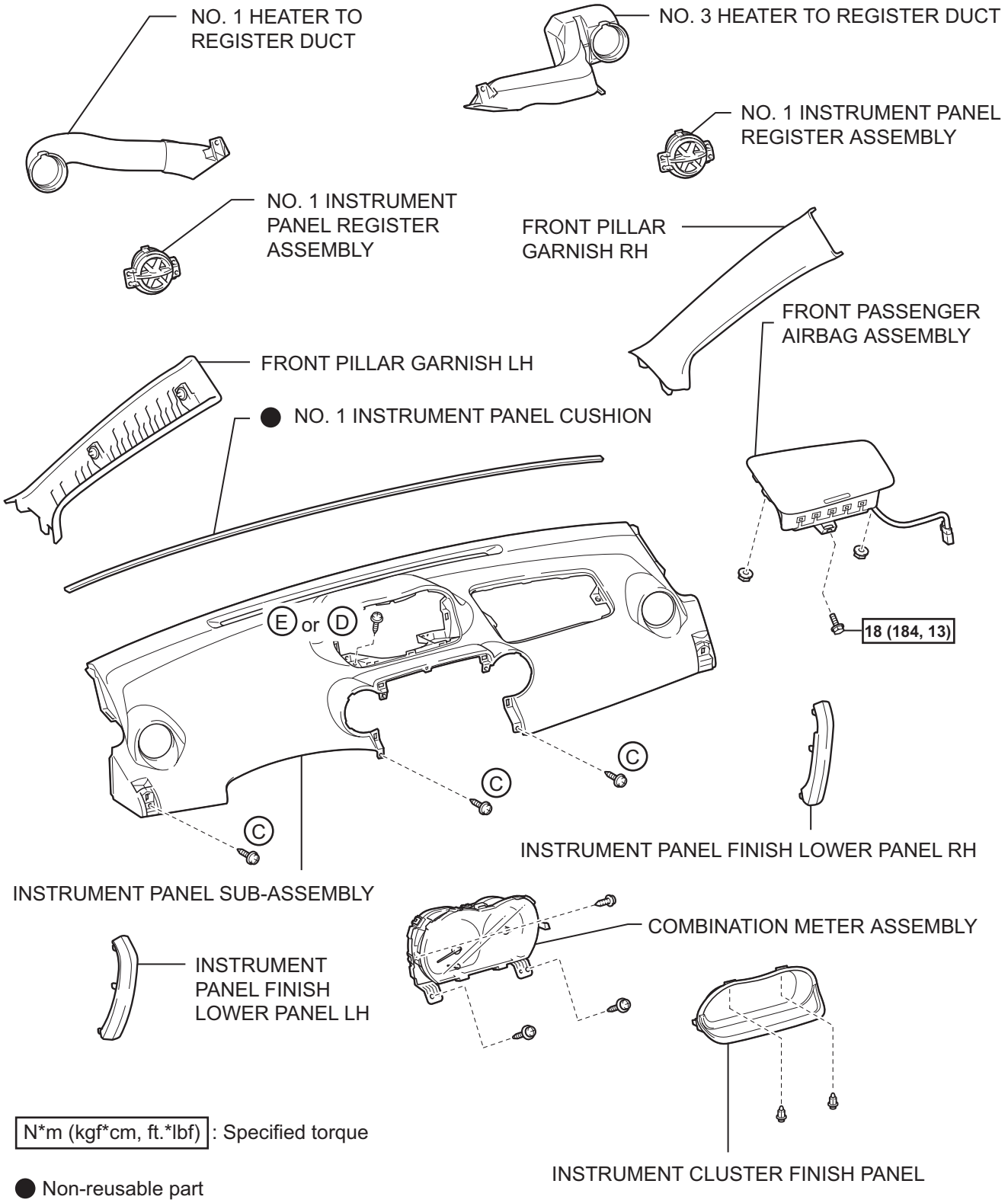
(a) Some operations in this section may affect the SRS airbags and seat belt pretensioner. Prior to performing the corresponding operations, read the SRS airbag NOTICE (see pageRS-1).

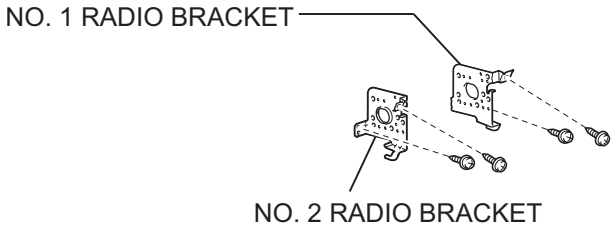
NOTICE:

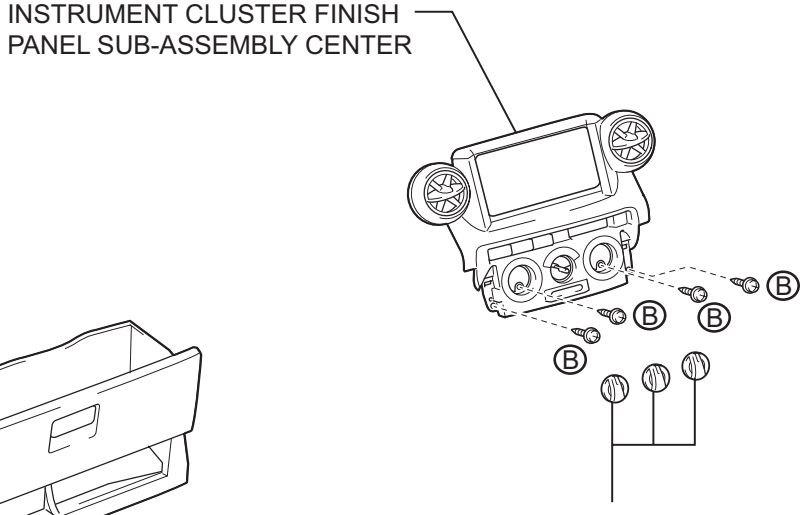
When disconnecting the negative (-) battery terminal, initialize the following systems after the terminal is reconnected.

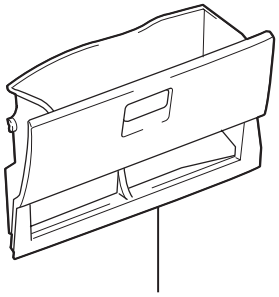
System Name	See Page
Sliding Roof System	RF-4

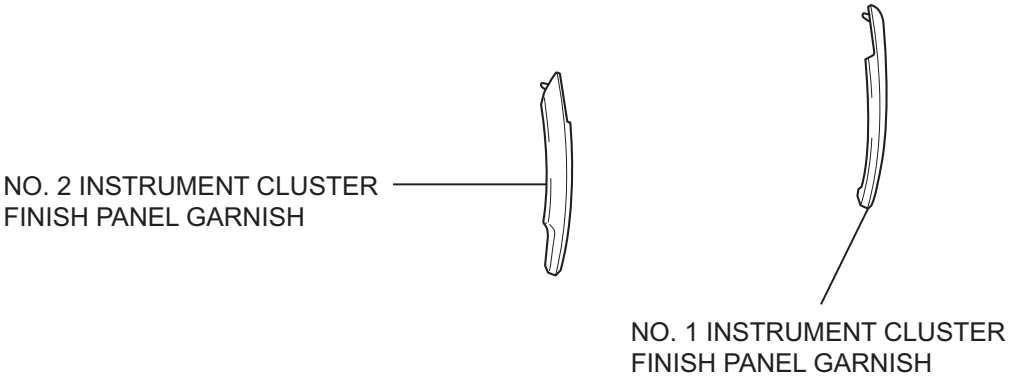
COMPONENTS


NO. 1 HEATER TO REGISTER DUCT
NO. 3 HEATER TO REGISTER DUCT
NO. 1 INSTRUMENT PANEL REGISTER ASSEMBLY
NO. 1 INSTRUMENT PANEL REGISTER ASSEMBLY
FRONT PILLAR GARNISH RH
FRONT PASSENGER AIRBAG ASSEMBLY
FRONT PILLAR GARNISH LH
● NO. 1 INSTRUMENT PANEL CUSHION
E or D
C
C
C
18 (184, 13)
INSTRUMENT PANEL FINISH LOWER PANEL RH
INSTRUMENT PANEL SUB-ASSEMBLY
COMBINATION METER ASSEMBLY
INSTRUMENT PANEL FINISH LOWER PANEL LH
INSTRUMENT CLUSTER FINISH PANEL
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
P
B117664E03





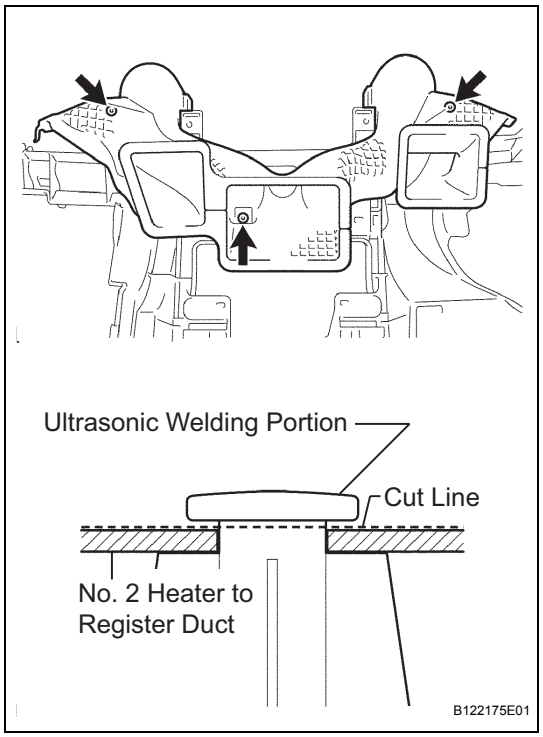




IP

P

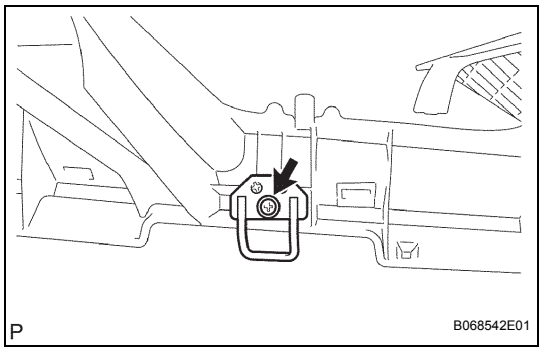
B121091E03



DISASSEMBLY

1. REMOVE NO. 2 HEATER TO REGISTER DUCT

(a) Using nippers, cut off the ultrasonic welding portion as shown in the illustration to remove the No. 2 heater to register duct from the instrument panel sub-assembly.



2. REMOVE GLOVE COMPARTMENT DOOR LOCK MOUNTING BRACKET

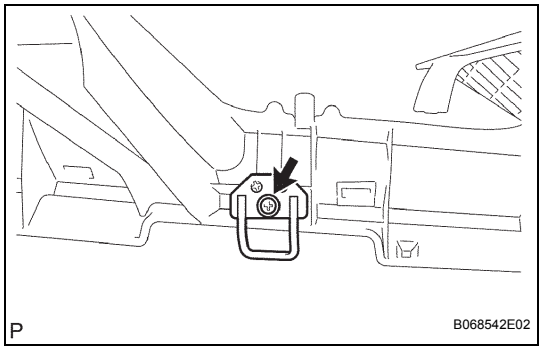
(a) Remove the screw and glove compartment door lock mounting bracket.

IP

REASSEMBLY

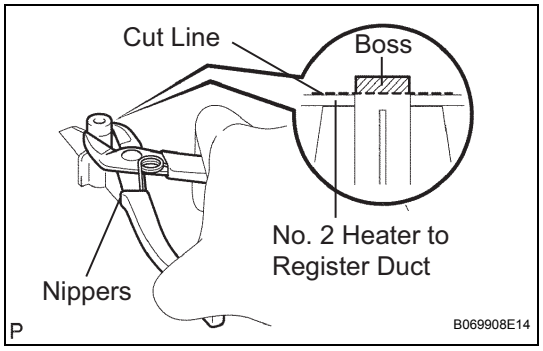
1. INSTALL GLOVE COMPARTMENT DOOR LOCK MOUNTING BRACKET

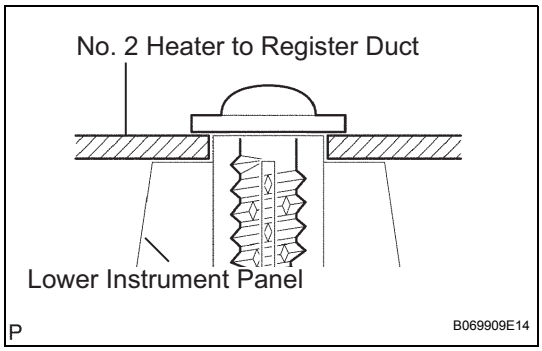
(a) Install the glove compartment door lock mounting bracket with the screw.



2. INSTALL NO. 2 HEATER TO REGISTER DUCT

(a) When replacing the lower instrument panel with a new one:
Cut the boss off using nippers, as shown in the illustration.





(b) Using a screw, install the No. 2 heater to register duct.

LOWER INSTRUMENT PANEL

PRECAUTION

1. PRECAUTION FOR VEHICLE WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

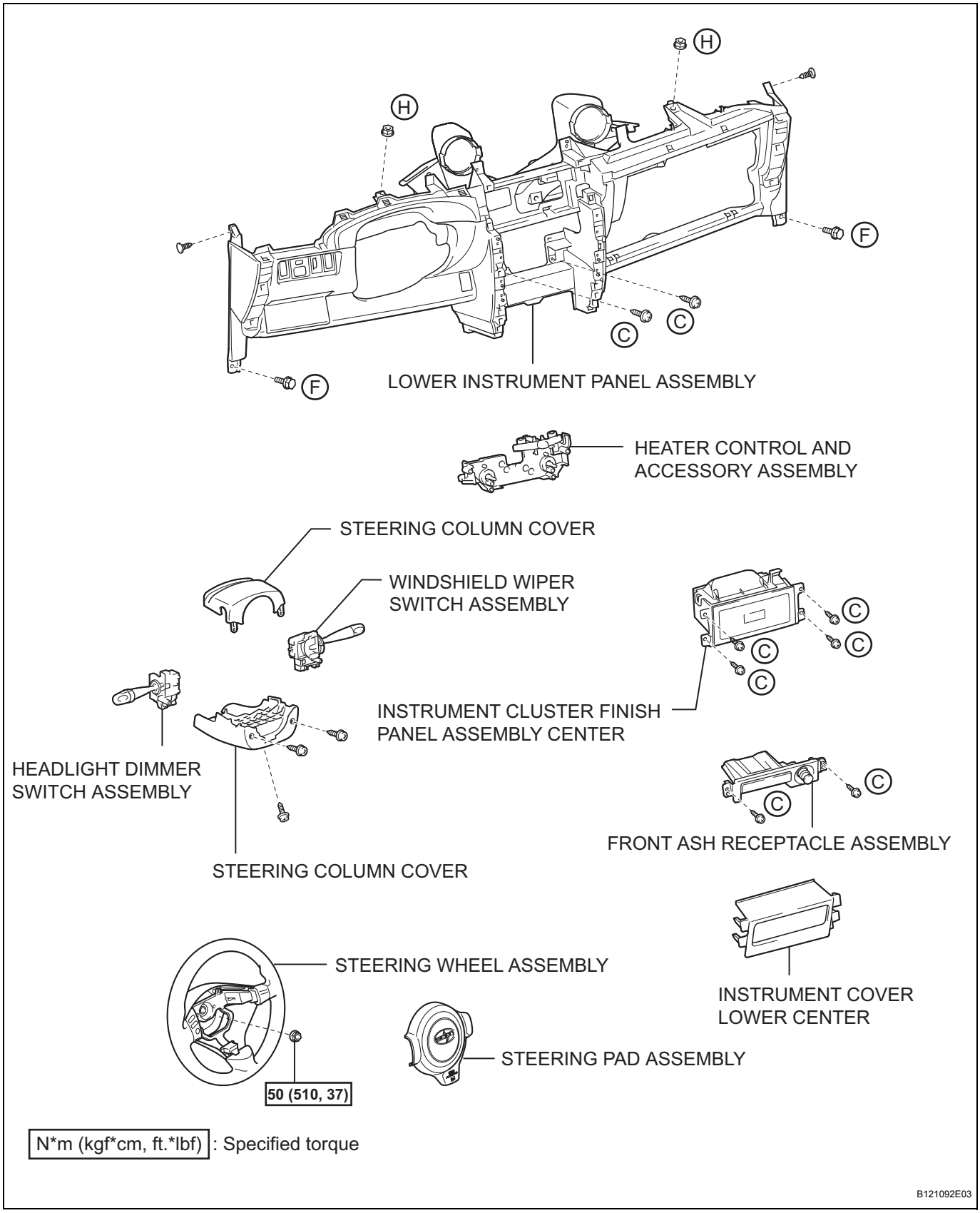
(a) Some operations in this section may affect the SRS airbags and seat belt pretensioner. Prior to performing the corresponding operations, read the SRS airbag NOTICE (see page RS-1).

NOTICE:

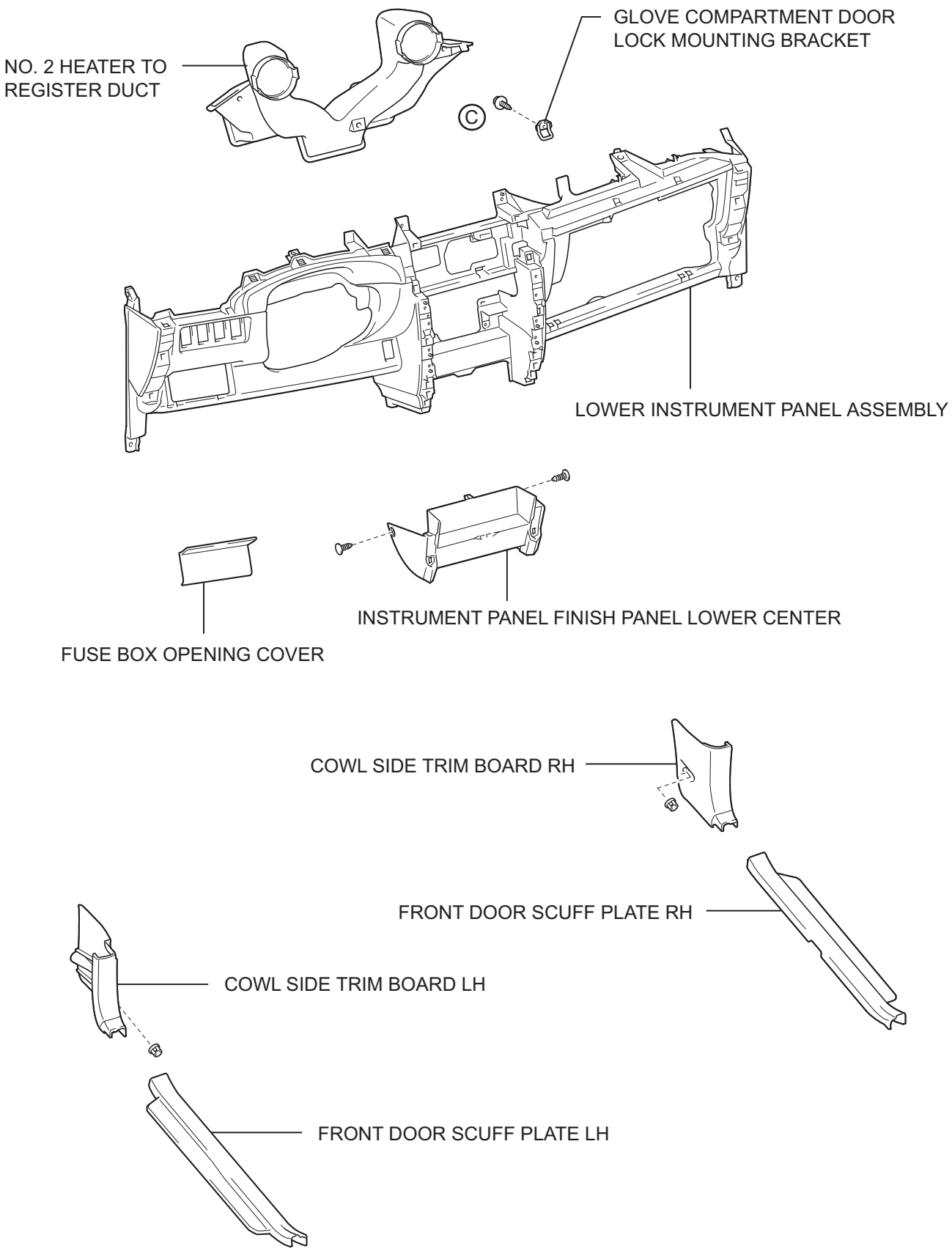
When disconnecting the negative (-) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Page
Sliding Roof System	RF-4

COMPONENTS



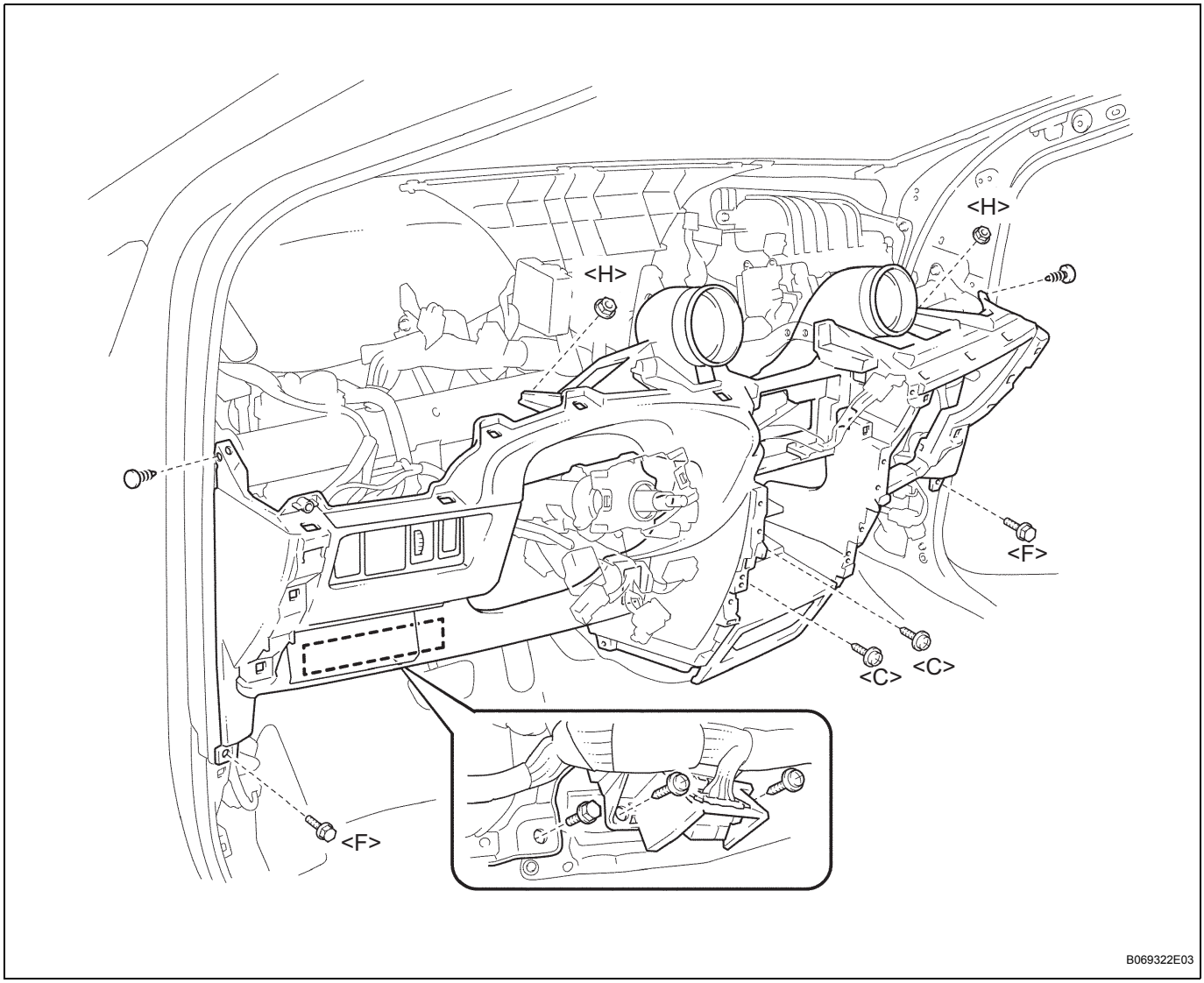
IP


NO. 2 HEATER TO REGISTER DUCT
GLOVE COMPARTMENT DOOR LOCK MOUNTING BRACKET
C
LOWER INSTRUMENT PANEL ASSEMBLY
INSTRUMENT PANEL FINISH PANEL LOWER CENTER
FUSE BOX OPENING COVER
COWL SIDE TRIM BOARD RH
FRONT DOOR SCUFF PLATE RH
COWL SIDE TRIM BOARD LH
FRONT DOOR SCUFF PLATE LH
P
B121093E02

INSTALLATION

1. INSTALL LOWER INSTRUMENT PANEL ASSEMBLY

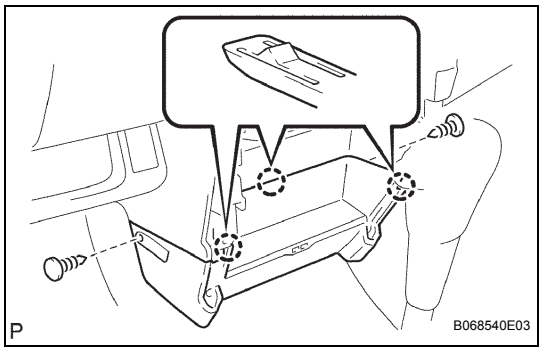
(a) Install the instrument panel.
(b) Install the instrument panel junction block assembly with the 2 screws and bolt.
(c) Install the 2 bolts, 2 nuts and 2 screws.
(d) Install the 2 clips.
(e) Connect the hood lock control cable.

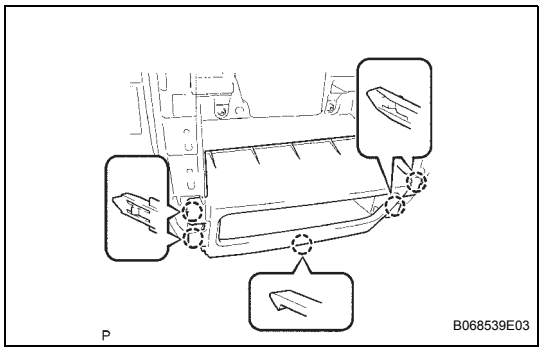


2. INSTALL FUSE BOX OPENING COVER

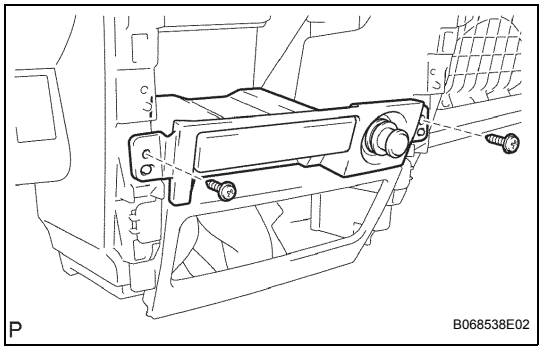
3. INSTALL INSTRUMENT PANEL FINISH PANEL LOWER CENTER

(a) Attach the 3 claws to install the instrument panel finish panel lower center.
(b) Install the 2 clips.

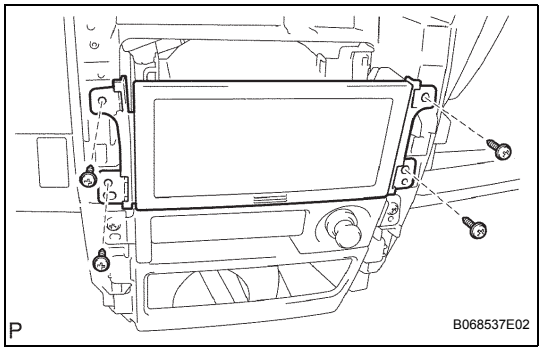




4. **INSTALL INSTRUMENT COVER LOWER CENTER**
   (a) Attach the 5 claws to install the instrument cover lower center.

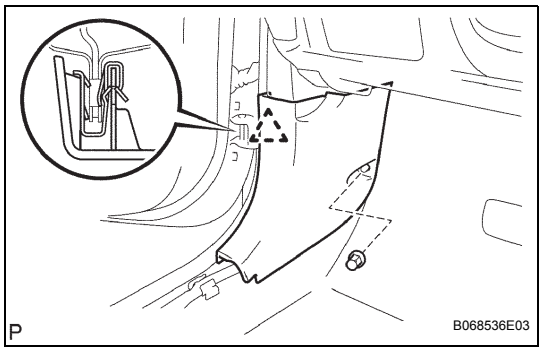


5. **INSTALL FRONT ASH RECEPTACLE ASSEMBLY**
   (a) Connect the connectors.
   (b) Install the front ash receptacle with the 2 screws.



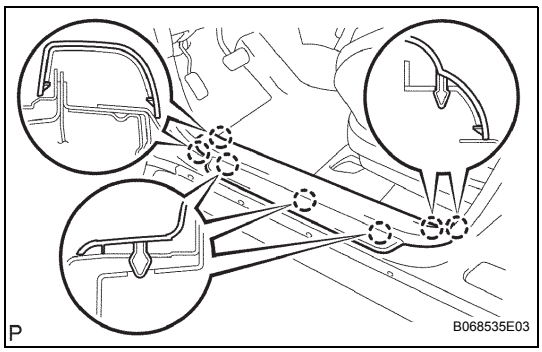
6. **INSTALL INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY CENTER**
   (a) Connect the connectors.
   (b) Install the instrument cluster finish panel assembly center with the 4 screws.

7. **INSTALL HEATER CONTROL AND ACCESSORY ASSEMBLY (See page AC-102)**



8. **INSTALL COWL SIDE TRIM BOARD LH**
   (a) Attach the clip to install the cowl side trim board.
   (b) Install the clip.

9. **INSTALL COWL SIDE TRIM BOARD RH**
   HINT:
   Use the same procedures for the RH side and LH side.



10. **INSTALL FRONT DOOR SCUFF PLATE LH**
    (a) Attach the 7 claws to install the front door scuff plate.

11. **INSTALL FRONT DOOR SCUFF PLATE RH**
    HINT:
    Use the same procedures for the RH side and LH side.

12. **INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY (See page WW-22)**

13. **INSTALL HEADLIGHT DIMMER SWITCH ASSEMBLY (See page LI-32)**

14. **INSTALL STEERING COLUMN COVER (See page SR-13)**

15. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-13)**

16. **INSTALL STEERING PAD ASSEMBLY (See page RS-288)**

17. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY**
    (a) Install the instrument panel (see page IP-10).

18. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

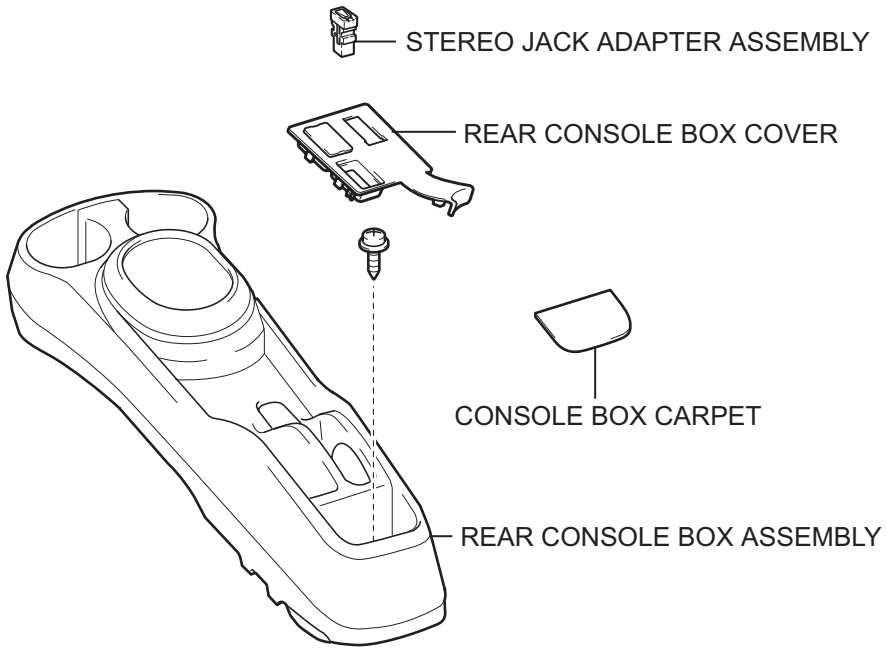
19. **PERFORM INITIALIZATION**
    (a) Perform initialization (see pageIN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

20. **CHECK SRS WARNING LIGHT**
    (a) Check the SRS warning light (see pageRS-28).

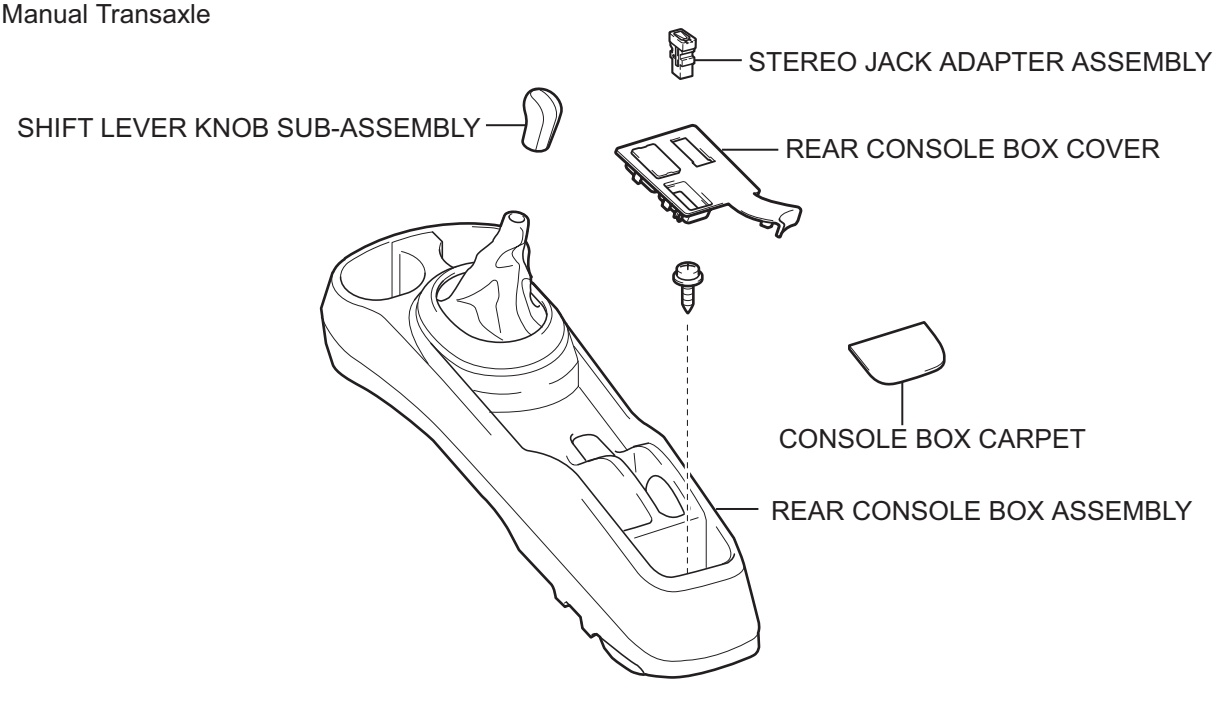
REAR CONSOLE BOX

COMPONENTS

Automatic Transaxle



Manual Transaxle



P

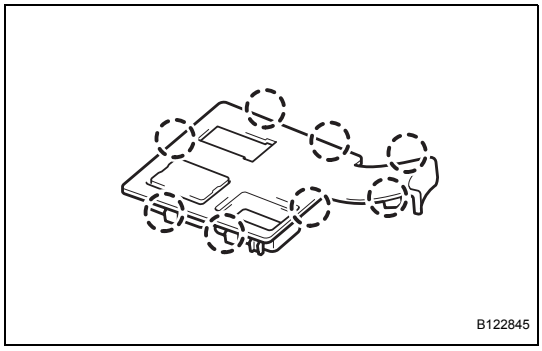
B122136E01

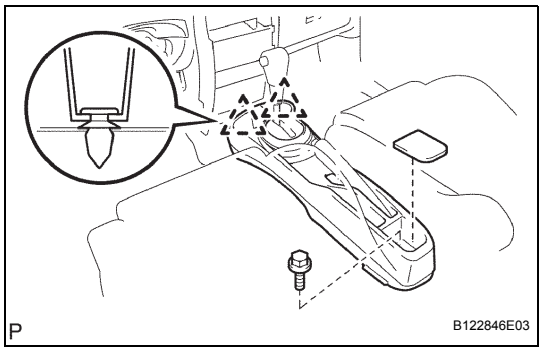
IP

REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)**

2. **REMOVE REAR CONSOLE BOX ASSEMBLY**
   (a) Using a screwdriver, detach the 8 claws and remove the rear console box cover.
   HINT:
   Tape the screwdriver tip before use.



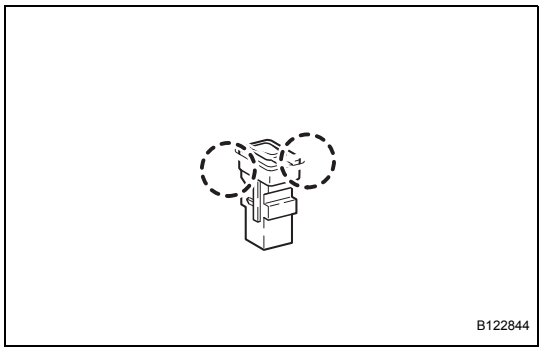


   (b) Remove the console box carpet.
   (c) Remove the screw.
   (d) Disconnect the connector.
   (e) Using a screwdriver, detach the 2 clips and remove the console box.

IP

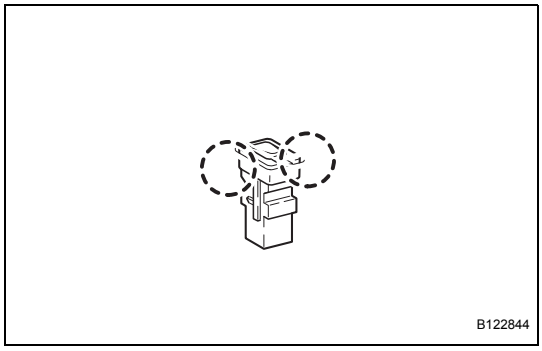
DISASSEMBLY

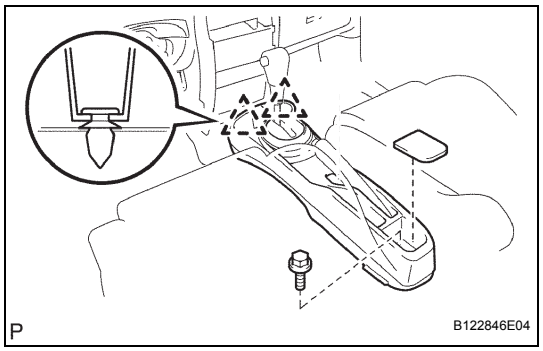
1. **REMOVE STEREO JACK ADAPTER ASSEMBLY**
   (a) Detach the 2 claws and remove the stereo jack adapter.
   (b) Disconnect the connectors.

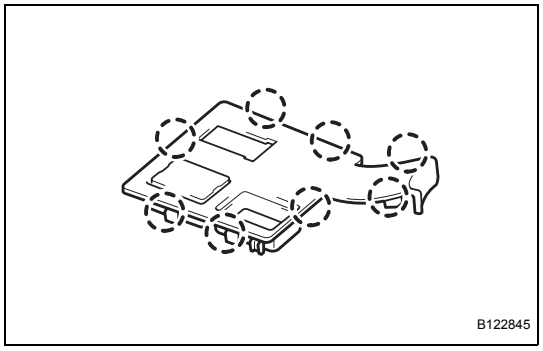


REASSEMBLY

1. **INSTALL STEREO JACK ADAPTER ASSEMBLY**
   (a) Connect the connectors.
   (b) Attach the 2 claws to install the stereo jack adapter.







INSTALLATION

1. INSTALL REAR CONSOLE BOX ASSEMBLY

(a) Attach the 2 clips to install the console box.
(b) Connect the connector.
(c) Install the screw.
(d) Install the console box carpet.
(e) Attach the 8 claws to install the rear console box cover.

2. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Seat belt warning system

Symptom	Suspected area	See page
Driver side seat belt warning light does not light up	1. GAUGE fuse	SB-2
	2. Combination meter	ME-46
	3. Center airbag sensor assembly	RS-325
	4. Front seat inner belt assembly LH	SB-5
	5. Wire harness	
Driver side seat belt warning light does not blink	1. Combination meter	ME-46
	2. Center airbag sensor assembly	RS-325
	3. Front seat inner belt assembly LH	SB-5
	4. Wire harness	
Passenger side seat belt warning light does not light up	1. GAUGE fuse	SB-2
	2. Front seat cushion pad RH	SB-5
	3. Instrument panel garnish sub-assembly	IP-2
	4. Front seat inner belt assembly RH	SB-5
	5. Combination meter	ME-49
	6. Wire harness	
Passenger side seat belt warning light does not blink	1. Instrument panel garnish sub-assembly	IP-2
	2. Front seat cushion pad RH	SB-5
	3. Front seat inner belt assembly RH	SB-5
	4. Combination meter	ME-49
	5. Wire harness	

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. **INSTALL FRONT SEAT INNER BELT ASSEMBLY RH**
   (a) Install the inner belt with the bolt.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

2. **INSTALL FRONT SEAT ASSEMBLY RH (See page SE-9)**

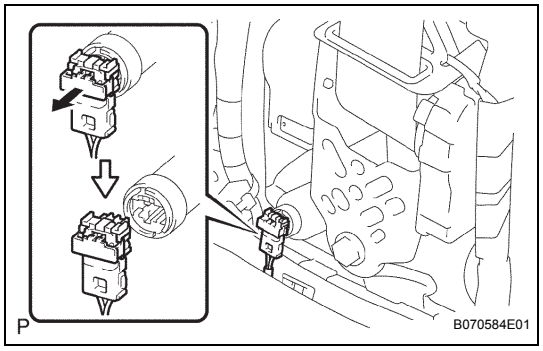
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

4. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

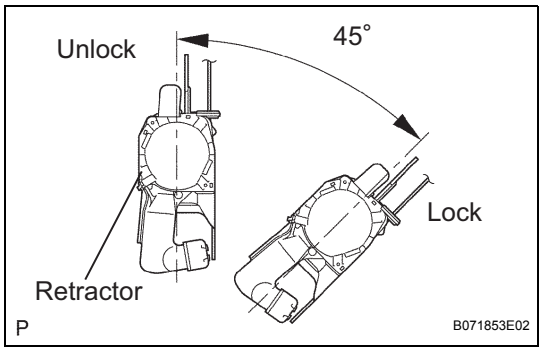
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-7)**
3. **REMOVE COWL SIDE TRIM BOARD RH (See page IR-7)**
4. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
5. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-7)**
6. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
7. **REMOVE CENTER PILLAR GARNISH LOWER RH (See page IR-8)**
8. **REMOVE FRONT SEAT OUTER BELT ASSEMBLY RH**
   CAUTION:
   Carefully read the notices for the pretensioner in the SRS airbag system section and the front seat outer belt section (see page RS-1).
   (a) Remove the floor anchor cover.
   (b) Remove the bolt and outer belt on the floor anchor side.
   (c) Remove the shoulder anchor cover.
   (d) Remove the bolt and outer belt on the shoulder anchor side.
   (e) Disconnect the pretensioner connector as shown in the illustration.
   (f) Remove the 2 bolts on the retractor side and remove the outer belt completely.



9. **REMOVE CENTER PILLAR GARNISH UPPER RH (See page IR-8)**
10. **REMOVE FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY**
    (a) Remove the 2 bolts and anchor adjuster.



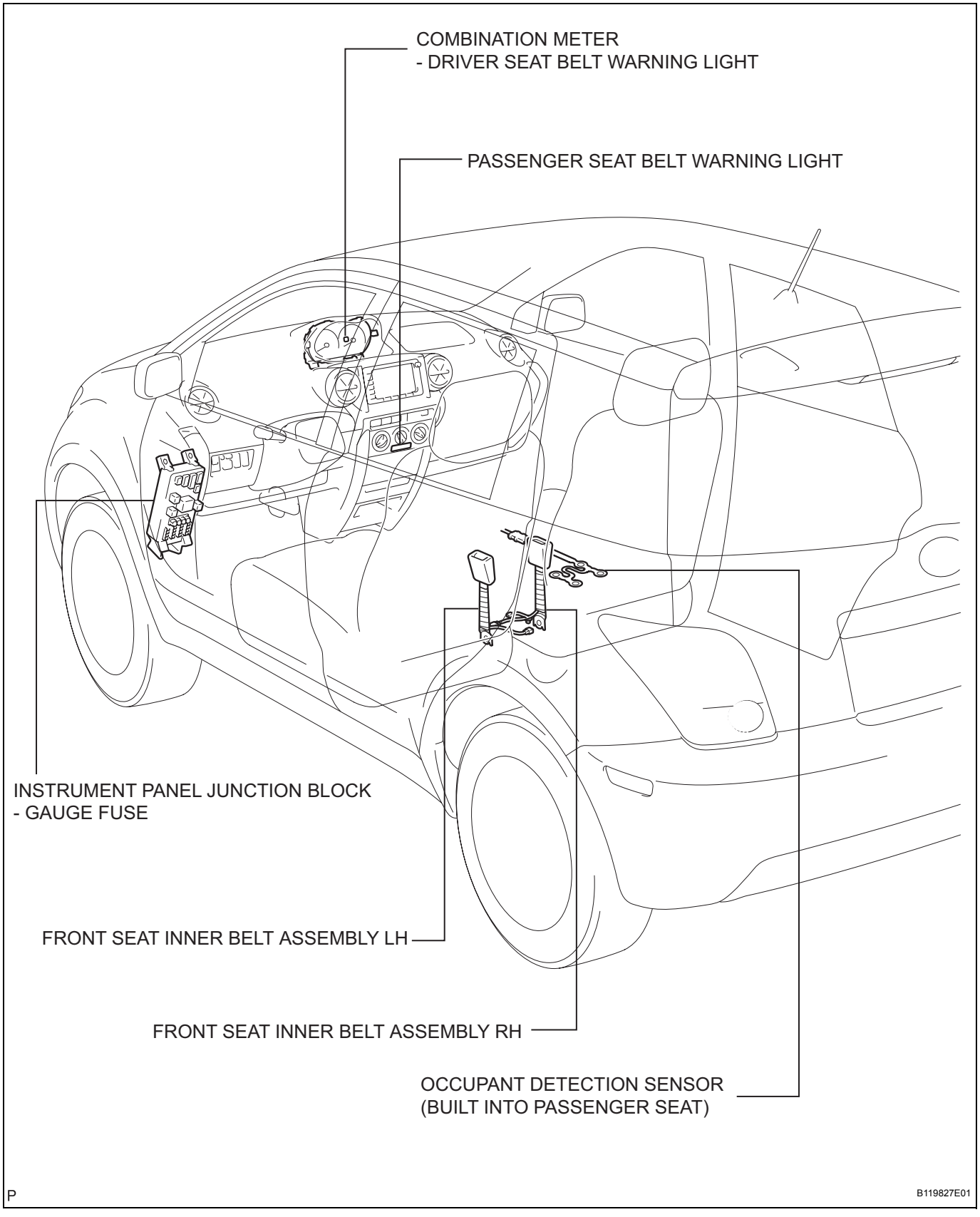
INSPECTION

1. INSPECT FRONT SEAT OUTER BELT ASSEMBLY
NOTICE:
Do not disassemble the retractor.

(a) When the inclination of the retractor is 15°or less, check that the belt can be pulled from the retractor.
When the inclination of the retractor is over 45°, check that the belt locks.
If the operation is not as specified, replace the belt.

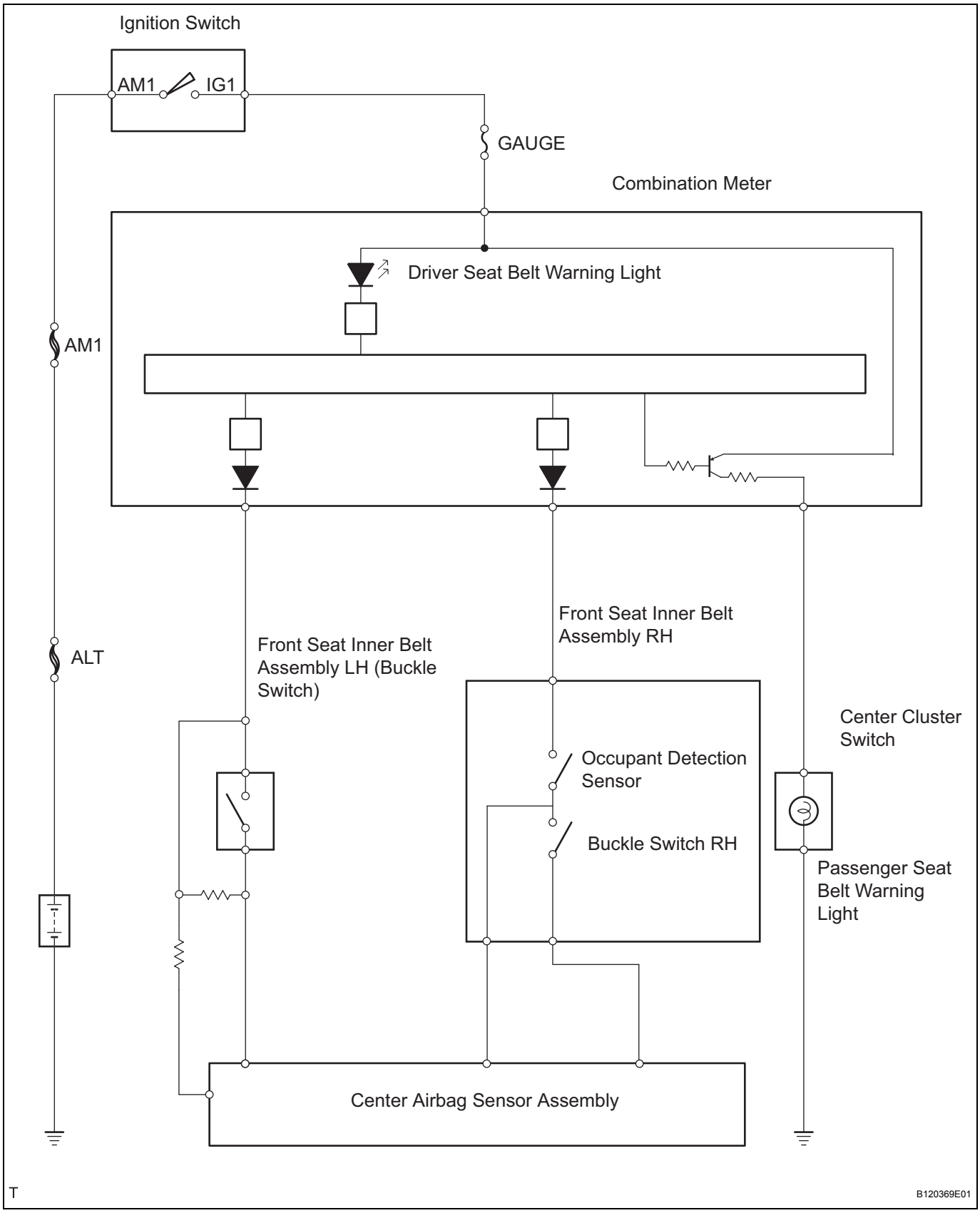
SEAT BELT WARNING SYSTEM

PARTS LOCATION



SB

SYSTEM DIAGRAM



INSTALLATION

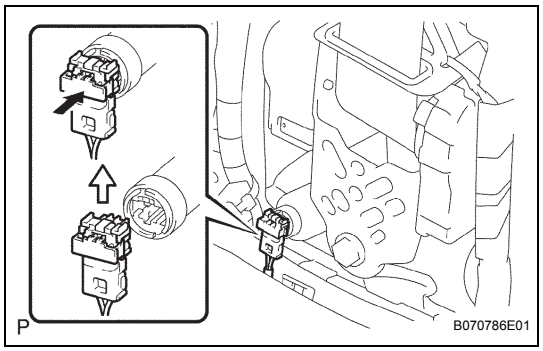
HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. **INSTALL FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY**
   (a) Install the anchor adjuster with the 2 bolts.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

2. **INSTALL CENTER PILLAR GARNISH UPPER RH (See page IR-16)**

3. **INSTALL FRONT SEAT OUTER BELT ASSEMBLY RH**
   (a) Install the outer belt with the 2 bolts on the retractor side.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf) for upper bolt
   42 N*m (428 kgf*cm, 31 ft.*lbf) for lower bolt



   (b) Connect the pretensioner connector as shown in the illustration.
   (c) Install the outer belt with the bolt on the shoulder anchor side.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   (d) Install the shoulder anchor cover.
   (e) Install the outer belt with the bolt on the floor anchor side.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   (f) Install the floor anchor cover.
   (g) With the belt installed, check that the belt locks when it is pulled out quickly.
   NOTICE:
   The check should be performed with the outer belt assembly installed.
   If the operation is not as specified, replace the belt.
   (h) Check the fastening function of the child restraint system.
   NOTICE:
   The check should be performed with the outer belt installed.
      (1) When the belt is pulled out fully, the belt should automatically try to retract.
      (2) After the belt has fully retracted, the belt should be able to be pulled out and retracted again.
      If the operation is not as specified, replace the belt.

4. **INSTALL CENTER PILLAR GARNISH LOWER RH (See page IR-16)**

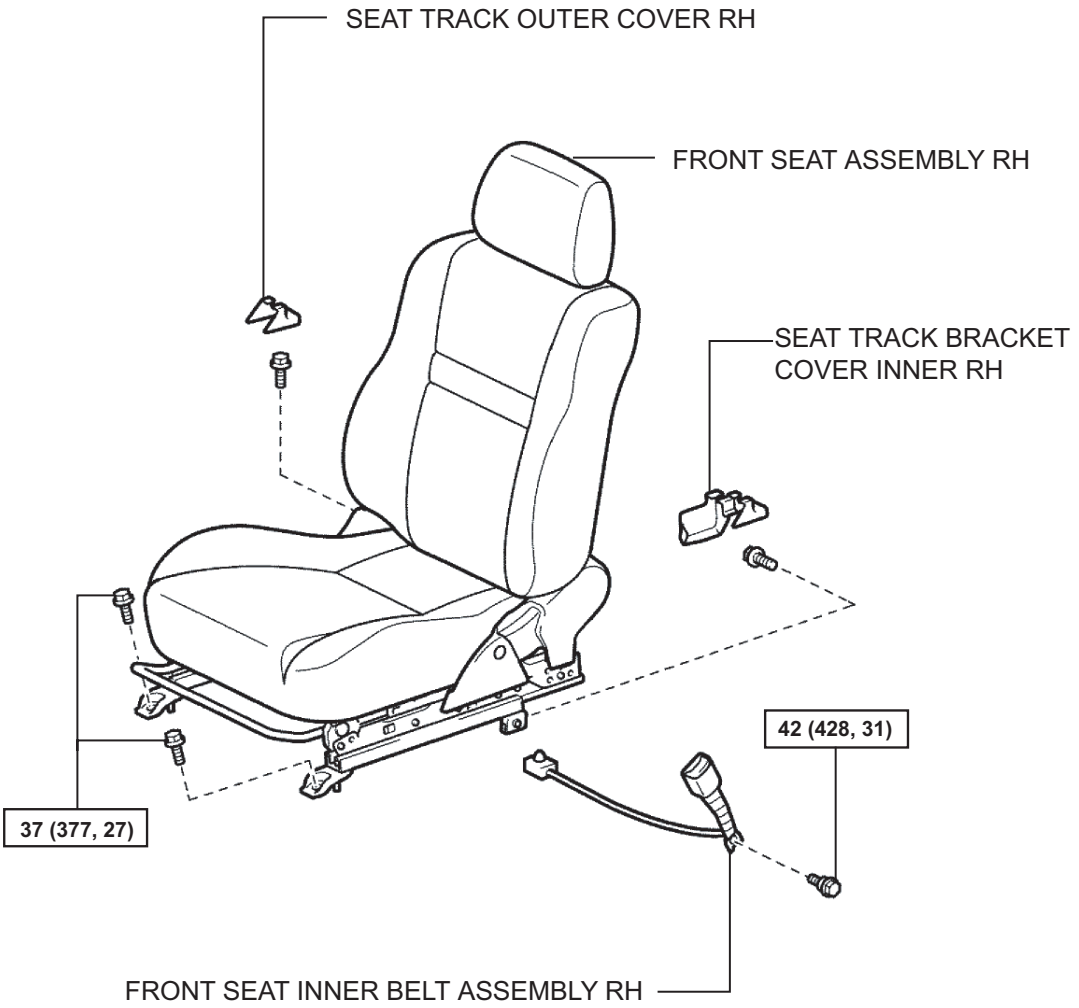
5. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**

6. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-17)**
7. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
8. **INSTALL COWL SIDE TRIM BOARD RH (See page IR-17)**
9. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-17)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FRONT SEAT INNER BELT ASSEMBLY

COMPONENTS

SB



N*m (kgf*cm, ft.*lbf) : Specified torque

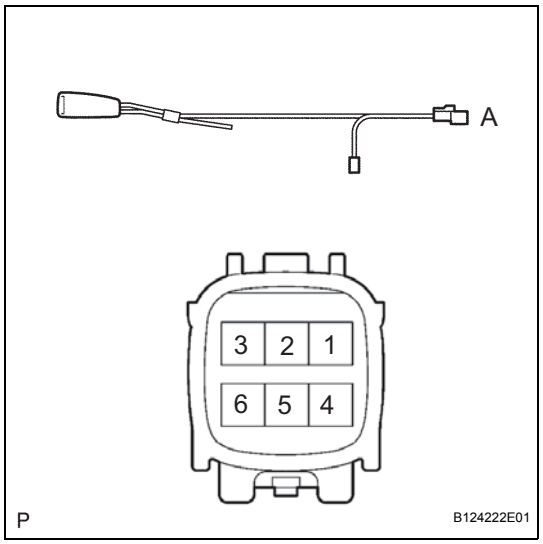
B122538E01

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT SEAT ASSEMBLY RH (See page SE-3)**
3. **REMOVE FRONT SEAT INNER BELT ASSEMBLY RH**
   (a) Remove the bolt and inner belt.

INSPECTION



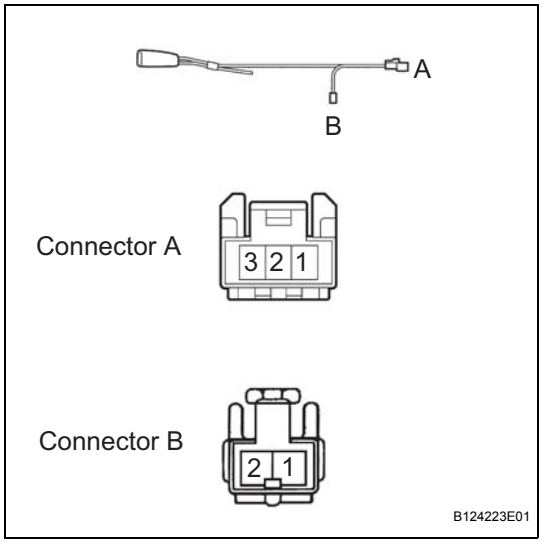
1. **INSPECT FRONT SEAT INNER BELT ASSEMBLY LH**
   (a) Check the buckle switch.
   (1) Fasten the seat belt (buckle switch is ON).
   (2) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	1,330 Ω
A-1 - A-3	10 kΩ or higher

   (3) Release the seat belt (buckle switch is OFF).
   (4) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	330 Ω
A-1 - A-3	Below 1 Ω

   If the result is not as specified, replace the inner belt assembly.



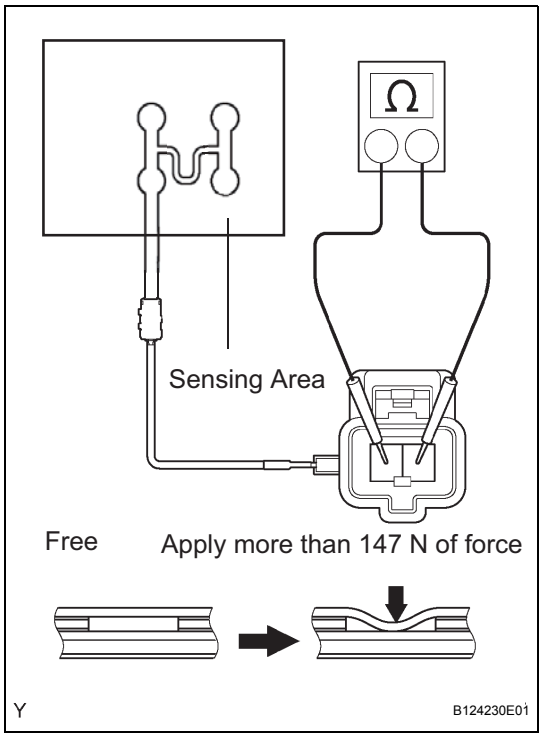
2. **INSPECT FRONT SEAT INNER BELT ASSEMBLY RH**
   (a) Check the buckle switch.
   (1) Fasten the seat belt (buckle switch is ON).
   (2) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	1,330 Ω
A-1 - B-2	10 kΩ or higher
A-3 - B-1	Below 1 Ω

   (3) Release the seat belt (buckle switch is OFF).
   (4) Measure the resistance between the terminals.
   Standard resistance

Tester Connection	Specified Condition
A-1 - A-2	330 Ω
A-1 - B-2	Below 1 Ω
A-3 - B-1	Below 1 Ω

If the result is not as specified, replace the inner belt assembly.



3. INSPECT OCCUPANT DETECTION SENSOR

(a) Measure the resistance of the sensor.

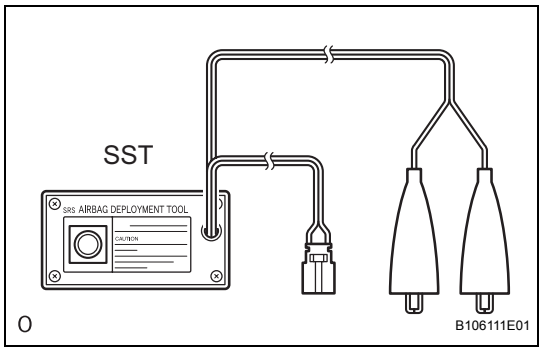
Standard resistance

Tester Connection	Specified Condition
Apply more than 147 N (15 kgf, 33 lbf) to occupant detection sensor	Below 100 Ω
Seat not occupied	1 MΩ or higher

If the result is not as specified, replace the front seat cushion pad.

DISPOSAL

HINT:
When scrapping vehicles equipped with a seat belt pretensioner or disposing of a front seat outer belt (with seat belt pretensioner), always first activate the seat belt pretensioner in accordance with the procedures described below. If any abnormality occurs during activation of the seat belt pretensioner, contact the SERVICE DEPARTMENT of TOYOTA MOTOR SALES, U.S.A., INC.

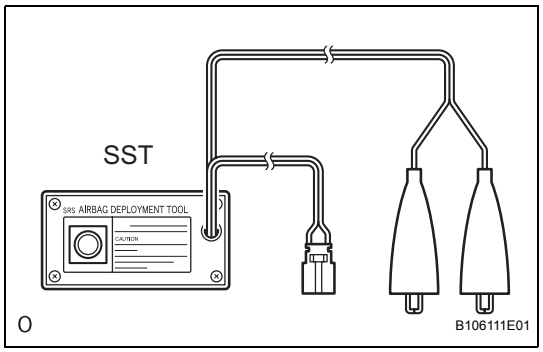


CAUTION:

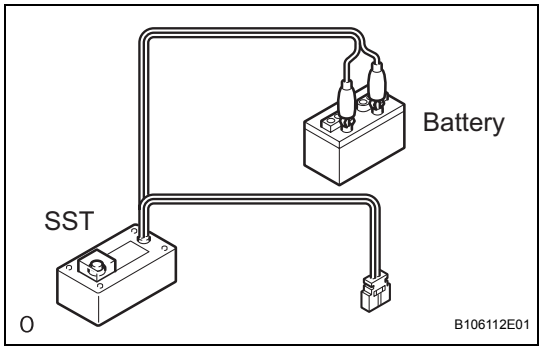
- **Never dispose of a front seat outer belt that has a non-activated pretensioner.**
- **The seat belt pretensioner produces a loud, exploding sound when it activates. Perform the operation where it will not be a nuisance to nearby people.**
- **When activating a front seat outer belt (with seat belt pretensioner), stand at least 10 m (33 ft.) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat outer belt with an activated pretensioner.**
- **Always wash your hands with water after completing the disposal.**
- **Do not apply water to a front seat outer belt that has an activated pretensioner.**
- **Perform procedures in a place away from electrical interference.**
- **When activating the seat belt pretensioner, always use the specified SST (SRS airbag deployment tool).**

1. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN INSTALLED IN VEHICLE)

HINT:
Prepare a battery to activate the seat belt pretensioner.

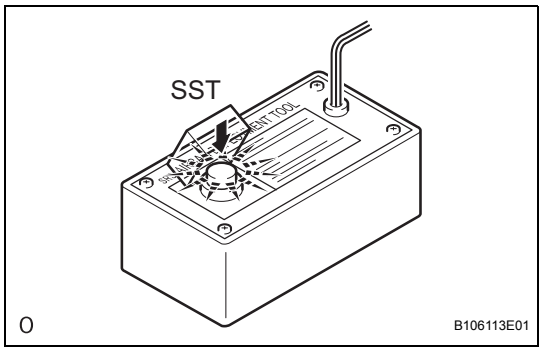


(a) Check if SST is functioning properly.
SST 09082-00700
NOTICE:
When activating the seat belt pretensioner, always use the specified SST.



(1) Connect the SST's red clip to the battery's positive (+) terminal and the black clip to the battery's negative (-) terminal.
HINT:
Do not connect the yellow connector. The yellow connector is used to connect to the seat belt pretensioner.

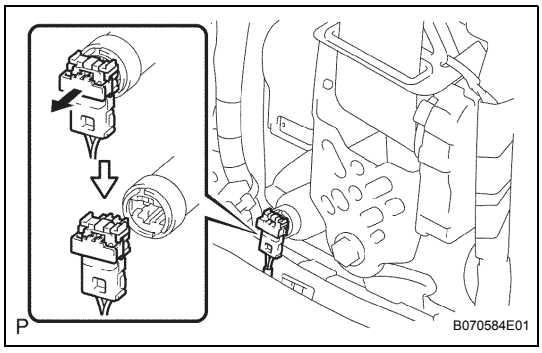
SB



(2) Press the SST activation switch and check that the LED of the SST activation switch illuminates.
NOTICE:
If the LED illuminates when the activation switch is not being pressed, SST may be malfunctioning. Replace SST with a new one.

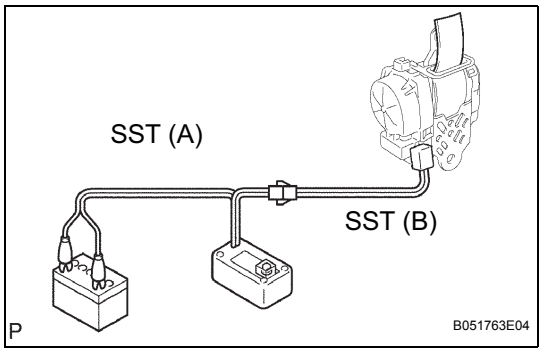
(b) Disconnect SST from the battery.

(c) Disconnect the pretensioner connector.
(1) Disconnect the cable from the negative (-) battery terminal.
(2) Check the SRS airbag system (see page RS-1).
(3) Remove the front door scuff plate (see page IR-7).
(4) Remove the rear door scuff plate (see page IR-7).
(5) Remove the front door opening trim (see page IR-7).
(6) Remove the rear door opening trim (see page IR-7).
(7) Remove the center pillar garnish lower (see page IR-8).

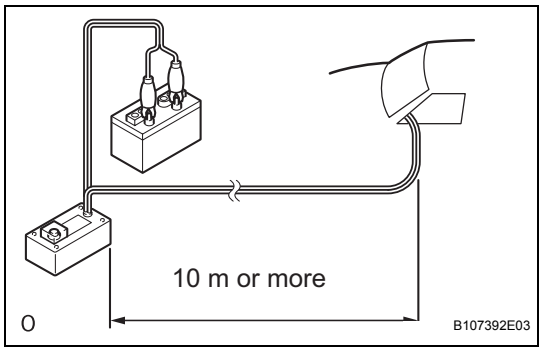


(8) Disconnect the pretensioner connector as shown in the illustration.

(d) Prepare SST for activation of the seat belt pretensioner.
(1) Install the floor anchor of the seat belt.



(2) Connect SST (A) to SST (B). Then connect SST (B)'s connector to the seat belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move SST at least 10 m (33 ft.) away from the front of the vehicle.
(4) Close all the doors and windows of the vehicle.
HINT:
Leave a gap in one of the windows for inserting SST wire harness.
NOTICE:
Take care not to damage SST wire harness.
(5) Connect the SST's red clip to the battery's positive (+) terminal and the black clip to the negative (-) terminal.

(e) Activate the seat belt pretensioner.
(1) Confirm that no one is inside the vehicle or within 10 m (33 ft.) of the vehicle.
(2) Press the SST activation switch to activate the seat belt pretensioner.
HINT:
The seat belt pretensioner operates at the same time the SST activation switch's LED illuminates.

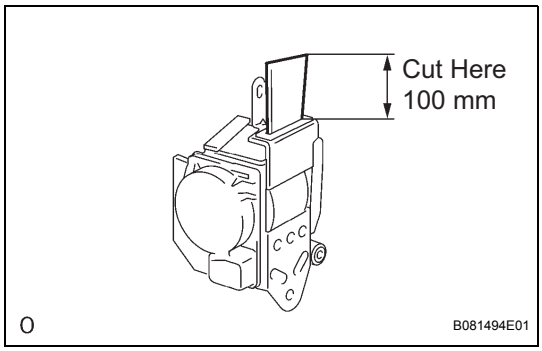
(f) Dispose of the front seat outer belt (with the seat belt pretensioner).
CAUTION:
- **Do not touch the front seat outer belt for at least 30 minutes after the seat belt pretensioner has been activated. It is very hot.**
- **Use gloves and safety glasses when handling a front seat outer belt whose pretensioner has been activated.**
- **Always wash your hands with water after completing the disposal.**
- **Do not apply water to a front seat outer belt that has an activated pretensioner.**

HINT:
When scrapping a vehicle, activate the seat belt pretensioner, and then scrap the vehicle with the activated front seat outer belt installed.

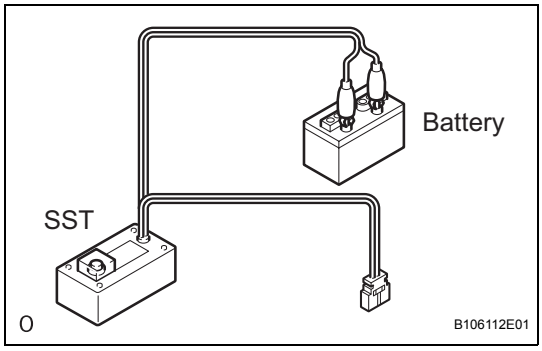
2. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)
NOTICE:
- **When only disposing of the front seat outer belt (with the seat belt pretensioner), never use the customer's vehicle to activate the seat belt pretensioner.**
- **Be sure to follow the procedures listed below when activating the seat belt pretensioner.**

SB

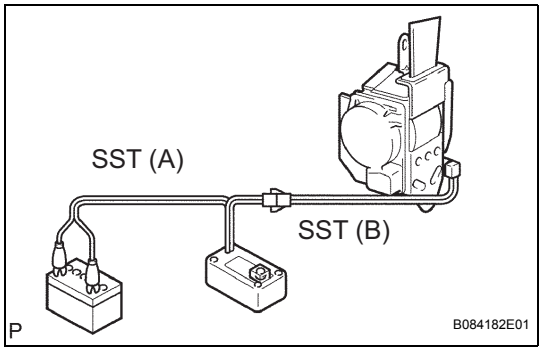
SB



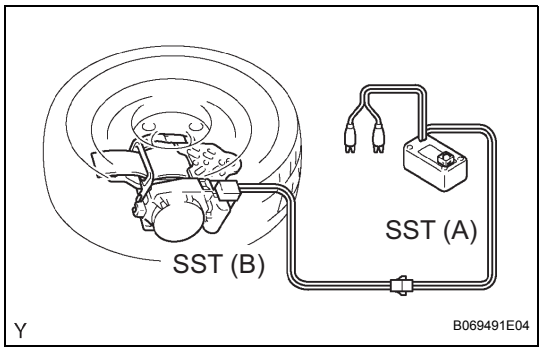
(a) Remove the front seat outer belt.
(1) Wind the seat belt with the retractor.
(2) When the seat belt is sufficiently wound, cut the seat belt approximately 100 mm (0.39 in.) from the retractor, as shown in the illustration.
HINT:
The seat belt is designed so that winding the seat belt before pretensioner activation will decrease the pulling power of the seat belt during pretensioner activation.



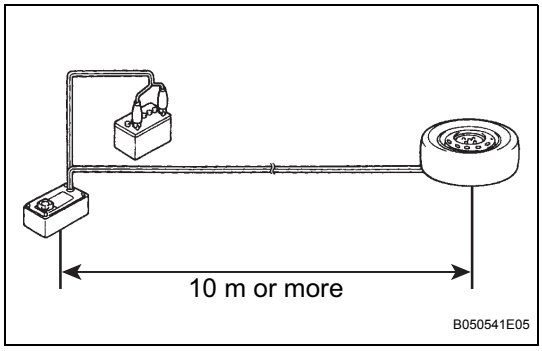
(b) Check if SST is functioning properly.
SST 09082-00700, 09082-00770
CAUTION:
When activating a seat belt pretensioner, always use the specified SST.



(c) Prepare SST for activation of the seat belt pretensioner.
(1) Connect SST (A) to SST (B). Then connect SST (B)'s connector to the seat belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Place the front seat outer belt on the ground and cover it with a tire (with wheel).
NOTICE:
Set up the front seat outer belt as shown in the illustration.



(3) Move SST at least 10 m (33 ft.) away from the wheel.
NOTICE:
Take care not to damage the SST wire harness.

(d) Activate the seat belt pretensioner.
(1) Connect the SST's red clip to the battery's positive (+) terminal and the black clip to the battery's negative (-) terminal.
(2) Check that no one is within 10 m (33 ft.) of the wheel.

(3) Press the SST activation switch to activate the seat belt pretensioner.
HINT:
The seat belt pretensioner operates at the same time the SST activation switch's LED illuminates.

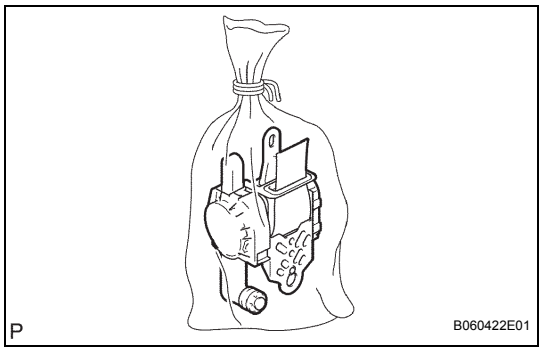
(e) Dispose of the front seat outer belt (with the seat belt pretensioner).

CAUTION:

- **Do not touch the front seat outer belt for at least 30 minutes after the seat belt pretensioner has been activated. It is very hot.**
- **Use gloves and safety glasses when handling a front seat outer belt whose pretensioner has been activated.**
- **Always wash your hands with water after completing the disposal.**
- **Do not apply water to a front seat outer belt that has an activated pretensioner.**

(1) Remove the tire (with wheel) and SST.

(2) Place the front seat outer belt in a plastic bag, tie the end tightly, and dispose of it in the same way as other general parts.

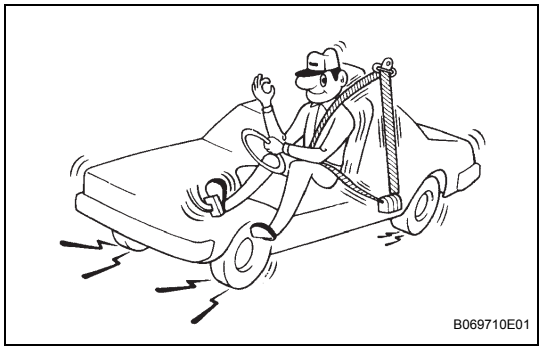


SB

FRONT SEAT OUTER BELT ASSEMBLY

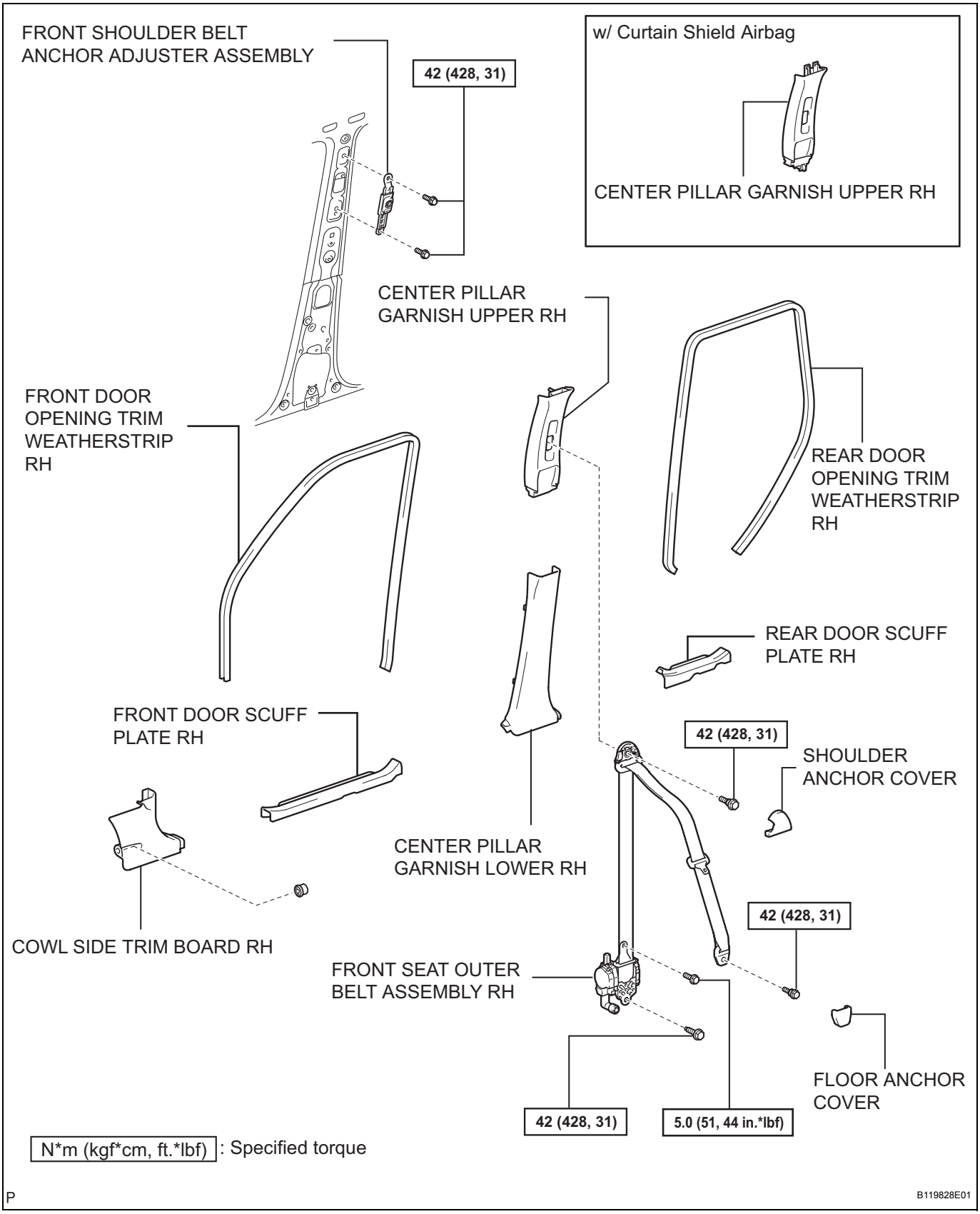
PRECAUTION

CAUTION:
Replace the faulty parts of the seat belt systems (outer belt, inner belt, bolts, nuts, adjustable shoulder anchor, tether anchor hardware and other related parts).
When inspecting a vehicle that was recently in a collision, be sure to check all of the seat belt systems regardless of whether or not the system was activated in the collision. Replace any damaged or malfunctioning systems.



1. RUNNING TEST (IN SAFE AREA)
CAUTION:
Conduct this test in a safe area.
(a) Fasten the front seat belts.
(b) Drive the vehicle at 16 km/h (10 mph) and firmly depress the brakes. Check that the belts lock and cannot be extended at this time.
If a belt does not lock, replace the seat belt assembly (see page SB-9).
HINT:
Inspect a seat belt assembly before installing it (see page SB-10).

COMPONENTS


FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY
42 (428, 31)
w/ Curtain Shield Airbag
CENTER PILLAR GARNISH UPPER RH
CENTER PILLAR GARNISH UPPER RH
FRONT DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR SCUFF PLATE RH
FRONT DOOR SCUFF PLATE RH
42 (428, 31)
SHOULDER ANCHOR COVER
CENTER PILLAR GARNISH LOWER RH
COWL SIDE TRIM BOARD RH
42 (428, 31)
FRONT SEAT OUTER BELT ASSEMBLY RH
FLOOR ANCHOR COVER
42 (428, 31)
5.0 (51, 44 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
P
B119828E01

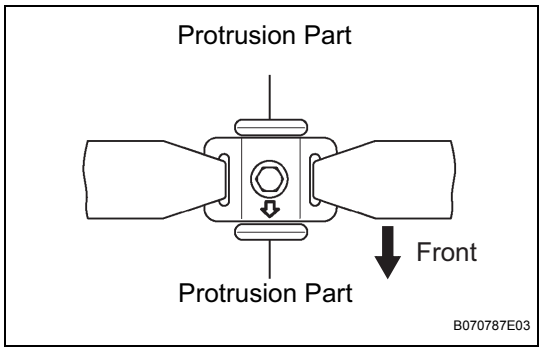
REMOVAL

1. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-12)**
2. **REMOVE REAR SEAT INNER BELT ASSEMBLY LH**
   (a) Remove the bolt and inner belt.
3. **REMOVE REAR SEAT INNER BELT ASSEMBLY RH**
   (a) Remove the bolt and inner belt.
4. **REMOVE REAR SEATBACK ASSEMBLY LH (See page SE-12)**
5. **REMOVE REAR SEATBACK ASSEMBLY RH (See page SE-12)**
6. **REMOVE CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Remove the 4 bolts and anchor bracket.

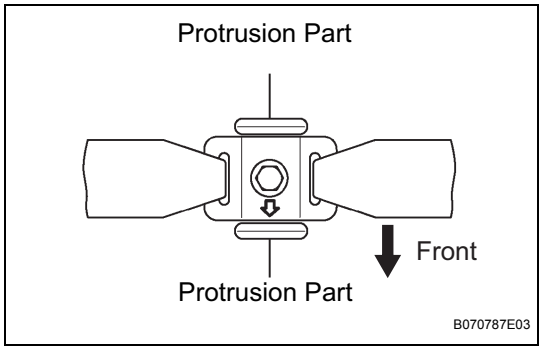
INSTALLATION

HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page IN-20).

1. **INSTALL CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Install the anchor bracket with the 4 bolts.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
2. **INSTALL REAR SEATBACK ASSEMBLY LH (See page SE-17)**
3. **INSTALL REAR SEATBACK ASSEMBLY RH (See page SE-17)**
4. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH**
   (a) Install the floor anchor and belt with the bolt, as shown in the illustration.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   NOTICE:
   Make sure that the anchor part does not run onto the protruding part of the floor panel.



5. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH**
   (a) Install the floor anchor and belt with the bolt, as shown in the illustration.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   NOTICE:
   Make sure that the anchor part does not run onto the protruding part of the floor panel.

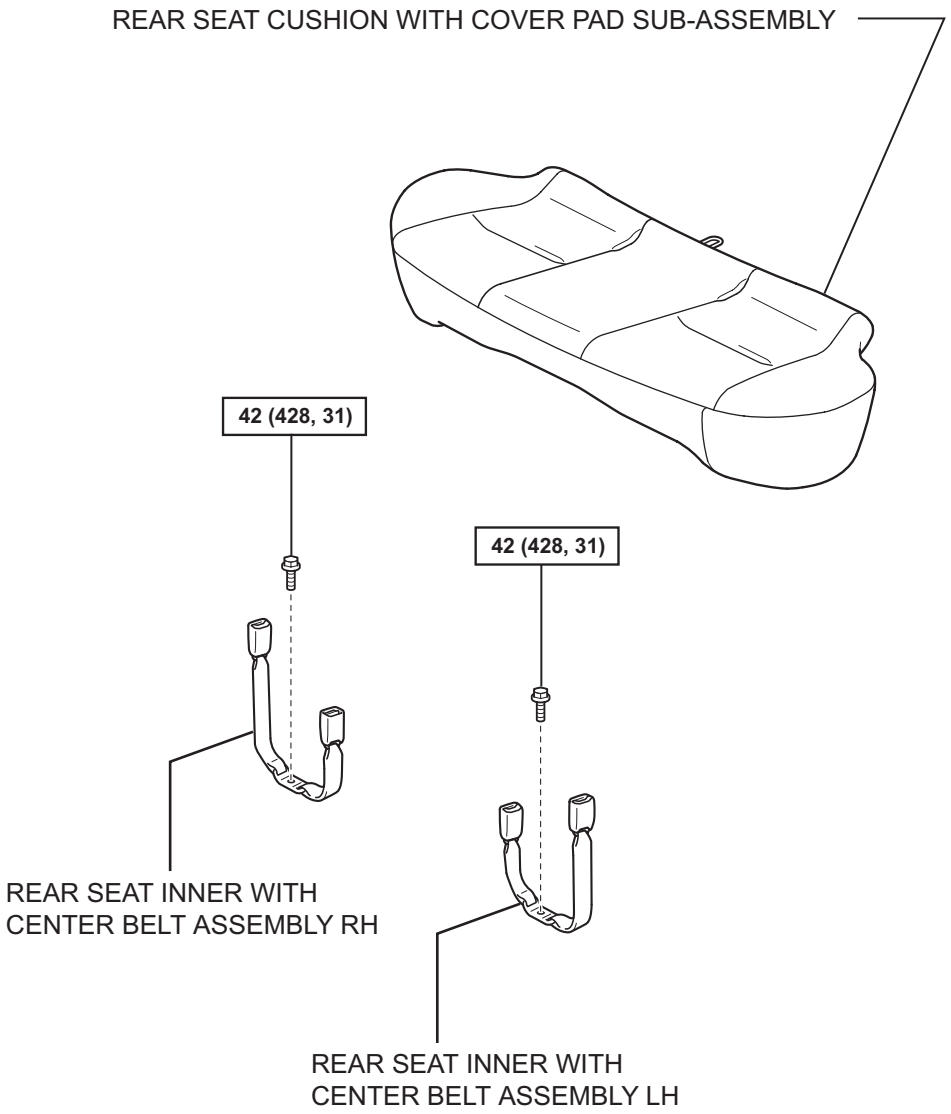


6. **INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-17)**

REAR SEAT INNER BELT ASSEMBLY

COMPONENTS

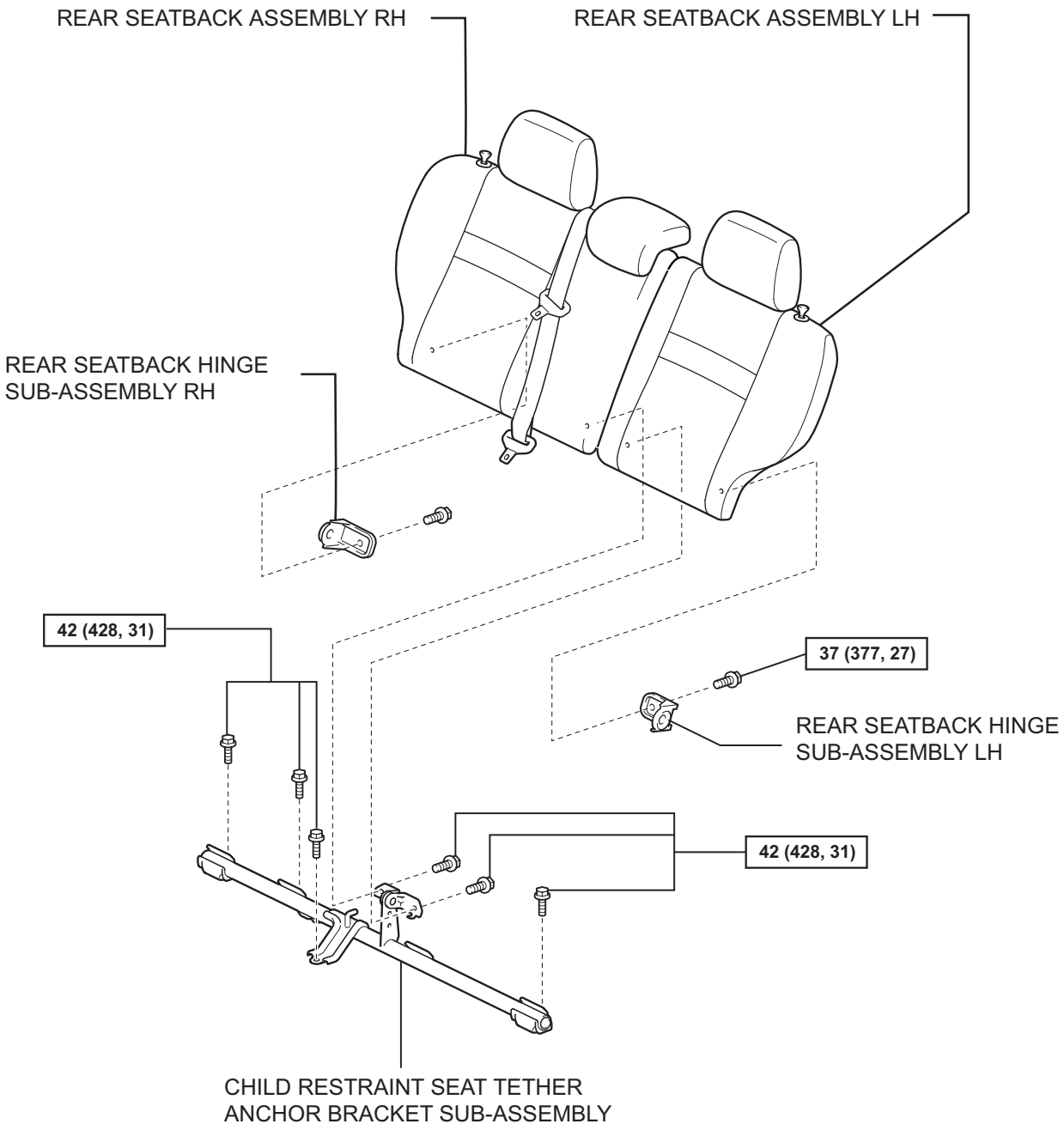
SB



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B121669E01



N*m (kgf*cm, ft.*lbf) : Specified torque

B121668E01

REMOVAL

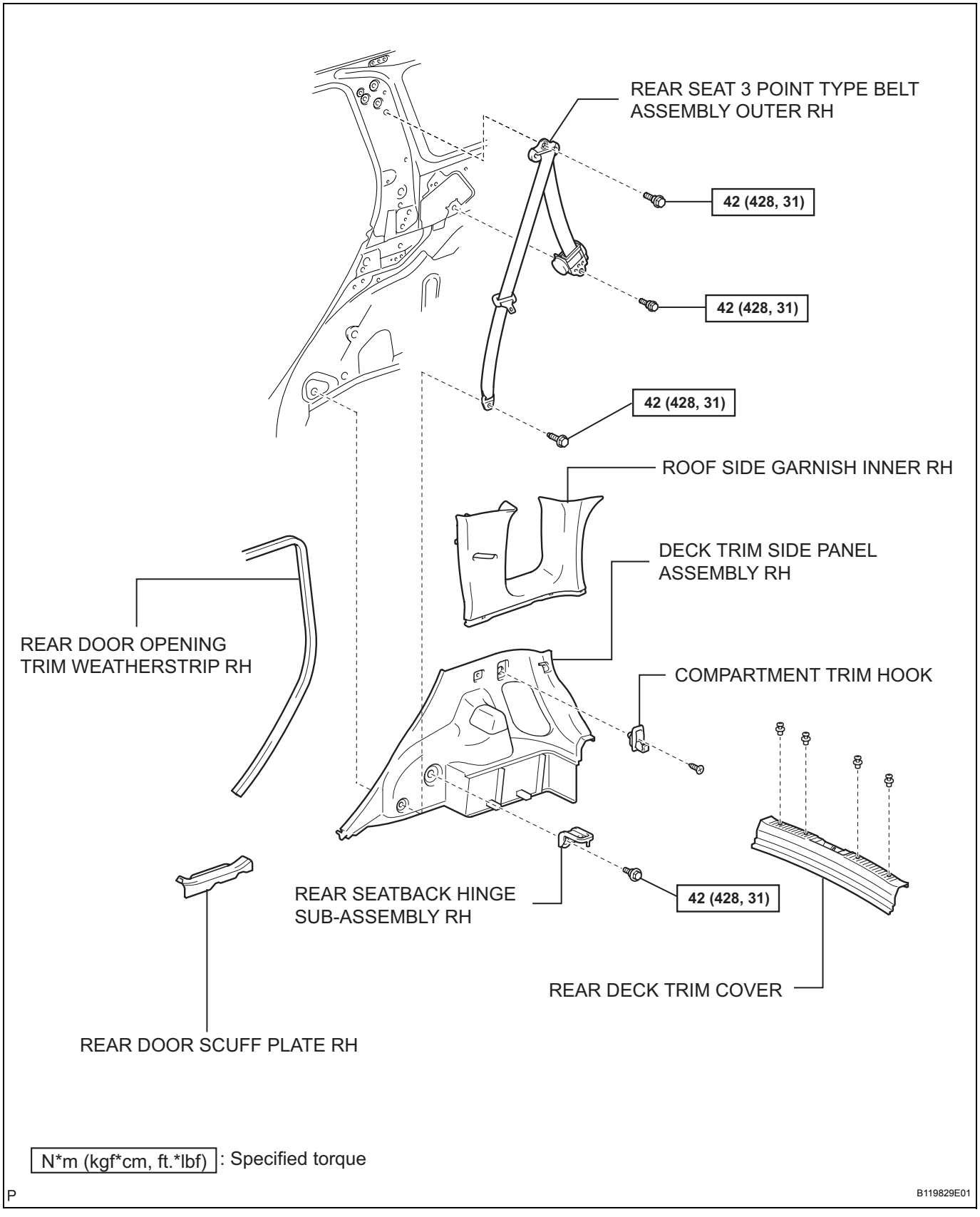
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the RH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-7)**
3. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
4. **REMOVE TONNEAU COVER ASSEMBLY**
5. **REMOVE NO. 1 DECK BOARD**
6. **REMOVE DECK FLOOR BOX RH (See page IR-8)**
7. **REMOVE SPARE WHEEL COVER ASSEMBLY**
8. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-12)**
9. **REMOVE REAR SEATBACK ASSEMBLY LH (See page SE-12)**
10. **REMOVE REAR SEATBACK ASSEMBLY RH (See page SE-12)**
11. **REMOVE REAR DECK TRIM COVER (See page IR-8)**
12. **REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (See page IR-9)**
13. **REMOVE ROOF SIDE GARNISH INNER RH (See page IR-9)**
14. **REMOVE REAR SEAT 3 POINT TYPE BELT ASSEMBLY RH**
    (a) Remove the 2 bolts and outer belt.
15. **REMOVE REAR SEAT BELT ASSEMBLY OUTER CENTER**
    HINT:
    RH side only.
    (a) Remove the rear seat headrest assembly (see page SE-13).
    (b) Remove the rear seatback lock release button (see page SE-13).
    (c) Remove the 2 tether anchor covers (see page SE-13).
    (d) Remove the 4 rear seat headrest supports (see page SE-13).
    (e) Remove the rear seatback stop button grommet (see page SE-14).

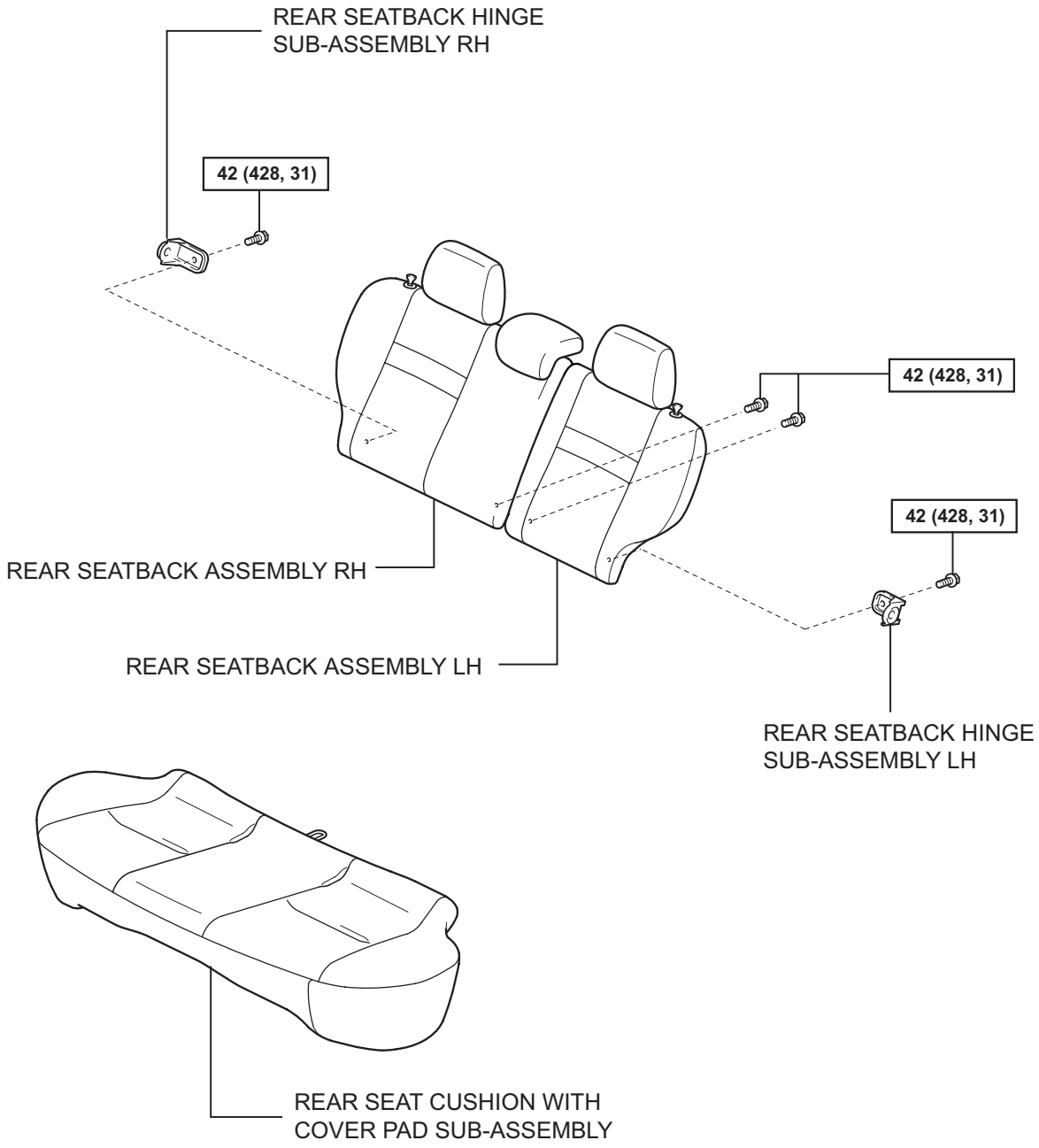
(f) Remove the rear seatback cover (with pad) RH (see page SE-14).
(g) Remove the nut on the retractor side and completely remove the belt.

REAR SEAT OUTER BELT ASSEMBLY

COMPONENTS



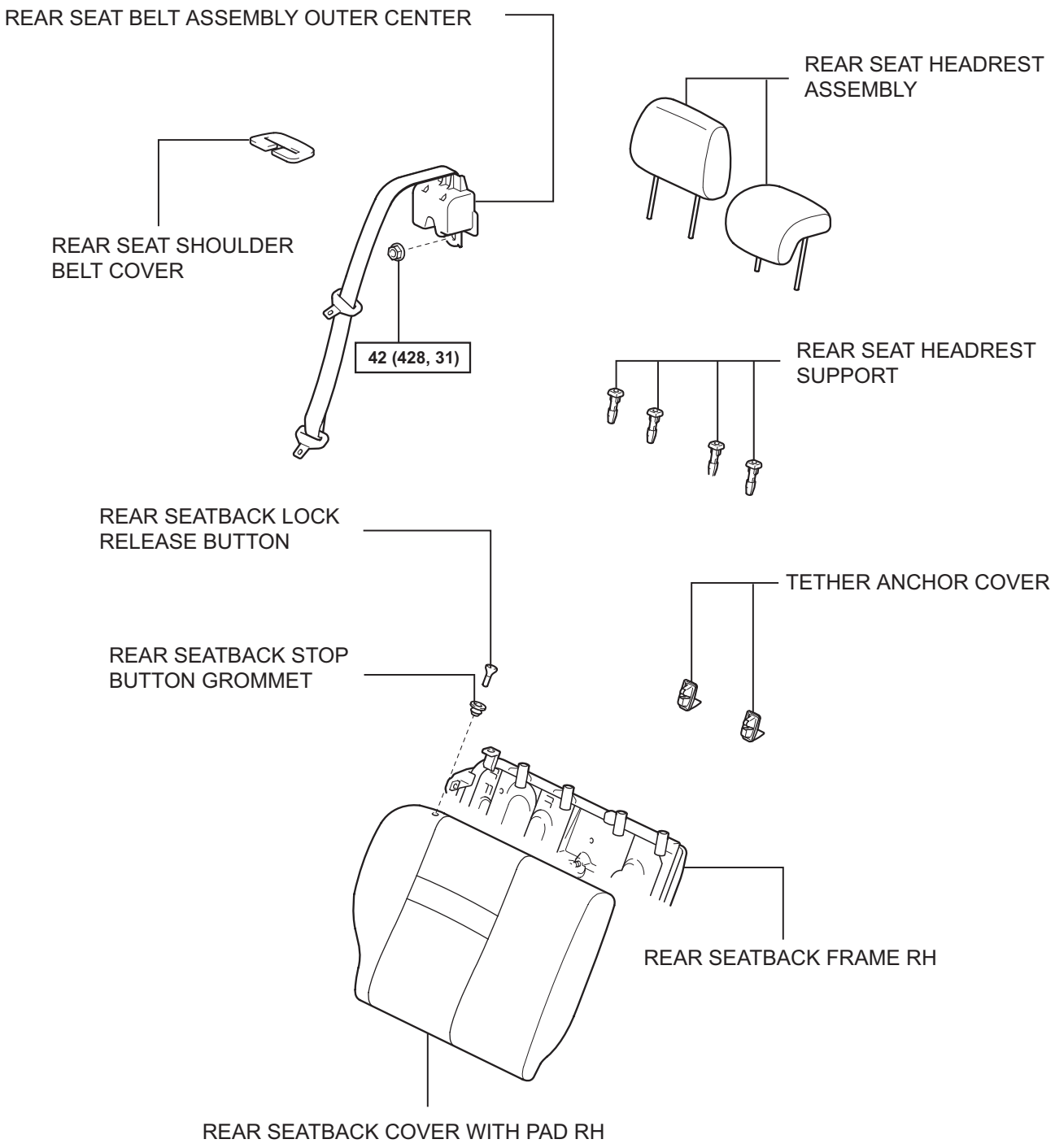
SB



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B121930E01

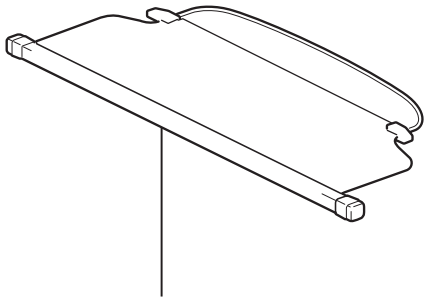


N*m (kgf*cm, ft.*lbf) : Specified torque

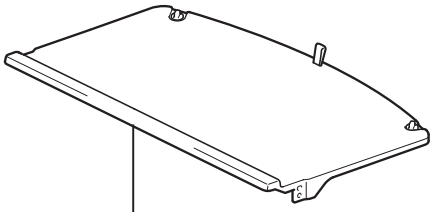
P

B122553E01

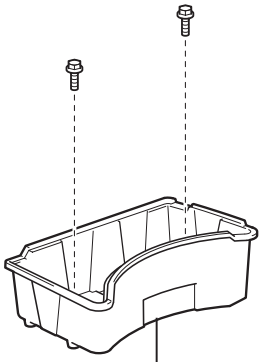
SB



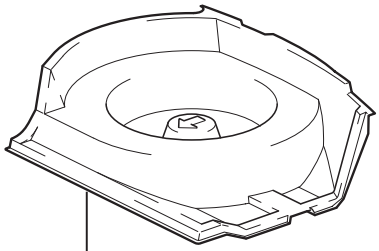
TONNEAU COVER ASSEMBLY



NO. 1 DECK BOARD



DECK FLOOR BOX RH



SPARE WHEEL COVER ASSEMBLY

P

B119831E01

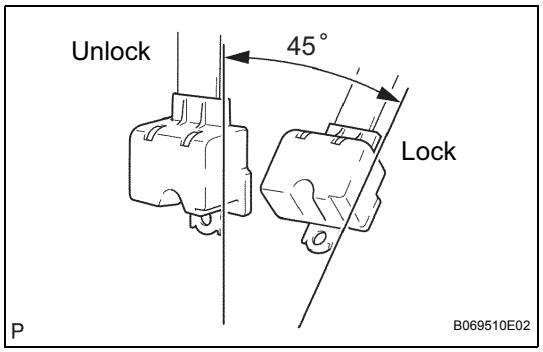
INSPECTION

1. INSPECT REAR SEAT OUTER BELT ASSEMBLY CENTER

NOTICE:

Do not disassemble the retractor.

(a) When the inclination of the retractor is 15°or less, check that the belt can be pulled from the retractor. When the inclination of the retractor is over 45°, check that the belt locks.
If the operation is not as specified, replace the belt.

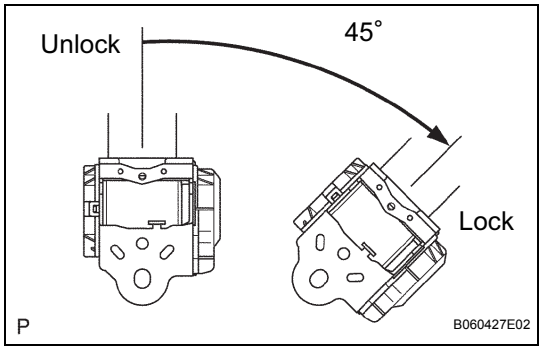


2. INSPECT REAR SEAT 3 POINT TYPE BELT ASSEMBLY

NOTICE:

Do not disassemble the retractor.

(a) When the inclination of the retractor is 15°or less, check that the belt can be pulled from the retractor. When the inclination of the retractor is over 45°, check that the belt locks.
If the operation is not as specified, replace the belt.



SB

SB

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL REAR SEAT OUTER BELT ASSEMBLY CENTER

(a) Install the belt with the nut.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

(b) Install the rear seatback cover (with pad) RH (see page SE-14).

(c) Install the rear seatback stop button grommet (see page SE-15).

(d) Install the 4 rear seat headrest supports (see page SE-15).

(e) Install the 2 tether anchor covers (see page SE-16).

(f) Install the rear seatback lock release button (see page SE-16).

(g) Install the rear seat headrest assembly (see page SE-16).

(h) With the belt installed, check that the belt locks when it is pulled out quickly.
NOTICE:
The check should be performed with the outer belt installed.
HINT:
The seat belt does not lock when it is pulled out to a length of 955 mm (37.60 in.) or less.
If the operation is not as specified, replace the belt.

(i) Check the fastening function of the child restraint system.
NOTICE:
The check should be performed with the outer belt installed.

(1) When the belt is pulled out fully, the belt should automatically try to retract.

(2) After the belt has fully retracted, the belt should be able to be pulled out and retracted again.
If the operation is not as specified, replace the belt.

2. INSTALL REAR SEAT 3 POINT TYPE BELT ASSEMBLY RH

(a) Install the belt with the bolt on the retractor side.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
NOTICE:
Make sure that the anchor part does not run onto the protruding part of the side panel.

(b) Install the belt with the bolt on the shoulder anchor side.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

(c) With the belt installed, check that the belt locks when it is pulled out quickly.
NOTICE:
The check should be performed with the outer belt assembly installed.
If the operation is not as specified, replace the belt.

(d) Check the fastening function of the child restraint system.
NOTICE:
The check should be performed with the outer belt assembly installed.
(1) When the belt is pulled out fully, the belt should automatically try to retract.
(2) After the belt has fully retracted, the belt should be able to be pulled out and retracted again. If the operation is not as specified, replace the belt.
If the operation is not as specified, replace the belt.

3. **INSTALL ROOF SIDE GARNISH INNER RH (See page IR-14)**

4. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH**
(a) Install the deck trim side panel assembly RH (see page IR-15).
(b) Install the rear seat 3 point type belt assembly RH with the bolt on the floor anchor side.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

5. **INSTALL REAR DECK TRIM COVER (See page IR-15)**

6. **INSTALL REAR SEATBACK ASSEMBLY RH (See page SE-17)**

7. **INSTALL REAR SEATBACK ASSEMBLY LH (See page SE-17)**

8. **INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-17)**

9. **INSTALL SPARE WHEEL COVER ASSEMBLY**

10. **INSTALL DECK FLOOR BOX RH (See page IR-15)**

11. **INSTALL NO. 1 DECK BOARD**

12. **INSTALL TONNEAU COVER ASSEMBLY**

13. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**

14. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-17)**

15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

16. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

NOTICE:

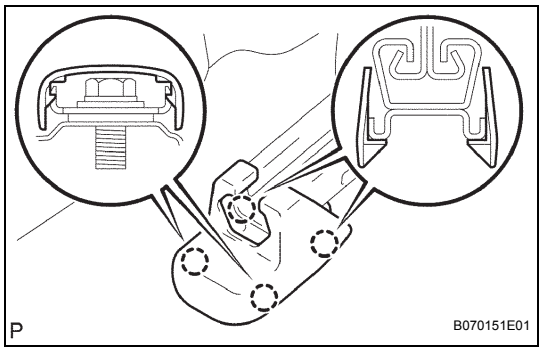
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

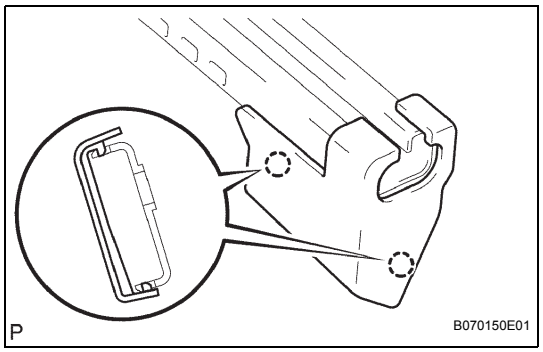
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



2. REMOVE SEAT TRACK OUTER COVER LH

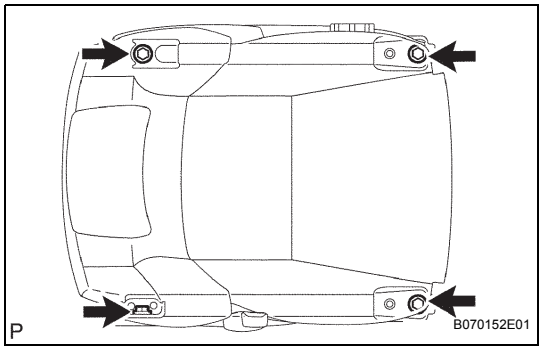
(a) Using a screwdriver, detach the 4 claws and remove the seat track outer cover.
HINT:
Tape the screwdriver tip before use.



3. REMOVE SEAT TRACK BRACKET COVER INNER LH

(a) Using a screwdriver, detach the 2 claws and remove the seat track bracket cover.
HINT:
Tape the screwdriver tip before use.

SE



4. REMOVE FRONT SEAT ASSEMBLY

(a) Remove the 4 bolts.
(b) Disconnect the connectors.
(c) Remove the seat.
NOTICE:
Be careful not to damage the vehicle body.

DISASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

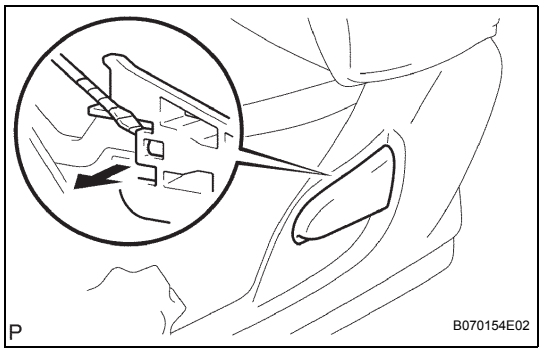
CAUTION:
Wear protective gloves. Sharp surfaces on the seatback spring and seat adjuster may injure your hands.

1. REMOVE FRONT SEAT HEADREST ASSEMBLY

2. REMOVE RECLINING ADJUSTER RELEASE HANDLE LH

(a) Raise the reclining adjuster release handle to reveal the claw.

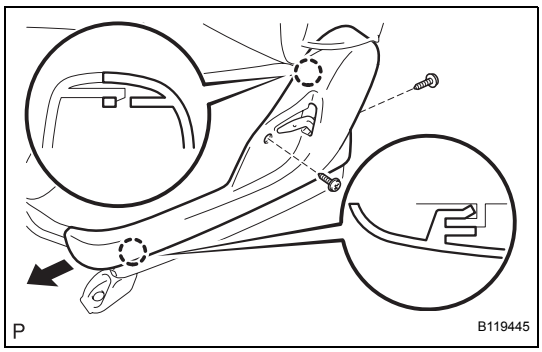
(b) Using a screwdriver, detach the claw and remove the release handle.
HINT:
Tape the screwdriver tip before use.



3. REMOVE FRONT SEAT CUSHION SHIELD LH

(a) Remove the 2 screws.

(b) Using a screwdriver, detach the 2 claws and remove the seat cushion shield.
HINT:
Tape the screwdriver tip before use.

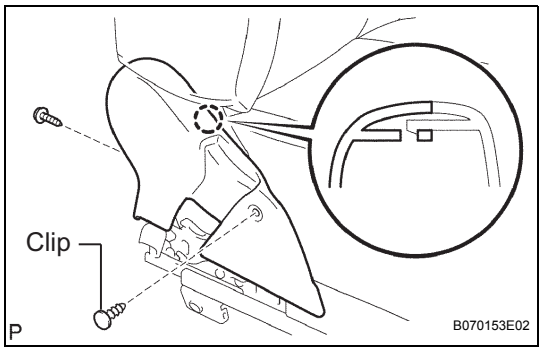


4. REMOVE FRONT SEAT INNER BELT ASSEMBLY LH (See page SB-5)

5. REMOVE FRONT SEAT CUSHION SHIELD INNER LH

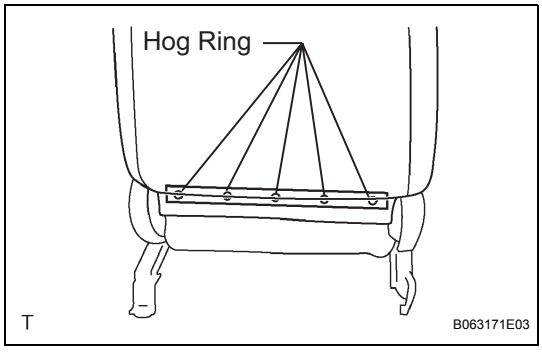
(a) Remove the clip and screw.

(b) Using a screwdriver, detach the claw and remove the cushion shield.
HINT:
Tape the screwdriver tip before use.

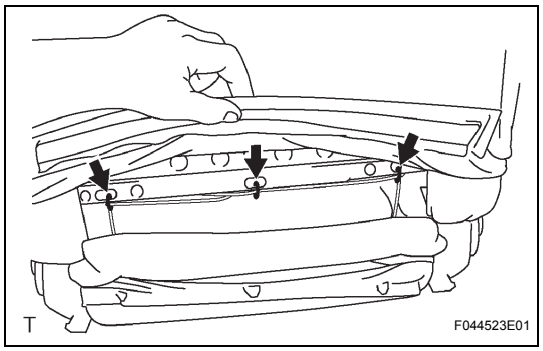


6. REMOVE FRONT SEATBACK ASSEMBLY

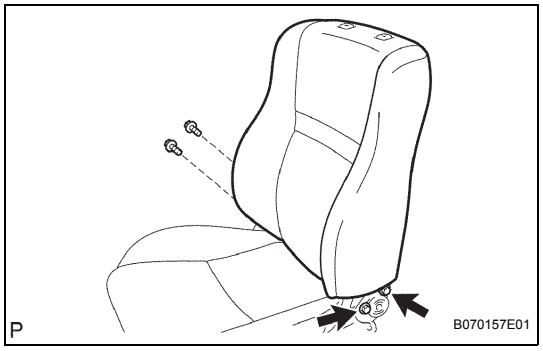
(a) Remove the hog rings.



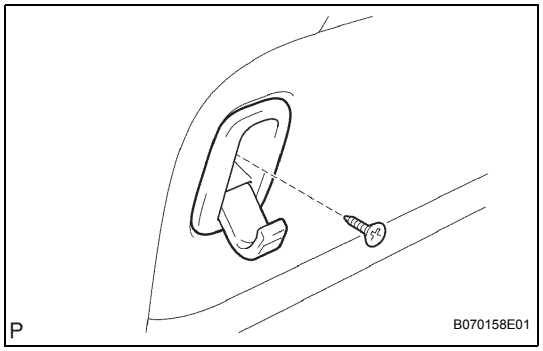
SE



(b) Lift up the seatback cover and remove the hog rings.
(c) Disconnect the clamp.



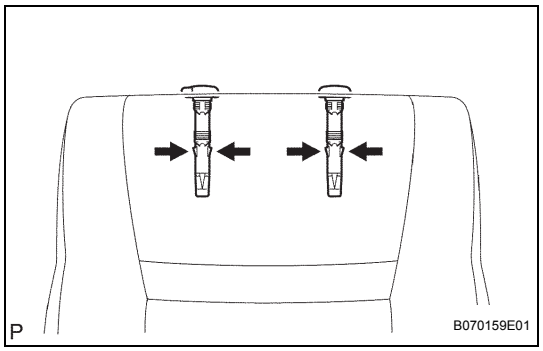
(d) Remove the 4 bolts and seatback.



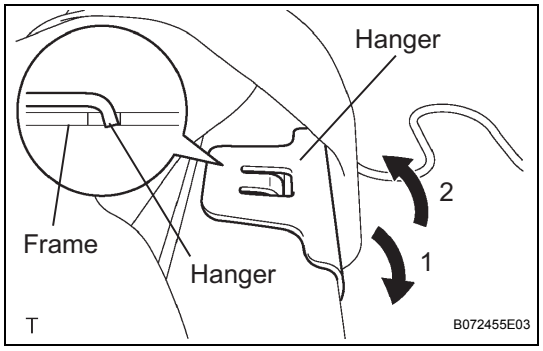
7. REMOVE FRONT SEATBACK COVER

(a) w/ Seat hook:
Remove the screw and seatback hook.

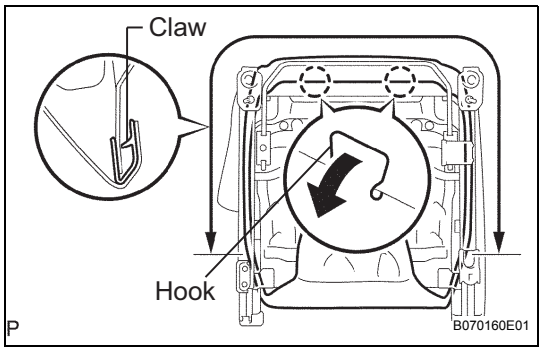
SE



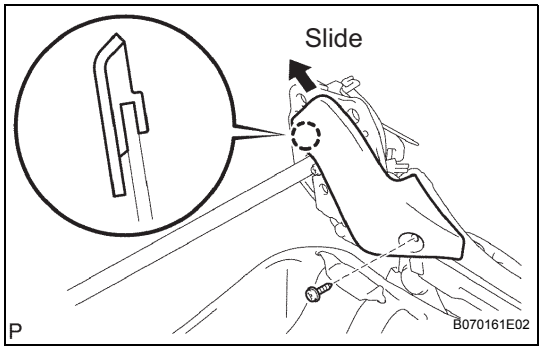
(b) Lift up the seatback cover to the top of the seat, and then detach the 4 claws and remove the 2 headrest supports.



(c) w/ Front seat side airbag:
Using a screwdriver, pry out the hanger as shown in the illustration.
NOTICE:
Be careful not to damage the airbag.
(d) Remove the hog rings and the seatback cover (with pad) from the seatback spring.
(e) Remove the hog ring and remove the seatback cover.



8. **REMOVE FRONT SEAT CUSHION COVER**
   (a) Remove the hog rings.
   (b) Detach the claw of the front part of the seat adjuster.
   (c) Detach the hook and remove the seat cushion cover (with pad) from seat adjuster.
   (d) Remove the hog rings and seat cushion cover.



9. **REMOVE RECLINING ADJUSTER INSIDE COVER LH**
   (a) Remove the screw and inside cover.
10. **REMOVE RECLINING ADJUSTER INSIDE COVER RH**
   (a) Remove the screw and inside cover.
11. **REMOVE SEAT POSITION AIRBAG SENSOR (See page RS-340)**

REASSEMBLY

HINT:

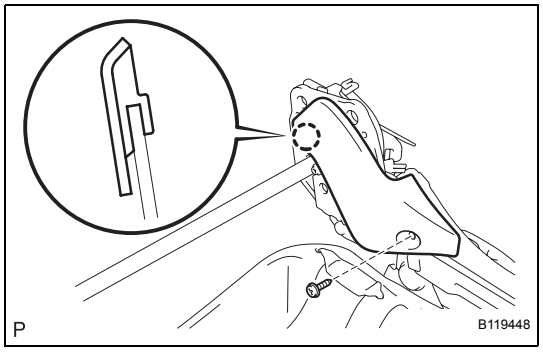
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

CAUTION:
Wear protective gloves. Sharp surfaces on the seatback spring and seat adjuster may injure your hands.

1. **INSTALL SEAT POSITION AIRBAG SENSOR (See page RS-341)**

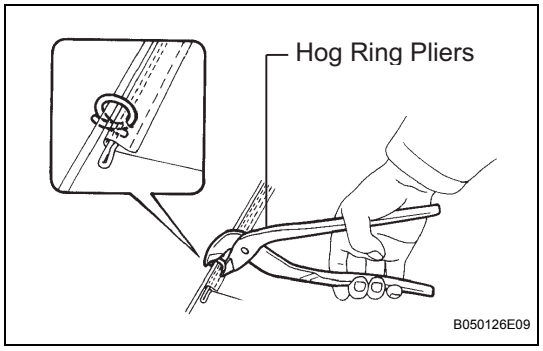
2. **INSTALL RECLINING ADJUSTER INSIDE COVER LH**
   (a) Install the inside cover with the screw.

3. **INSTALL RECLINING ADJUSTER INSIDE COVER RH**
   (a) Install the inside cover with the screw.

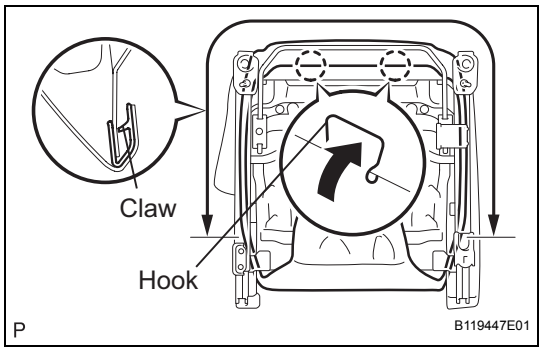


4. **INSTALL FRONT SEAT CUSHION COVER**
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, avoid wrinkling the cover.**

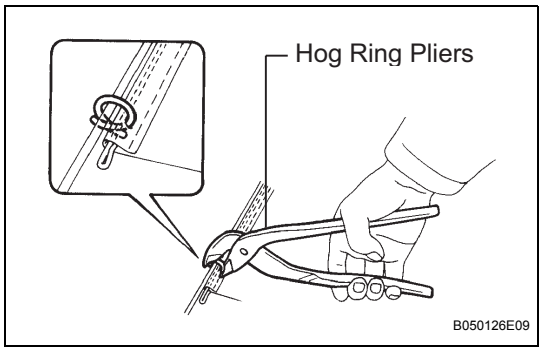
   (a) Using hog ring pliers, install the seat cushion cover to the seat cushion pad with new hog rings.



   (b) Attach the hook and claw of the front part of the seat adjuster to install the seat cushion cover (with pad).
   (c) Using hog ring pliers, install new hog rings.



SE



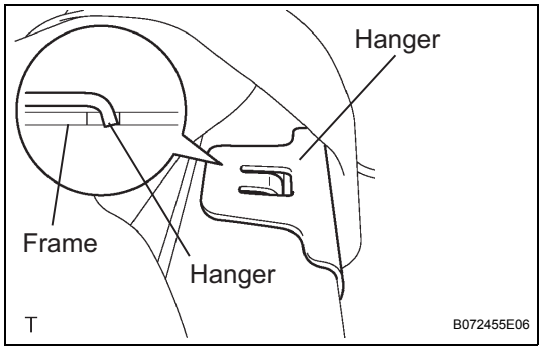
5. INSTALL FRONT SEATBACK COVER

NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, avoid wrinkling the cover.**

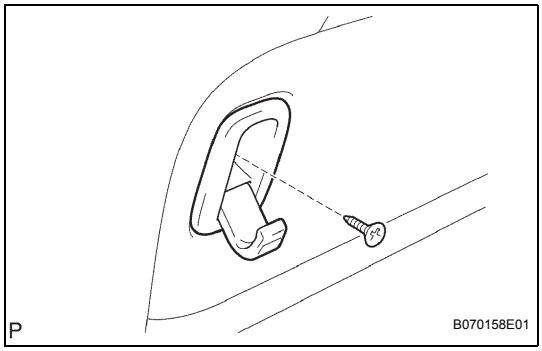
(a) Using hog ring pliers, install the seatback cover to the seatback pad with new hog rings.

(b) Using hog ring pliers, install the seatback cover (with pad) to the seatback frame with new hog rings.

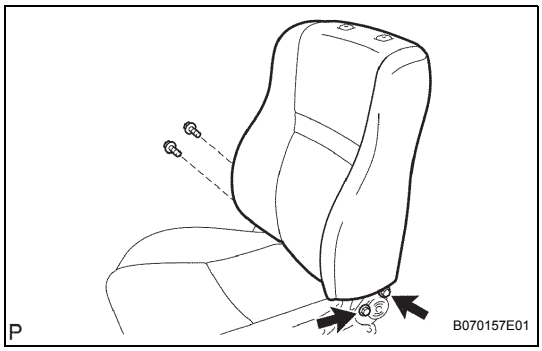


(c) w/ Front seat side airbag:
Attach the hanger to the seatback frame as shown in the illustration.

(d) Install the 2 headrest supports.



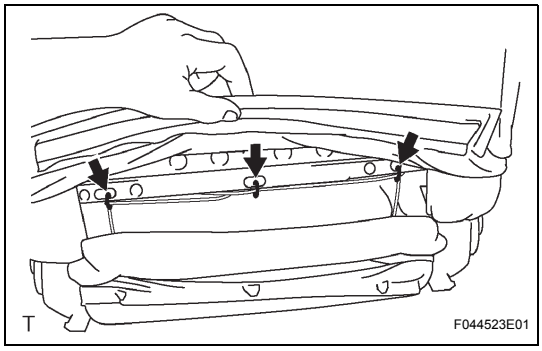
(e) w/ Seat hook:
Install the seatback hook with the screw.



6. INSTALL FRONT SEATBACK ASSEMBLY

(a) Install the seatback with the 4 bolts.

(b) Connect the clamps.

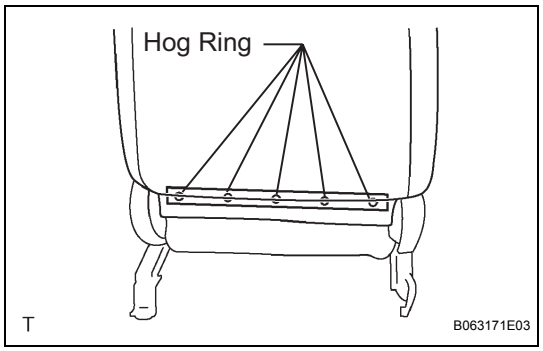


(c) Lift up the seatback cover. Then using hog ring pliers, install the seat cushion cover to the seat cushion pad with new hog rings.

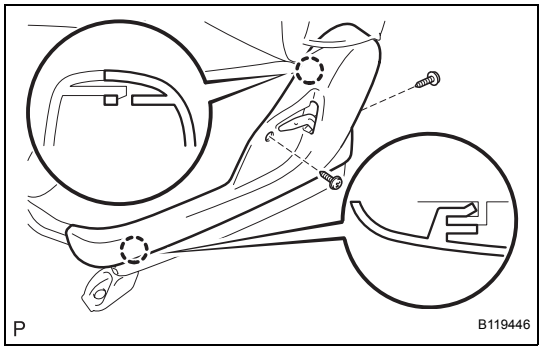
NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, avoid wrinkling the cover.**

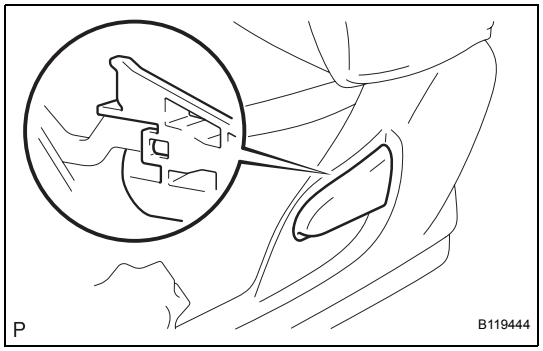
SE



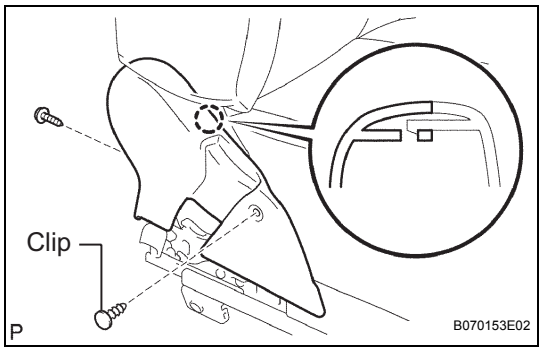
(d) Using hog ring pliers, install new hog rings.
NOTICE:
- **Be careful not to damage the cover.**
- **When installing the hog rings, avoid wrinkling the cover.**



7. INSTALL FRONT SEAT CUSHION SHIELD LH
(a) Attach the 2 claws to install the seat cushion shield.
(b) Install the 2 screws.



8. INSTALL RECLINING ADJUSTER RELEASE HANDLE LH
(a) Attach the claw to install the release handle.



9. REMOVE FRONT SEAT CUSHION SHIELD INNER LH
(a) Attach the claw to install the seat cushion shield.
(b) Install the clip and screw.

10. INSTALL FRONT SEAT INNER BELT ASSEMBLY LH (See page SB-6)

11. INSTALL FRONT SEAT HEADREST ASSEMBLY

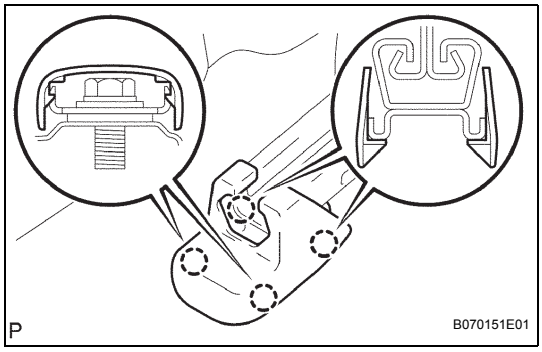
SE

INSTALLATION

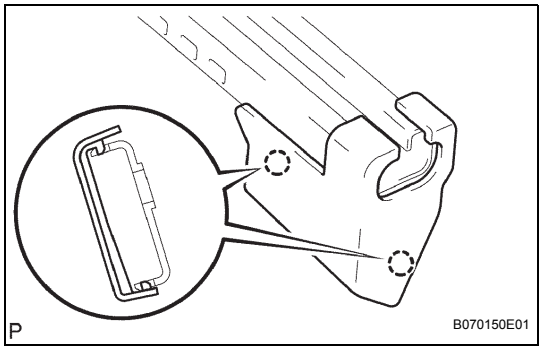
HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **INSTALL FRONT SEAT ASSEMBLY**
   (a) Place the seat on the cabin.
   NOTICE:
   Be careful not to damage the vehicle body.
   (b) Connect the connectors under the seat.
   (c) Tighten the 4 bolts.
   Torque: 37 N*m (375 kgf*cm, 27 ft.*lbf)



2. **INSTALL SEAT TRACK OUTER COVER LH**
   (a) Attach the 4 claws to install the seat track outer cover.



3. **INSTALL SEAT TRACK BRACKET COVER INNER LH**
   (a) Attach the 2 claws to install the seat track bracket cover.

4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

5. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

6. **INSPECT SRS WARNING LIGHT**
   (a) Check the SRS warning light (see page RS-28).

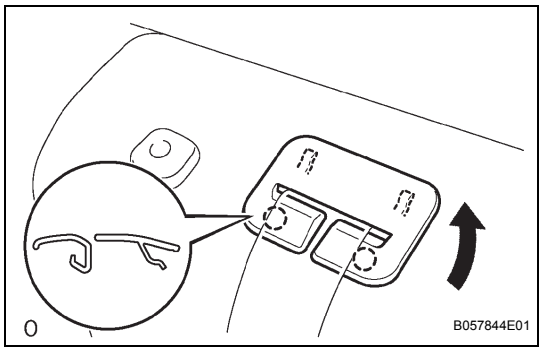
SE

DISASSEMBLY

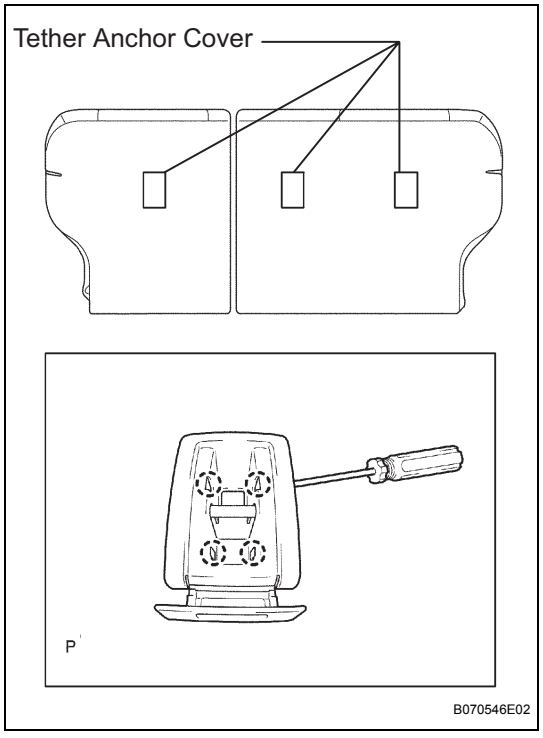
CAUTION:
Wear protective gloves. Sharp areas on the seatback frame may injure your hands.

1. **REMOVE REAR SEAT HEADREST ASSEMBLY**
   (a) Remove the 3 headrests.

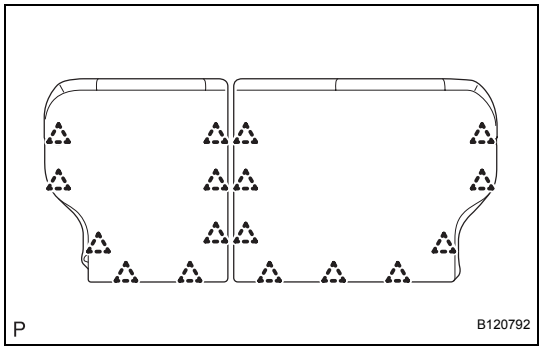
2. **REMOVE REAR SEATBACK LOCK RELEASE BUTTON**
   (a) Remove the 2 buttons.



3. **REMOVE REAR SEAT SHOULDER BELT COVER (for RH Side)**
   (a) Using a screwdriver, pry out the shoulder belt cover.
   HINT:
   Tape the screwdriver tip before use.

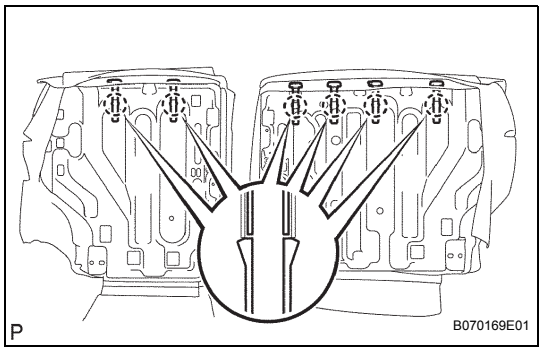


4. **REMOVE TETHER ANCHOR COVER**
   (a) Using a screwdriver, pry out the 3 tether anchor covers.
   HINT:
   Tape the screwdriver tip before use.

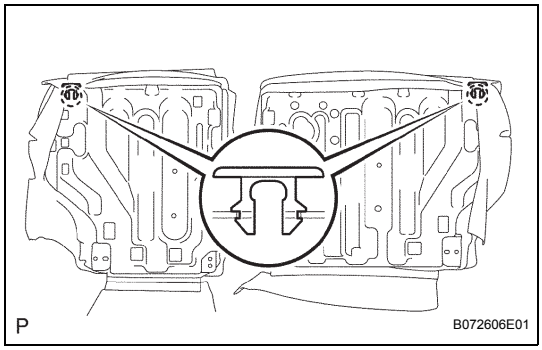


5. **REMOVE REAR SEAT HEADREST SUPPORT**
   (a) Using a clip remover, remove the 17 clips.
   NOTICE:
   If clips are damaged during removal, replace them.
   (b) Remove the hog rings.

SE



(c) Detach the claws and remove the 6 headrest supports.
HINT:
In order to detach the claw of the headrest support, insert your hand between the seatback frame and the seatback cover (with pad).



6. REMOVE REAR SEATBACK STOP BUTTON GROMMET

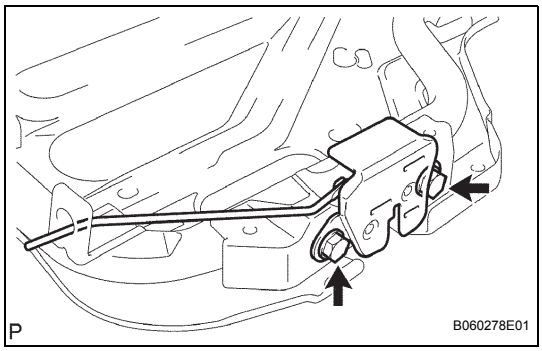
(a) Detach the claws and remove the 2 grommets.
HINT:
In order to detach the claw of the headrest support, insert your hand between the seatback frame and the seatback cover (with pad).

7. REMOVE REAR SEATBACK COVER WITH PAD LH

(a) Remove the seatback cover (with pad) from the seatback frame.

8. REMOVE REAR SEATBACK COVER WITH PAD RH

(a) Remove the seatback cover (with pad) from the seatback frame.



9. REMOVE REAR SEATBACK LOCK ASSEMBLY LH

(a) Remove the 2 bolts and lock.

10. REMOVE REAR SEATBACK LOCK ASSEMBLY RH

(a) Remove the 2 bolts and lock.

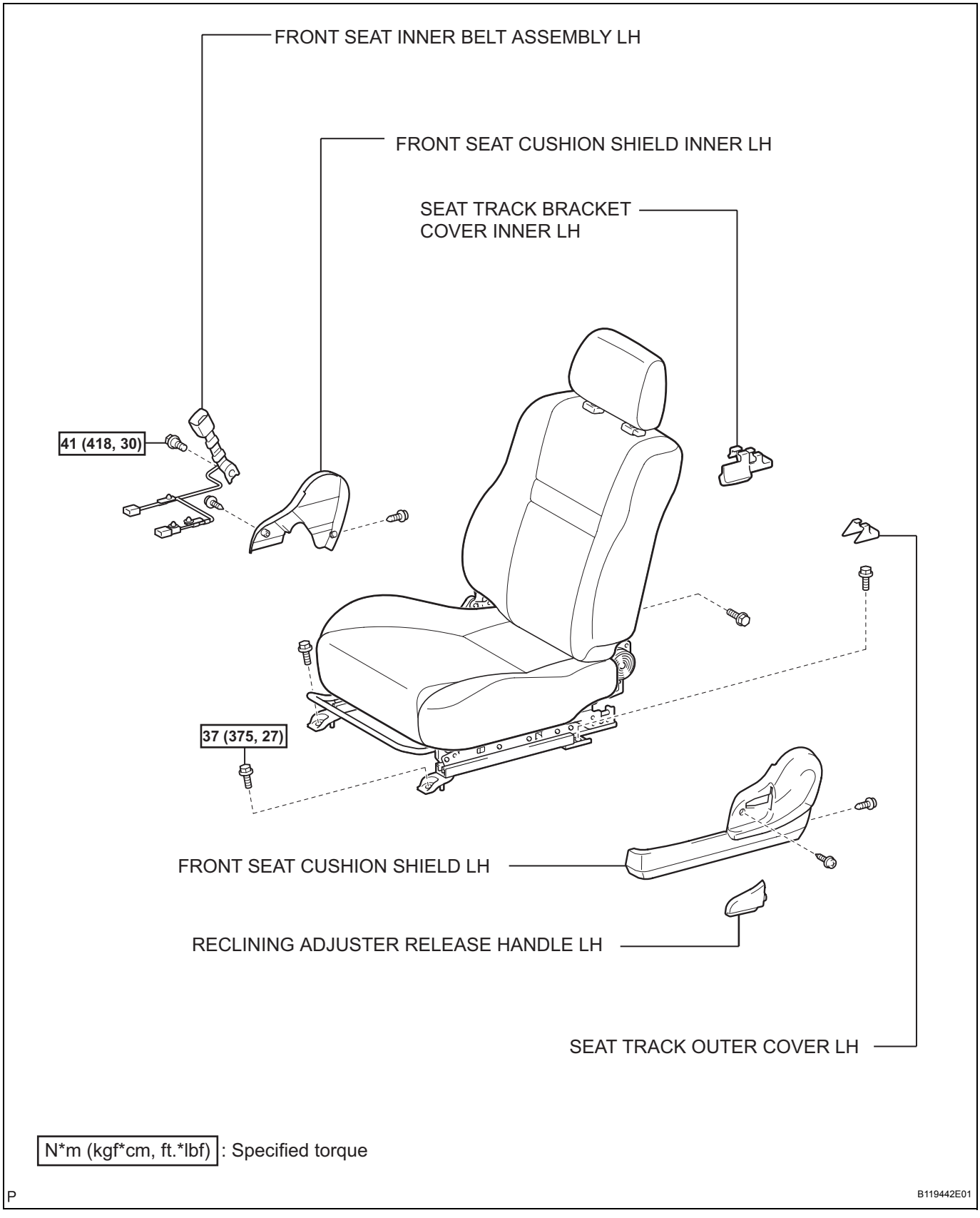
11. REMOVE REAR SEAT BELT ASSEMBLY OUTER CENTER

(a) Remove the nut and belt.

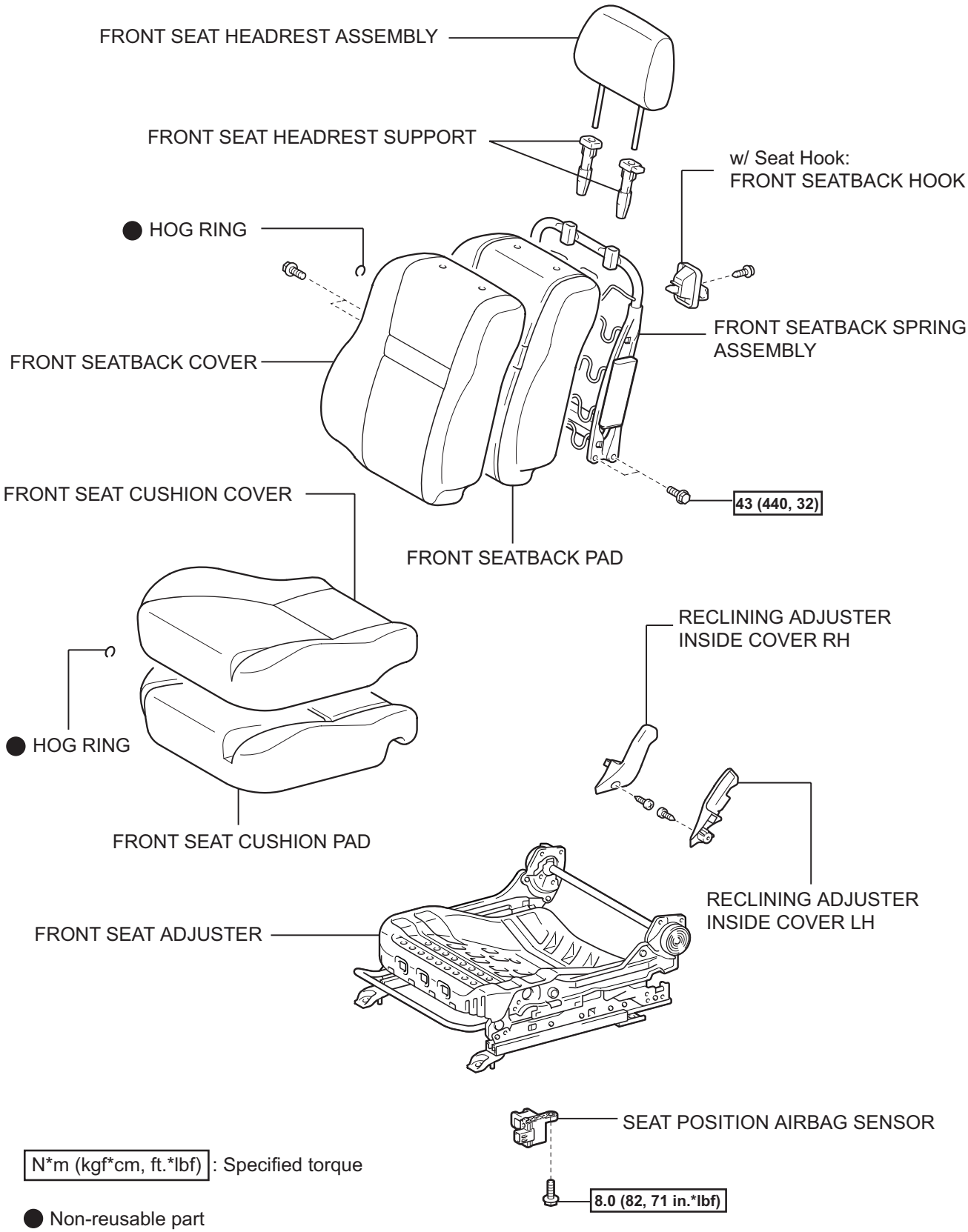
SE

FRONT SEAT ASSEMBLY

COMPONENTS



SE



SE

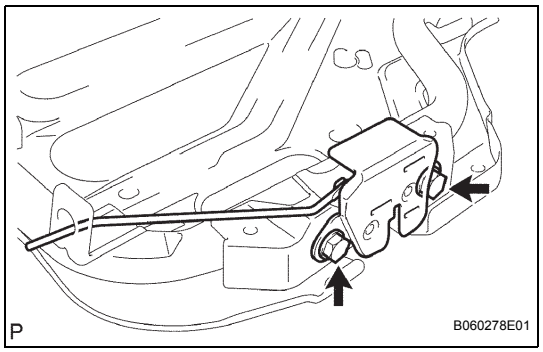
P

B121117E01

REASSEMBLY

CAUTION:
Wear protective gloves. Sharp areas on the seatback frame may injure your hands.

1. **INSTALL REAR SEAT BELT ASSEMBLY OUTER CENTER**
   (a) Install the belt with the nut.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

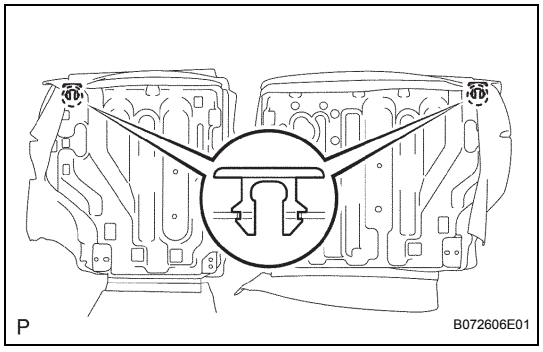


2. **INSTALL REAR SEATBACK LOCK ASSEMBLY LH**
   (a) Install the lock with the 2 bolts.

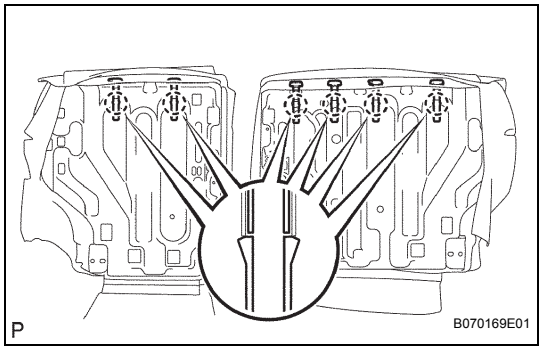
3. **INSTALL REAR SEATBACK LOCK ASSEMBLY RH**
   (a) Install the lock with the 2 bolts.

4. **INSTALL REAR SEATBACK COVER WITH PAD LH**
   (a) Install the seatback cover (with pad) to the seatback frame.

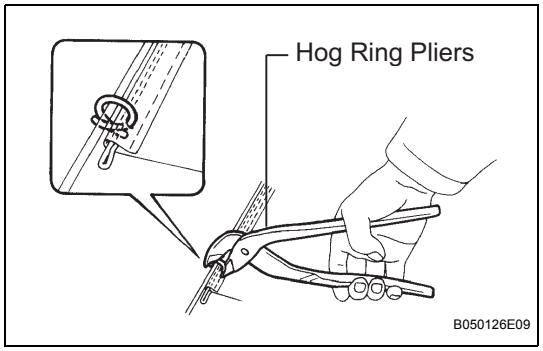
5. **INSTALL REAR SEATBACK COVER WITH PAD RH**
   (a) Install the seatback cover (with pad) to the seatback frame.



6. **INSTALL REAR SEATBACK STOP BUTTON GROMMET**
   (a) Attach the claws to install the 2 grommets.

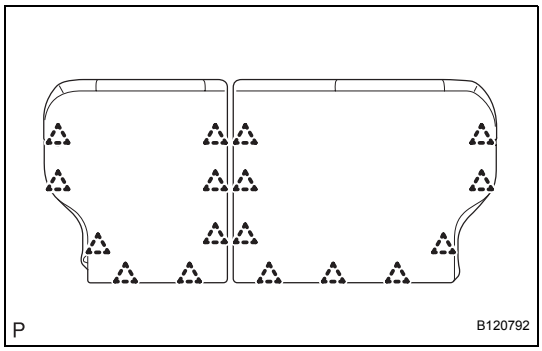


7. **INSTALL REAR SEAT HEADREST SUPPORT**
   (a) Attach the claws to install the 6 headrest supports.

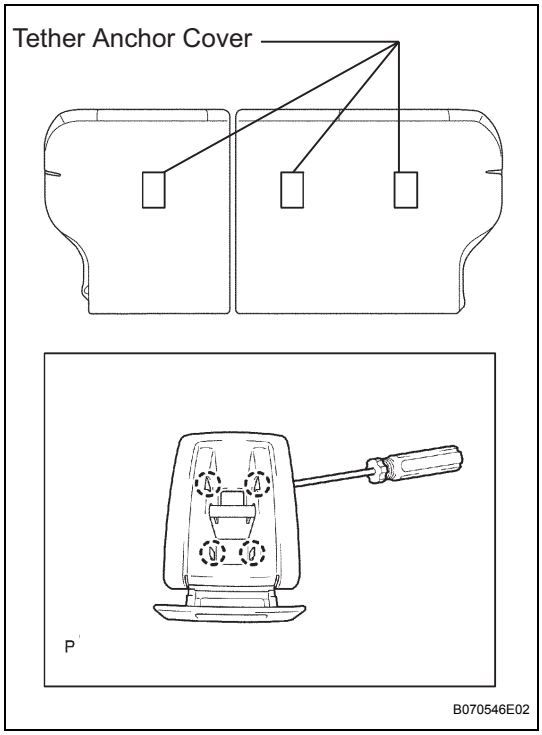


   (b) Using hog ring pliers, install the seatback cover (with pad) to the seatback frame with new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, avoid wrinkling the cover.**

SE

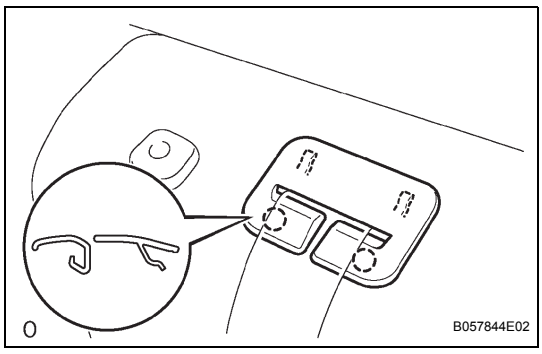


(c) Install the 17 clips.



8. INSTALL TETHER ANCHOR COVER

(a) Install the 3 tether anchor covers.



9. INSTALL REAR SEAT SHOULDER BELT COVER (for RH Side)

(a) Attach the claws to install the shoulder belt cover.

10. INSTALL REAR SEATBACK LOCK RELEASE BUTTON

(a) Install the 2 buttons.

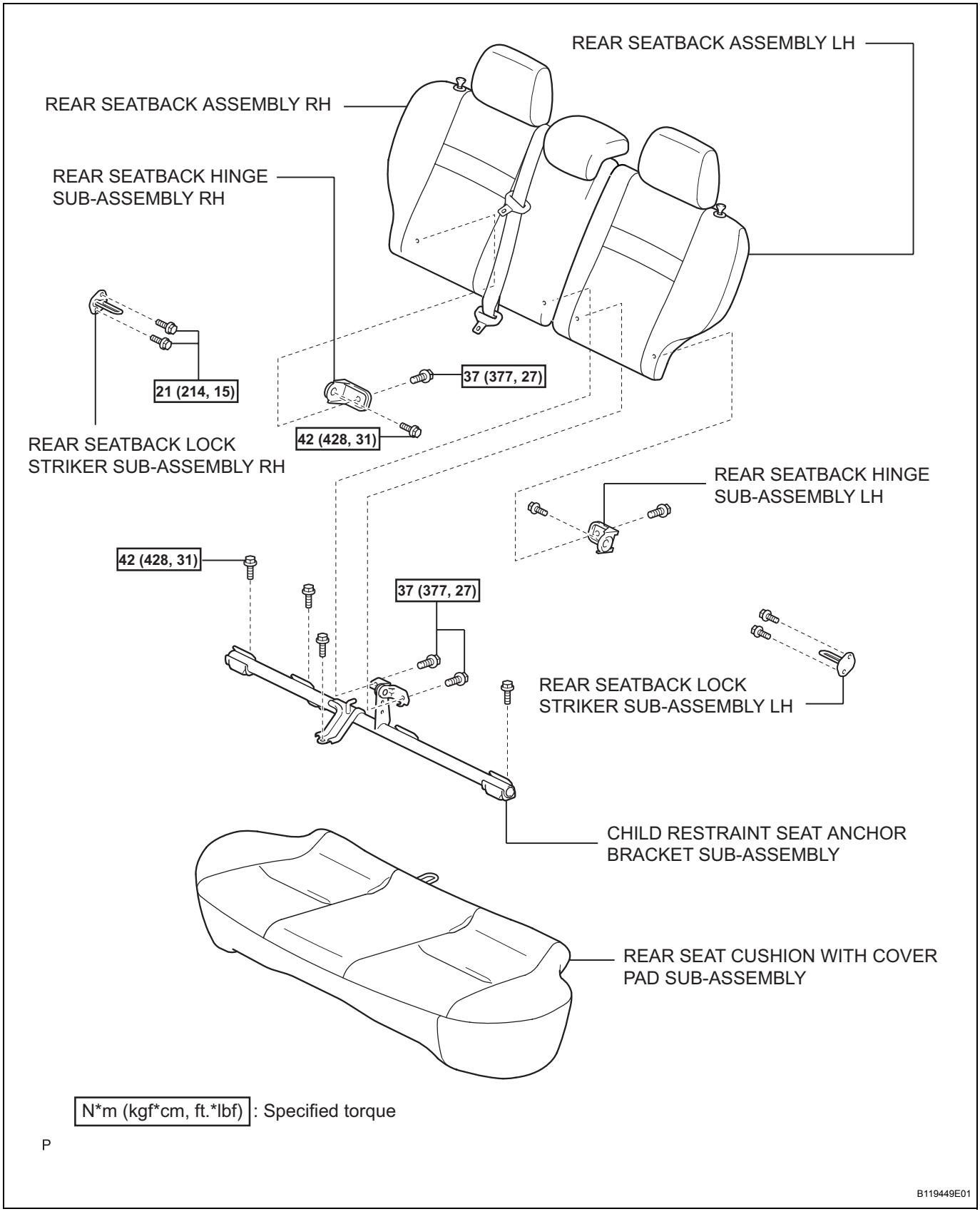
11. INSTALL REAR SEAT HEADREST ASSEMBLY

(a) Install the 3 headrests.

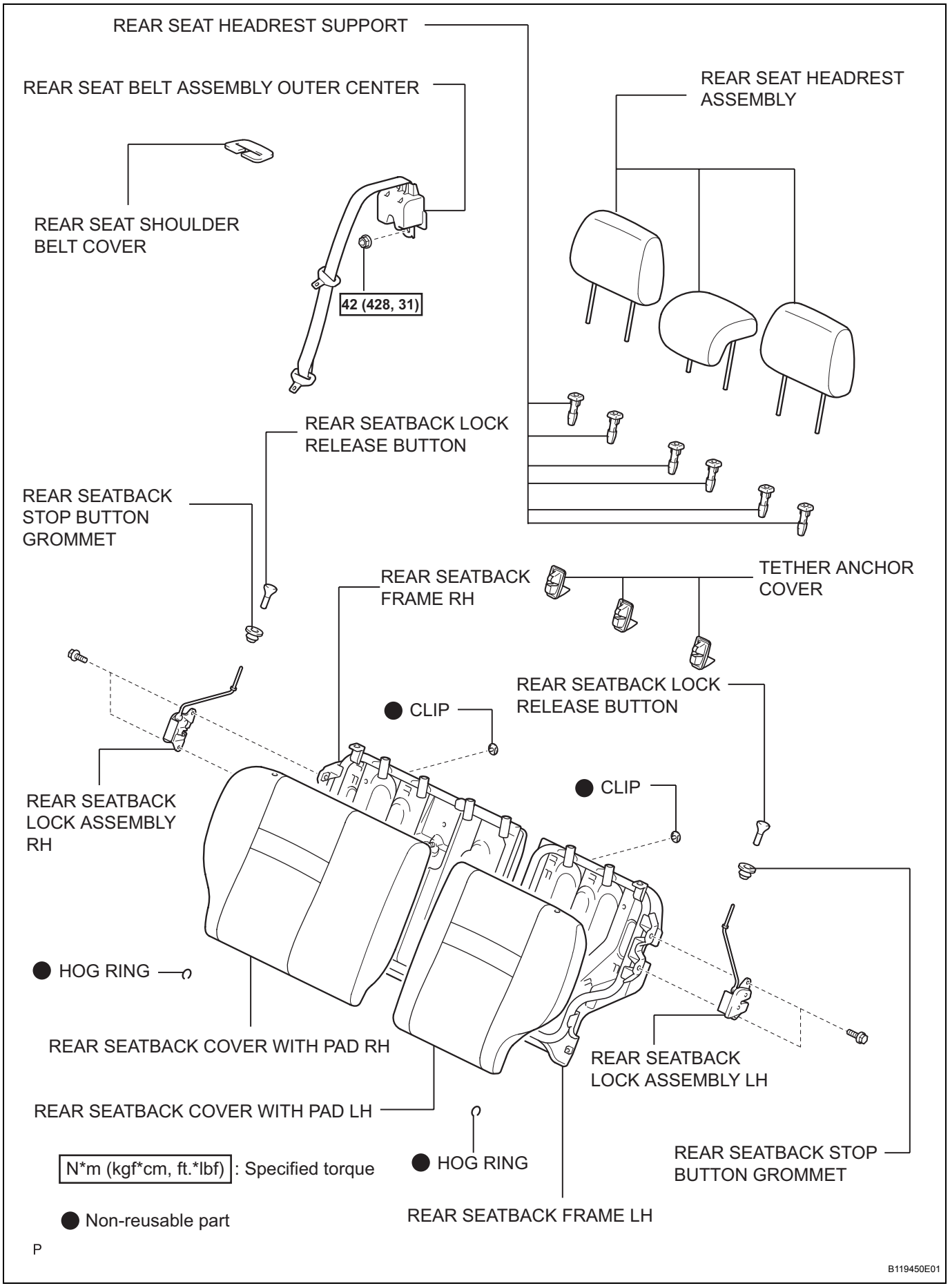
SE

REAR SEAT ASSEMBLY

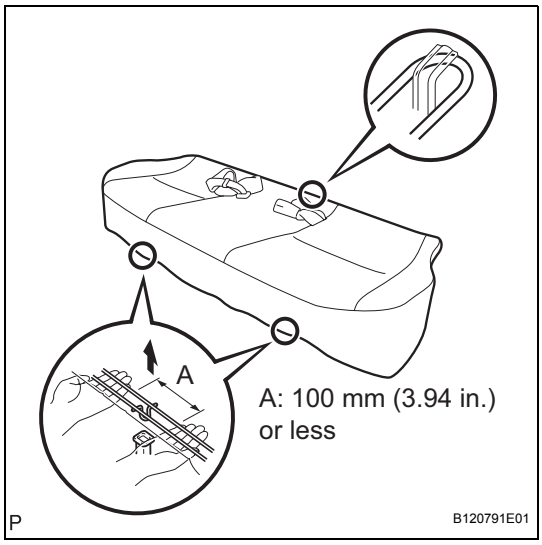
COMPONENTS



SE

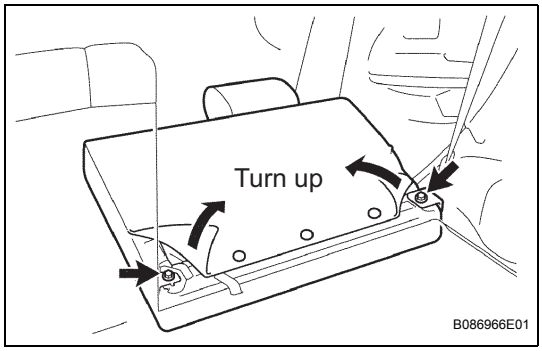

REAR SEAT HEADREST SUPPORT
REAR SEAT BELT ASSEMBLY OUTER CENTER
REAR SEAT HEADREST ASSEMBLY
REAR SEAT SHOULDER BELT COVER
42 (428, 31)
REAR SEATBACK LOCK RELEASE BUTTON
REAR SEATBACK STOP BUTTON GROMMET
REAR SEATBACK FRAME RH
TETHER ANCHOR COVER
CLIP
REAR SEATBACK LOCK RELEASE BUTTON
CLIP
REAR SEATBACK LOCK ASSEMBLY RH
HOG RING
REAR SEATBACK COVER WITH PAD RH
REAR SEATBACK LOCK ASSEMBLY LH
REAR SEATBACK COVER WITH PAD LH
HOG RING
REAR SEATBACK STOP BUTTON GROMMET
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
REAR SEATBACK FRAME LH
P
B119450E01

SE



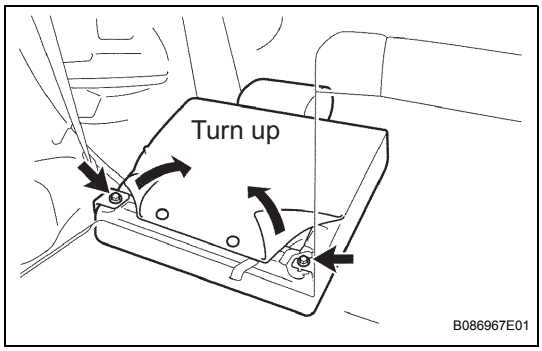
REMOVAL

1. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY**
   (a) Detach the seat cushion's 2 front hooks from the vehicle body.
   NOTICE:
   Follow the instructions below carefully as the cushion frame deforms easily.
      (1) Choose a hook to detach first. Place your hands near the hook as shown in the illustration. Then lift the seat cushion to detach the hook.
      (2) Repeat for the other hook.
   (b) Detach the seat cushion's rear hook.
   (c) Remove the seat cushion.



2. **REMOVE REAR SEATBACK ASSEMBLY LH**
   (a) Tilt the seatback down toward the front of the vehicle.
   (b) Turn up the seatback cover as shown in the illustration.
   (c) Remove the 2 bolts and seatback.

SE



3. **REMOVE REAR SEATBACK ASSEMBLY RH**
   HINT:
   Use the same procedures described for the LH side.
4. **REMOVE REAR SEATBACK LOCK STRIKER SUB-ASSEMBLY LH**
   (a) Remove the 2 bolts and seatback lock striker.
5. **REMOVE REAR SEATBACK LOCK STRIKER SUB-ASSEMBLY RH**
   (a) Remove the 2 bolts and seatback lock striker.
6. **REMOVE REAR SEATBACK HINGE SUB-ASSEMBLY LH**
   (a) Remove the bolt and seatback hinge.
7. **REMOVE REAR SEATBACK HINGE SUB-ASSEMBLY RH**
   (a) Remove the bolt and seatback hinge.
8. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Remove the 4 bolts and anchor bracket.

INSTALLATION

1. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Install the anchor bracket with the 4 bolts.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

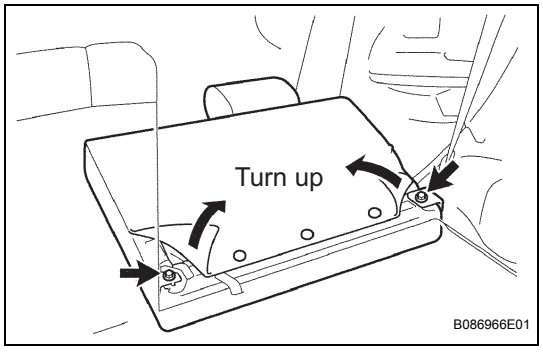
2. **INSTALL REAR SEATBACK HINGE SUB-ASSEMBLY LH**
   (a) Install the seatback hinge with the bolt.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

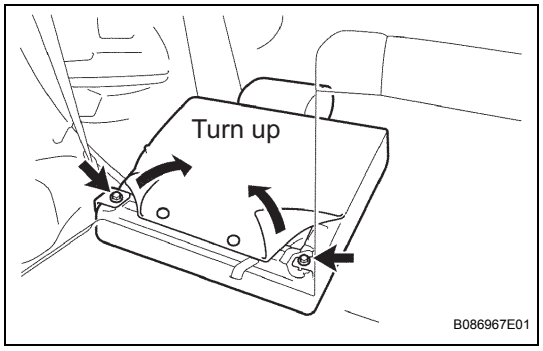
3. **INSTALL REAR SEATBACK HINGE SUB-ASSEMBLY RH**
   (a) Install the seatback hinge with the bolt.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

4. **INSTALL REAR SEATBACK LOCK STRIKER SUB-ASSEMBLY LH**
   (a) Install the seatback lock striker with the 2 bolts.
   Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

5. **INSTALL REAR SEATBACK LOCK STRIKER SUB-ASSEMBLY RH**
   (a) Install the seatback lock striker with the 2 bolts.
   Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

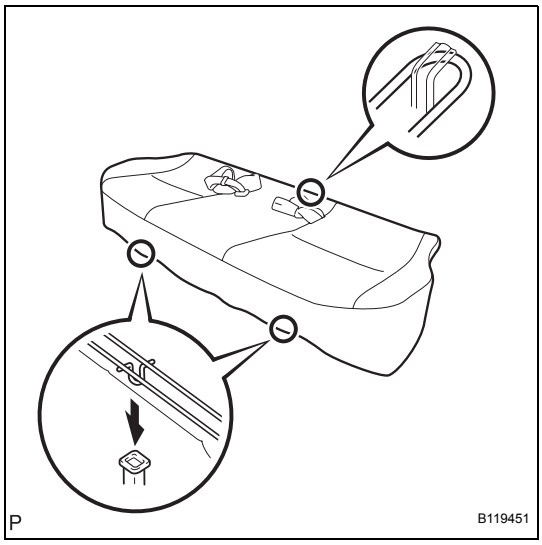
6. **INSTALL REAR SEATBACK ASSEMBLY LH**
   (a) Turn up the seatback cover as shown in the illustration.
   (b) Install the seatback with the 2 bolts.
   Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)
   (c) Return the seatback to the upright position.





7. **INSTALL REAR SEATBACK ASSEMBLY RH**
   HINT:
   Use the same procedures described for the LH side.
   Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

SE



8. INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY

(a) Attach the seat cushion's rear hook.

(b) Attach the seat cushion's 2 front hooks to the vehicle body.

(c) Confirm that the seat cushion is firmly installed.

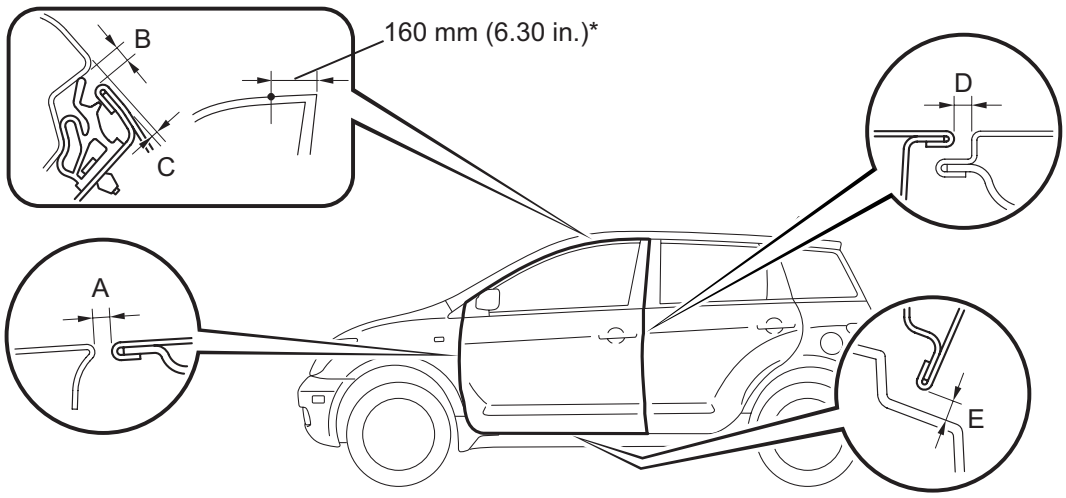
NOTICE:

When installing the seat cushion, make sure the seat belt buckle is not under the seat cushion.

ON-VEHICLE INSPECTION

1. INSPECT FRONT DOOR PANEL SUB-ASSEMBLY

(a) Check that the clearance measurements of areas A to E are within the standard range.



*: 160 mm (6.30 in.) from the end of the window frame, check clearances B and C as illustrated in the cross section.

P B120450E02

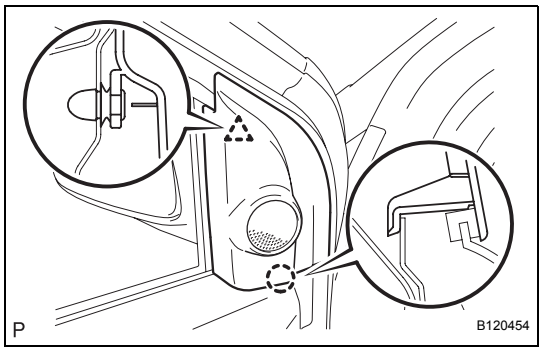
Standard measurement

Area	Specified Condition
A	5.0 +-1.5 mm (0.197 +-0.059 in.)
B	5.1 +-1.5 mm (0.200 +-0.059 in.)
C	1.9 +-1.5 mm (0.075 +-0.059 in.)
D	5.5 +-1.5 mm (0.220 +-0.059 in.)
E	6.0 +-1.5 mm (0.240 +-0.059 in.)

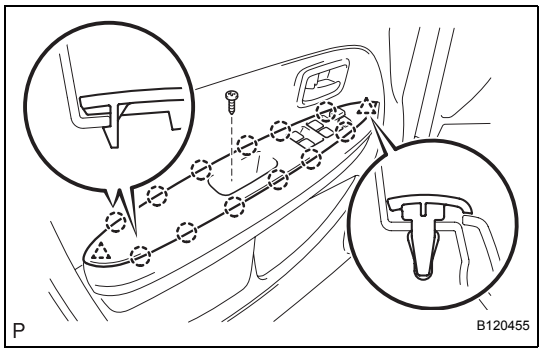
DISASSEMBLY

HINT:
- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.

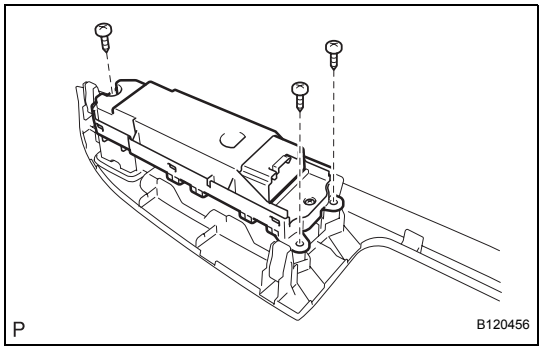
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



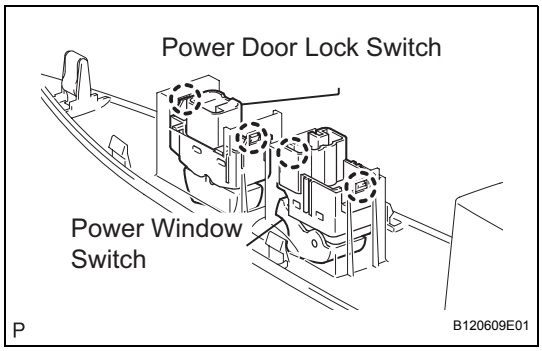
2. REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH LH
(a) Using a screwdriver, detach the clip and claw, and remove the garnish.
HINT:
Tape the screwdriver tip before use.



3. REMOVE FRONT ARMREST BASE PANEL UPPER LH
(a) Remove the screw.
(b) Using a screwdriver, detach the 12 claws and 2 clips, and remove the armrest base panel together with the switch.
HINT:
Tape the screwdriver tip before use.
(c) Disconnect the switch connector.

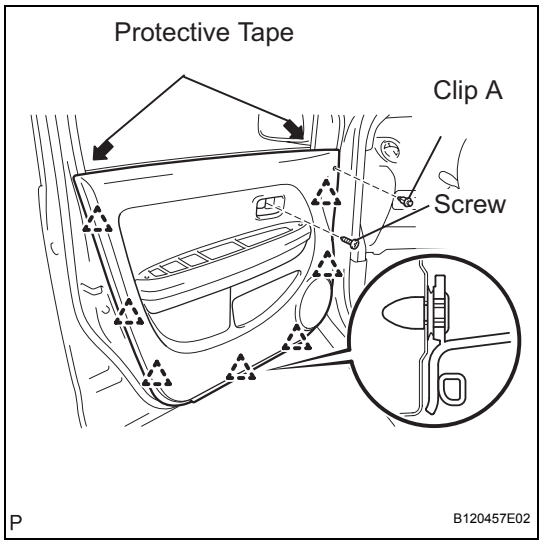


(d) Driver side:
Remove the 3 screws and switch from the armrest base panel upper.
NOTICE:
Be careful when removing the screw as the master switch may fall and became damaged.

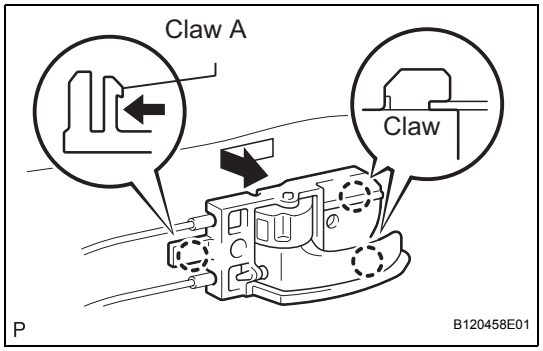


(e) Passenger side:
(1) Detach the 2 claws and power window switch from the armrest base panel upper.
(2) Detach the 2 claws and door lock switch from the armrest base panel upper.

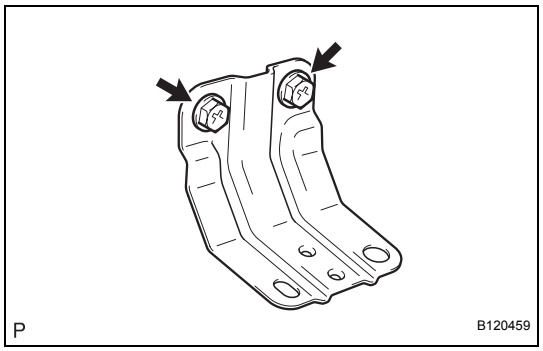
ED



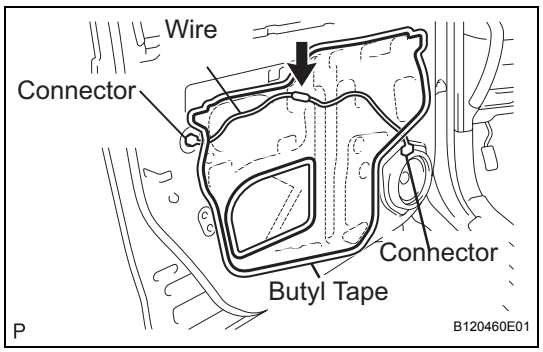
4. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY LH**
   (a) Remove the screw and clip A as shown in the illustration.
   (b) Using a clip remover, detach the 7 clips.
   (c) Remove the trim board upward.
   HINT:
   In order to prevent the door panel from being damaged, use protective tape to cover the areas indicated by the arrow marks in the illustration.
   (d) Using a screwdriver, detach the claws and remove the weatherstrip inner.
   HINT:
   Tape the screwdriver tip before use.



5. **REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY LH**
   (a) Using a screwdriver, detach claw A.
   HINT:
   Tape the screwdriver tip before use.
   (b) Move the inside handle in the direction indicated by the arrow mark in the illustration. This will release the 2 claws and allow removal of the inside handle.
   (c) Disconnect the 2 cables from the inside handle.



6. **REMOVE FRONT DOOR SERVICE HOLE COVER LH**
   (a) Remove the 2 bolts and trim bracket.



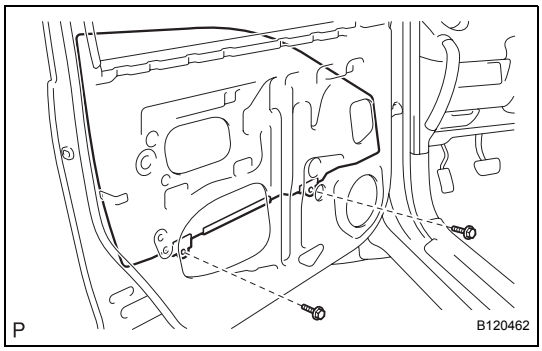
   (b) Disconnect the 2 connectors.
   (c) Using a screwdriver, remove the clip indicated by the arrow mark and remove the wire.
   HINT:
   Tape the screwdriver tip before use.
   (d) Remove the service hole cover.

7. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (See page AV-7)**

8. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY LH (See page MI-7)**

9. **REMOVE FRONT DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH (See page ET-19)**

10. **REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-4)**



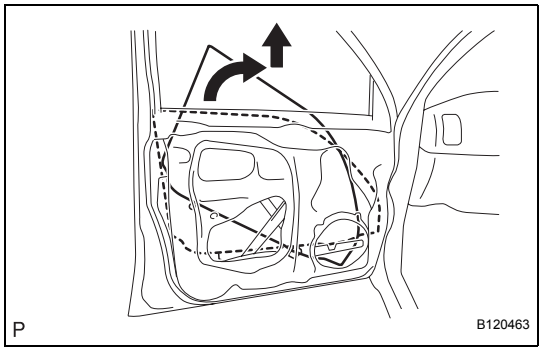
11. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY LH

(a) Driver side:
Temporarily install the window regulator master switch.

(b) Passenger side:
Temporarily install the power window regulator switch.

(c) Move the door glass until the bolts appear in the service holes.

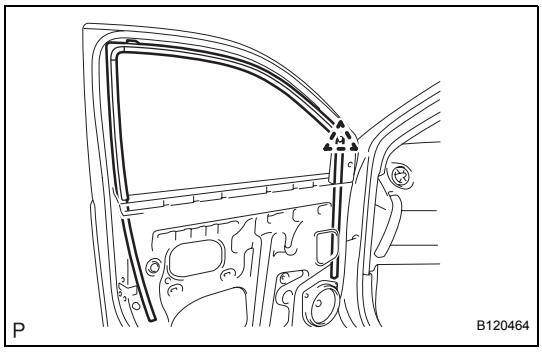
(d) Remove the 2 bolts.
NOTICE:
Be careful when removing the bolts as the glass may fall and become damaged.



(e) Remove the door glass in the direction indicated by the arrow marks in the illustration.
NOTICE:
Be careful not to damage the glass.

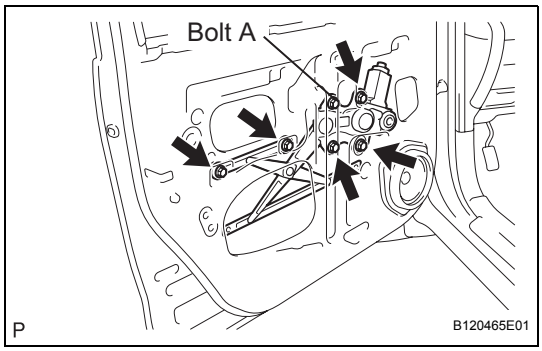
(f) Driver side:
Remove the window regulator master switch.

(g) Passenger side:
Remove the power window regulator switch.



(h) Using a clip remover, remove the clip as shown in the illustration.

(i) Remove the glass run.



12. REMOVE FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY LH

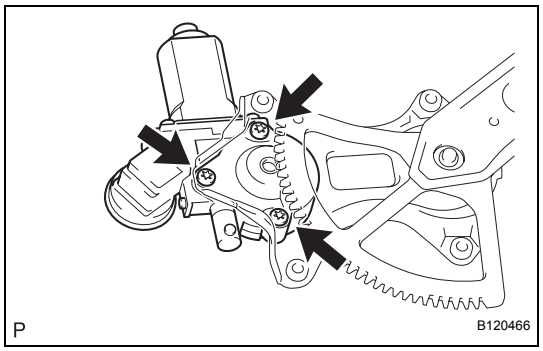
(a) Disconnect the window regulator connector.

(b) Loosen bolt A shown in the illustration.

(c) Remove the 5 bolts and window regulator.
HINT:
Remove the window regulator through the service hole.
NOTICE:
Be careful when removing the bolts as the window regulator may fall and become damaged.

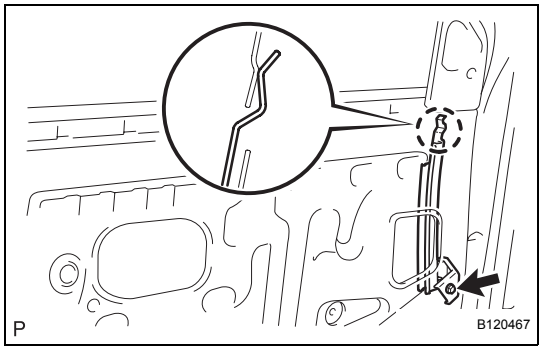
(d) Remove bolt A from the window regulator.

ED



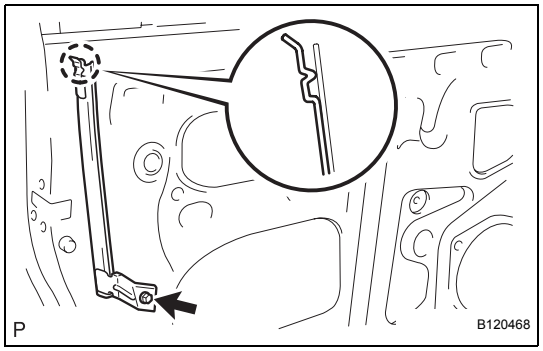
13. REMOVE POWER WINDOW REGULATOR MOTOR ASSEMBLY LH FRONT

(a) Using a T25 "torx" driver, remove the 3 screws and motor.



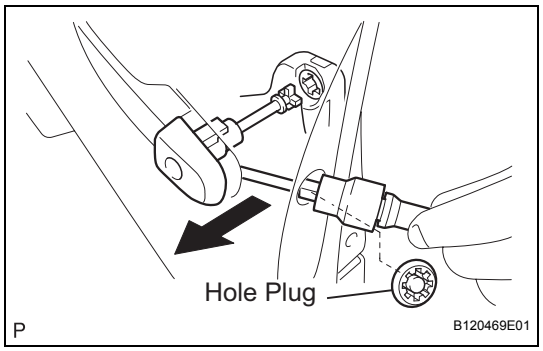
14. REMOVE FRONT DOOR FRAME SUB-ASSEMBLY FRONT LOWER LH

(a) Remove the bolt and frame.
HINT:
Remove the frame through the service hole.
NOTICE:
Be careful when removing the bolt as the frame may fall and become damaged.



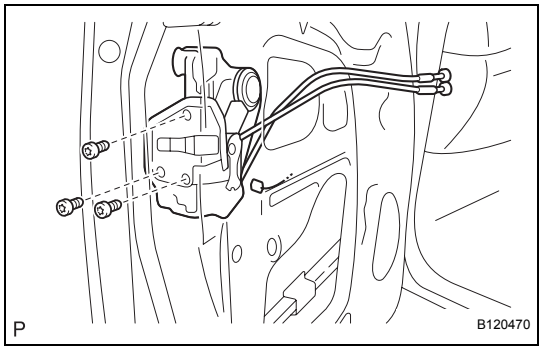
15. REMOVE FRONT DOOR FRAME SUB-ASSEMBLY REAR LOWER LH

(a) Remove the bolt and frame.
HINT:
Remove the frame through the service hole.
NOTICE:
Be careful when removing the bolt as the frame may fall and become damaged.



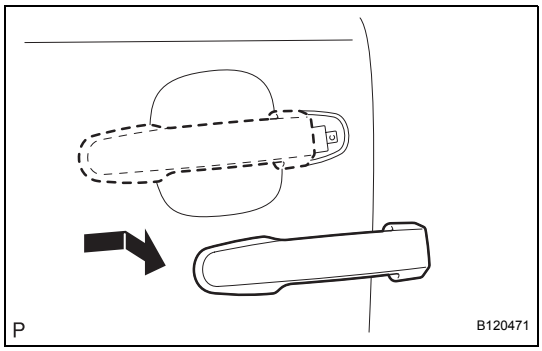
16. REMOVE FRONT DOOR OUTSIDE HANDLE COVER LH

(a) Remove the hole plug.
(b) Using a T30 "torx" socket wrench, loosen the screw and remove the cover with the door lock key cylinder installed.



17. REMOVE FRONT DOOR WITH MOTOR LOCK ASSEMBLY LH

(a) Using a T30 "torx" socket wrench, remove the 3 screws and door lock.
HINT:
Remove the door lock through the service hole.
NOTICE:
Be careful when removing the bolts as door lock may fall and become damaged.



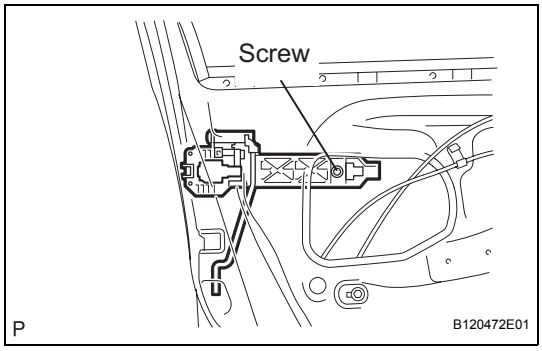
18. REMOVE FRONT DOOR HANDLE ASSEMBLY OUTSIDE LH

(a) Remove the handle by sliding and pulling it in the direction indicated by the arrow mark in the illustration.

(b) Remove the outside handle pad front and rear.

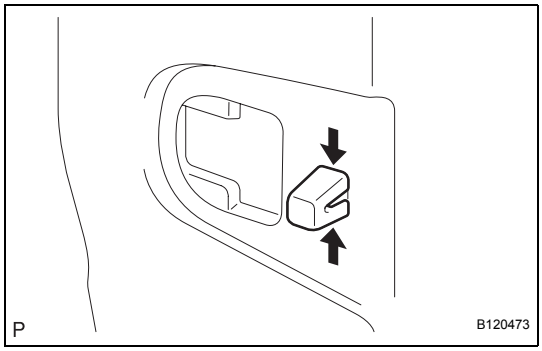
NOTICE:

If the release plate is not pulled and held when removing the handle, the release plate will interfere with the handle and become damaged.



19. REMOVE FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY LH

(a) Using a T30 "torx" socket wrench, loosen the screw of the frame.



(b) Using pliers, pinch the clip and remove the handle frame, as shown in the illustration.

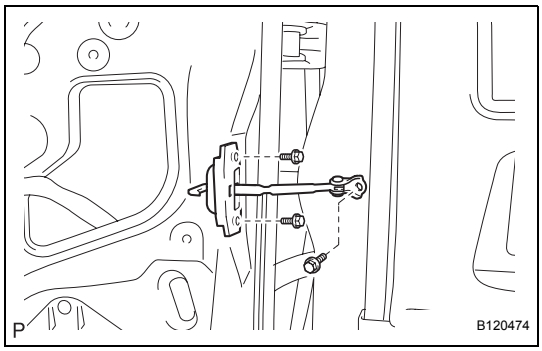
HINT:

Remove the frame through the service hole.

NOTICE:

Be sure to remove the outside handle frame together with the clips as the clips will be damaged if they remain attached to the door panel.

(c) Remove the lock open rod.



20. REMOVE FRONT DOOR CHECK ASSEMBLY LH

(a) Remove the 3 bolts and door check.

HINT:

Remove the check through the service hole.

21. REMOVE FRONT DOOR WEATHERSTRIP LH

(a) Using a clip remover, detach the clips and remove the weatherstrip.

HINT:

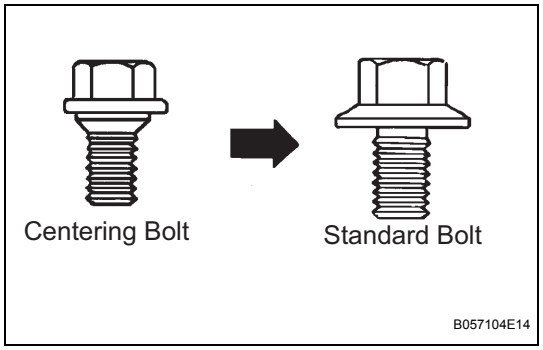
If clips are damaged during removal, replace them.

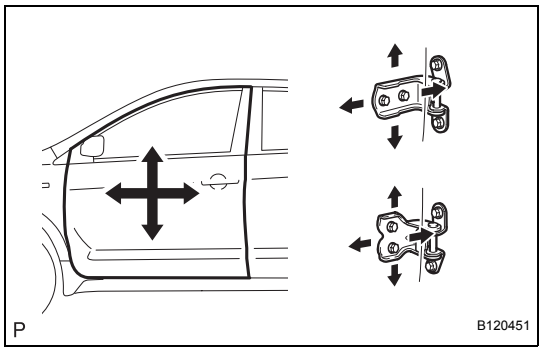
ED

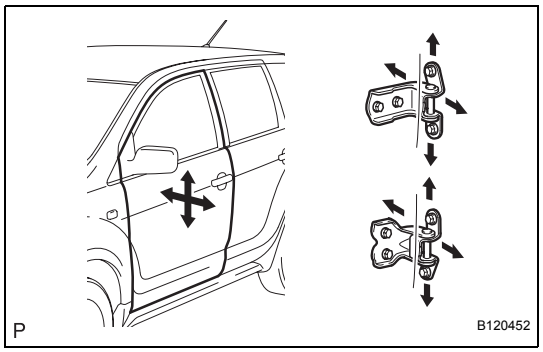
ADJUSTMENT

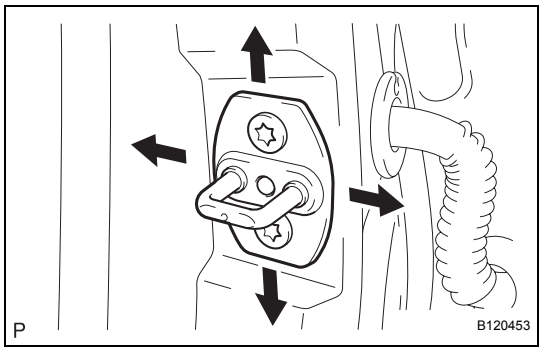
HINT:

- Before adjusting the door position for vehicles equipped with side airbags and curtain shield airbags, be sure to disconnect the negative (-) terminal cable from the battery. After adjustment, inspect the SRS warning light, side airbag system and curtain shield airbag system for normal operation. Then initialize both airbag systems.
- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (w/ washers) when making adjustments.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).









1. ADJUST FRONT DOOR PANEL SUB-ASSEMBLY LH

(a) Using SST, loosen the body's hinge bolts and adjust the door's position.
SST 09812-00010, 09812-00020

(b) Tighten the body side hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

(c) Loosen the door's hinge bolts and adjust the door's position.

(d) Tighten the door side hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

(e) Adjust the striker position by slightly loosening the striker mounting screws and hitting the striker with a plastic-faced hammer.

(f) Tighten the striker mounting screws after the adjustment.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

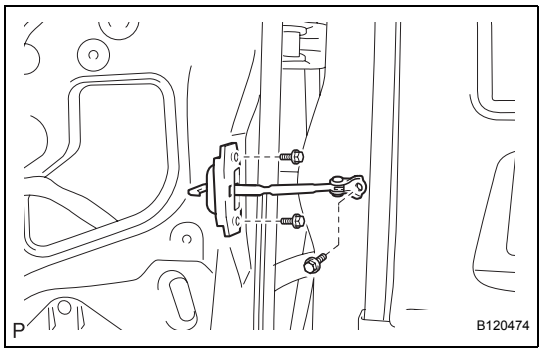
ED

REASSEMBLY

HINT:
- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. INSTALL FRONT DOOR WEATHERSTRIP LH

(a) Install the weatherstrip and attach the clips.



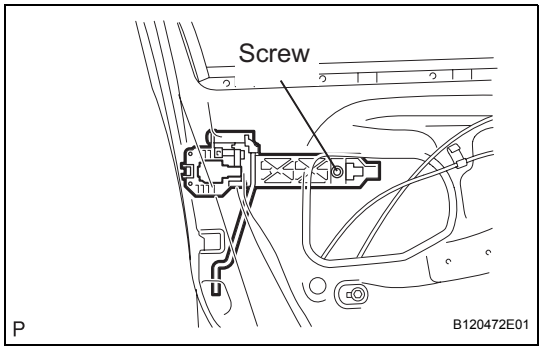
2. REMOVE FRONT DOOR CHECK ASSEMBLY LH

(a) Apply MP grease to the sliding areas of the check.

(b) Install the check to the door panel with the 2 bolts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
HINT:
Install the door check so that the rivet head is facing upward.

(c) Apply adhesive to the threads of the bolt.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent

(d) Install the check to the body panel with the bolt.
Torque: 30 N*m (306 kgf*cm, 22 in.*lbf)



3. INSTALL FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY LH

(a) Install the lock open rod.

(b) Apply MP grease to the sliding areas of the frame.

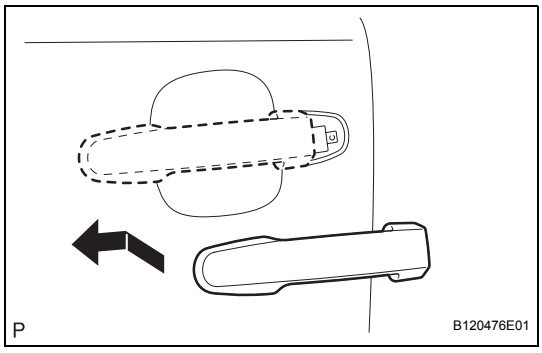
(c) Using a T30 "torx" socket wrench, install the frame with the screw.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

4. INSTALL FRONT DOOR HANDLE ASSEMBLY OUTSIDE LH

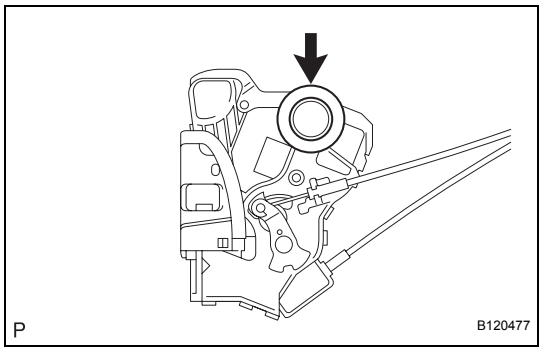
NOTICE:
If the release plate is not pulled and held when installing the handle, the release plate will interfere with the handle and become damaged.

(a) Install the outside handle pad front and rear.

(b) Install the handle by pushing it in the direction of the arrow mark in the illustration.



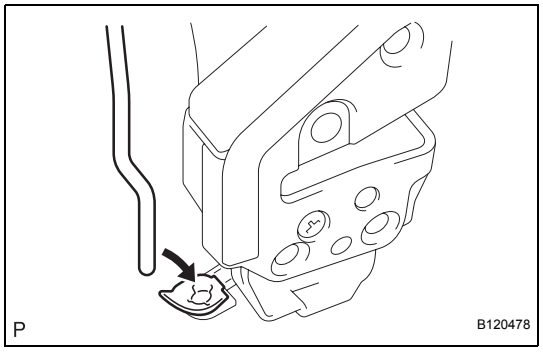
ED



5. INSTALL FRONT DOOR WITH MOTOR LOCK ASSEMBLY LH

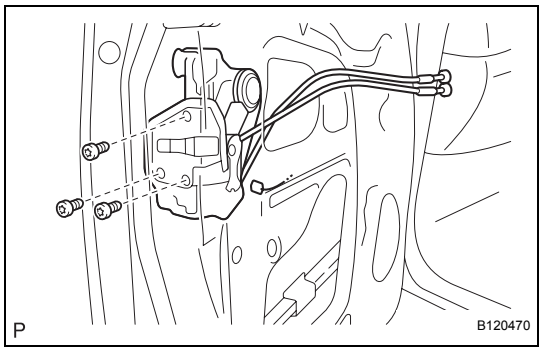
(a) Apply MP grease to the sliding and rotating areas of the door lock.

(b) Install a new door lock wire harness packing.
NOTICE:
- **When reinstalling a door lock, always use new packing.**
- **Do not allow grease or dirt to contaminate the gap between the door panel and packing.**
- **Old packing or damaged packing cannot effectively protect against water. Water will damage the door lock.**



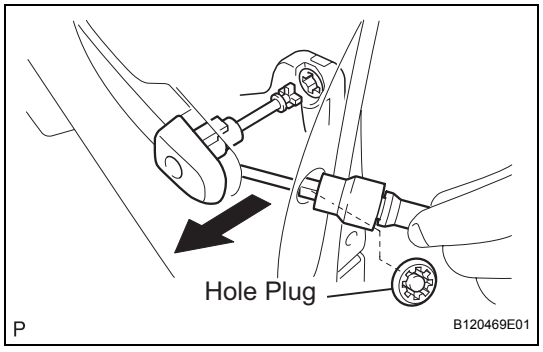
(c) Install the control rod into the door lock, and then set it to the door panel.
NOTICE:
Make sure that the rod is securely engaged with the lock.

(d) Apply adhesive to the threads of the 3 screws.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent



(e) Using a T30 "torx" socket wrench, install the door lock with the 3 screws.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

(f) Connect the door lock connector.

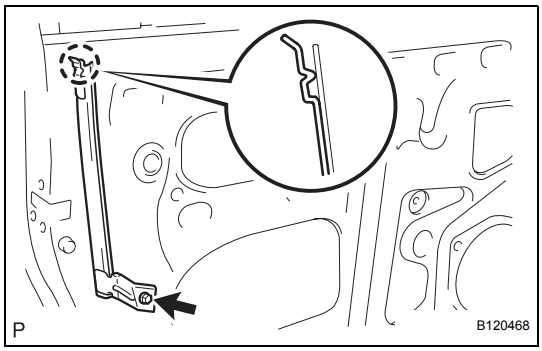


6. INSTALL FRONT DOOR OUTSIDE HANDLE COVER LH

(a) Using a T30 "torx" socket wrench, install the cover (with the door lock key cylinder installed) with the screw.
Torque: 4.0 N*m (41 kgf*cm, 37 in.*lbf)

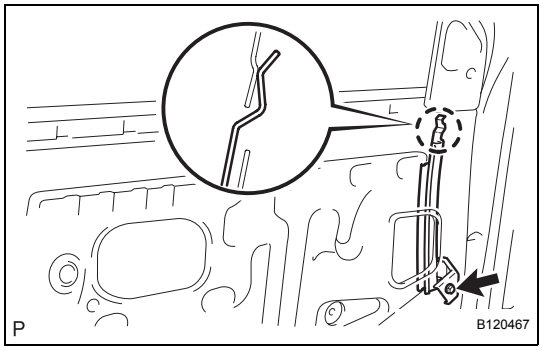
(b) Install the hole plug.

ED



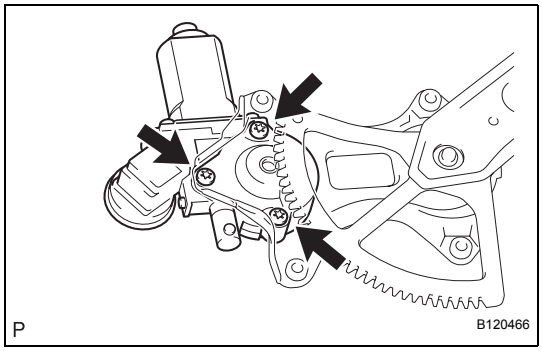
7. INSTALL FRONT DOOR FRAME SUB-ASSEMBLY REAR LOWER LH

(a) Install the frame with the bolt.
Torque: 6.2 N*m (63 kgf*cm, 55 in.*lbf)



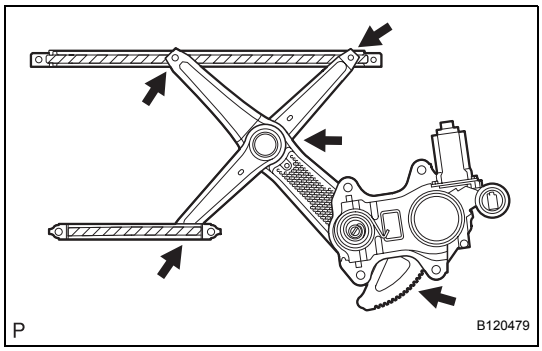
8. INSTALL FRONT DOOR FRAME SUB-ASSEMBLY FRONT LOWER LH

(a) Install the frame with the bolt.
Torque: 6.2 N*m (63 kgf*cm, 55 in.*lbf)



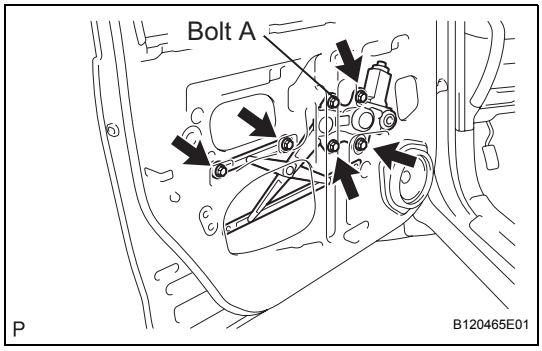
9. INSTALL POWER WINDOW REGULATOR MOTOR ASSEMBLY LH FRONT

(a) Using a T25 "torx" driver, install the motor with the screws.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

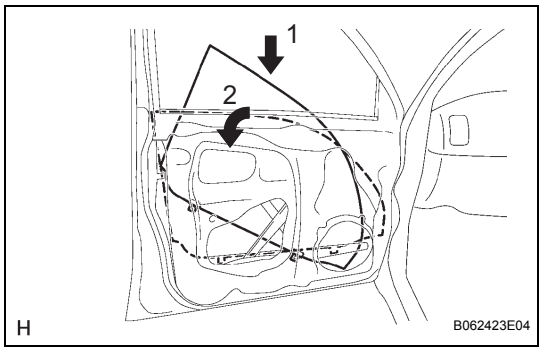


10. INSTALL FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY LH

(a) Apply MP grease to the sliding and rotating areas of the window regulator.
NOTICE:
Do not apply grease to the spring of the window regulator.



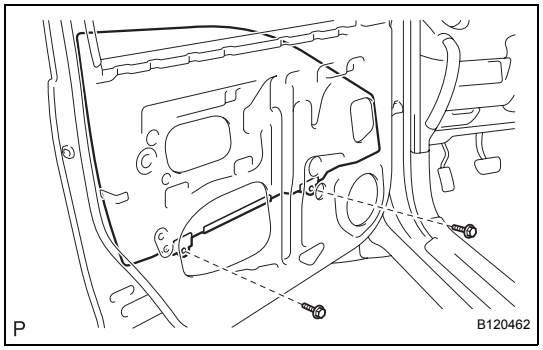
(b) Loosely screw bolt A onto the window regulator.
(c) Insert the window regulator into the door panel. Use bolt A to hang the window regulator on the door panel.
(d) Install the window regulator with the 5 bolts and tighten bolt A.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Be careful not to drop the window regulator as it may become damaged.
(e) Connect the window regulator connector.



11. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY LH

(a) Install the glass run.
NOTICE:
Be careful not to damage the glass.

(b) Insert the door glass into the door panel along the glass run as indicated in the illustration.



(c) Install the door glass to the window regulator with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

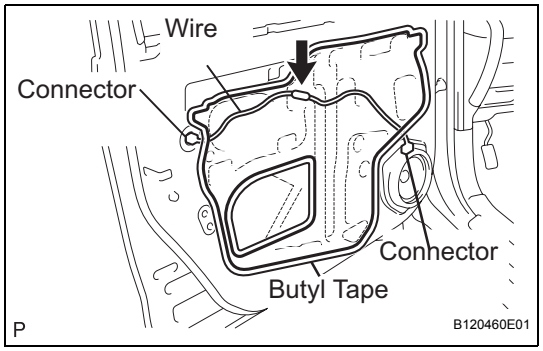
(d) Inspect operation of the power window.
(1) Connect the power window switch to the wire harness and turn the ignition switch ON.
(2) Use the UP and DOWN function several times.

12. INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-5)

13. INSTALL FRONT DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH (See page ET-20)

14. INSTALL OUTER REAR VIEW MIRROR ASSEMBLY LH (See page MI-9)

15. INSTALL NO. 2 FRONT SPEAKER ASSEMBLY (See page AV-8)



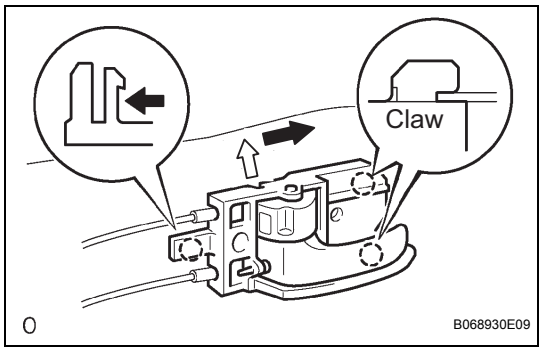
16. INSTALL FRONT DOOR SERVICE HOLE COVER LH

(a) Apply butyl tape to the door as shown in the illustration.

(b) Install a new service hole cover.
HINT:
- When installing the service hole cover, pull out the links and connectors through the service hole cover.
- There should be no wrinkles or folds after attaching the service hole cover.
- After attaching the service hole cover, check the sealing quality.

(c) Connect the 2 connectors and install the wire.

(d) Install the trim bracket with the 2 bolts.

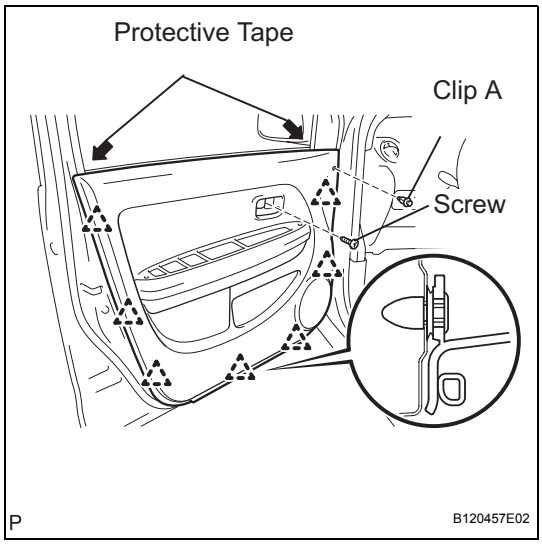


17. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY LH

(a) Move the inside handle in the direction indicated by the arrow in the illustration to install the inside handle.

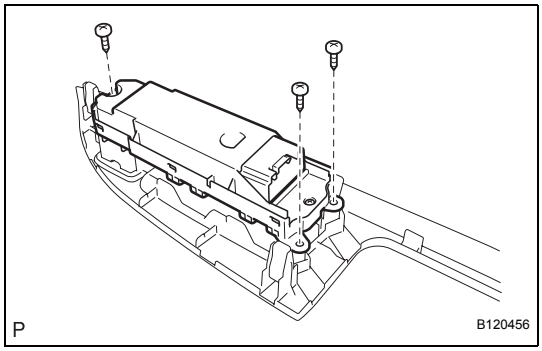
(b) Connect the 2 cables to the inside handle.

ED



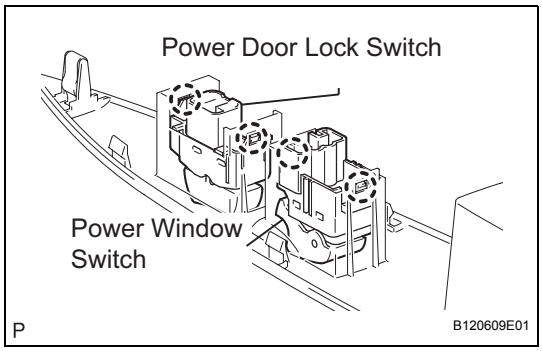
18. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY LH

(a) Attach the claws to install the weatherstrip inner.
(b) Attach the 7 clips to install the trim board.
(c) Install the screw and clip A as shown in the illustration.

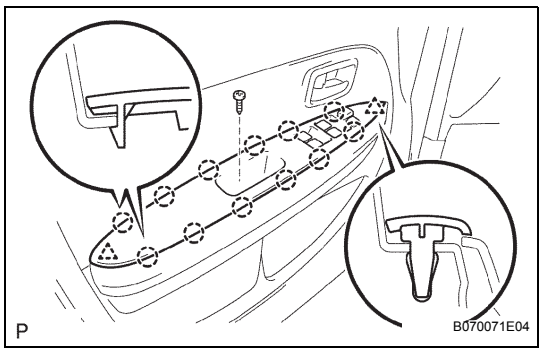


19. INSTALL FRONT ARMREST BASE PANEL UPPER LH

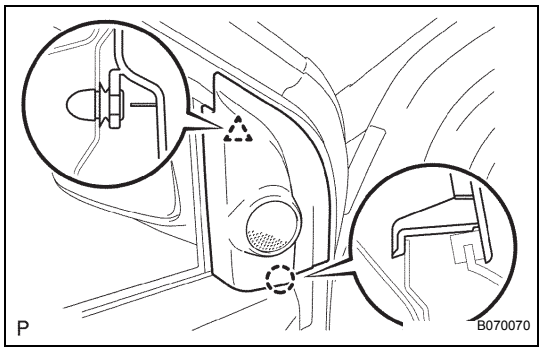
(a) Driver side:
  (1) Install the window regulator master switch to the armrest base panel upper LH with the 3 screws.



(b) Passenger side:
  (1) Attach the 2 claws to install the power window regulator switch.
  (2) Attach the 2 claws to install the door lock switch.
(c) Connect the switch connector.



(d) Attach the 12 claws and 2 clips to install the armrest base panel together with the switch.
(e) Install the screw.



20. INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH LH

(a) Attach the clip and claw to install the garnish.

21. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

22. PERFORM INITIALIZATION

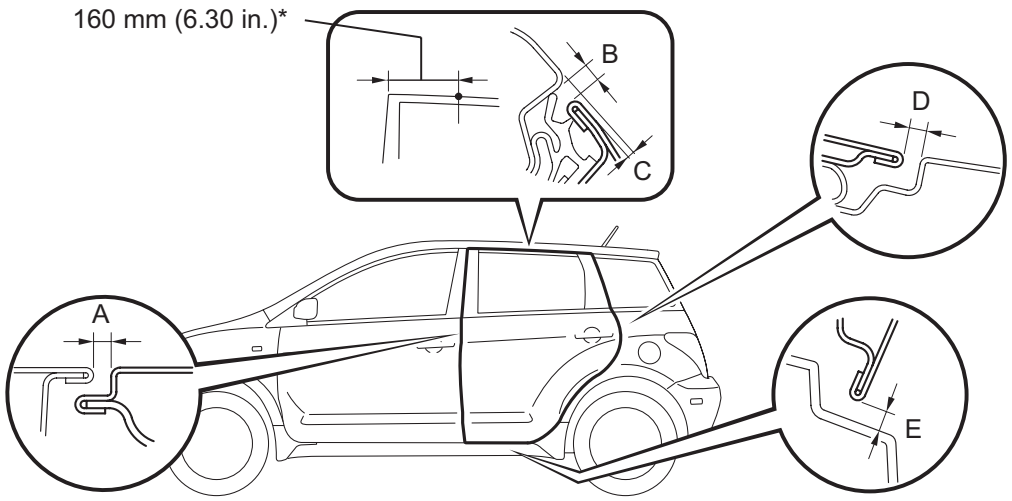
(a) Perform initialization (see page IN-23).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

ON-VEHICLE INSPECTION

1. INSPECT REAR DOOR PANEL SUB-ASSEMBLY LH



*: 160 mm (6.30 in.) from the end of the window frame, check clearances B and C as illustrated in the cross section.

B120489E02

(a) Check that the clearance measurements of areas A to E are within the standard range.

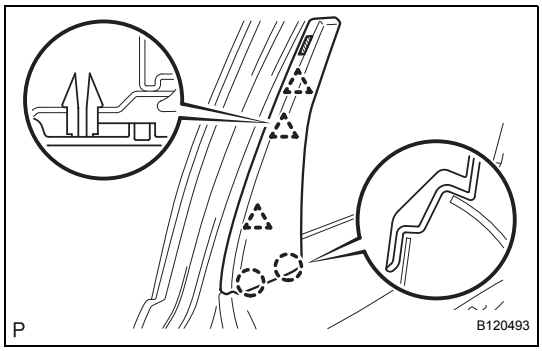
Standard measurement

Area	Specified Condition
A	5.5 +-1.5 mm (0.220 +-0.059 in.)
B	5.1 +-1.5 mm (0.200 +-0.059 in.)
C	2.0 +-1.5 mm (0.079 +-0.059 in.)
D	5.0 +-1.5 mm (0.197 +-0.059 in.)
E	6.0 +-1.5 mm (0.240 +-0.059 in.)

DISASSEMBLY

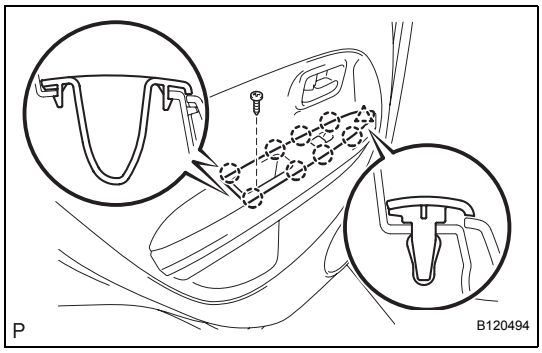
HINT:
- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

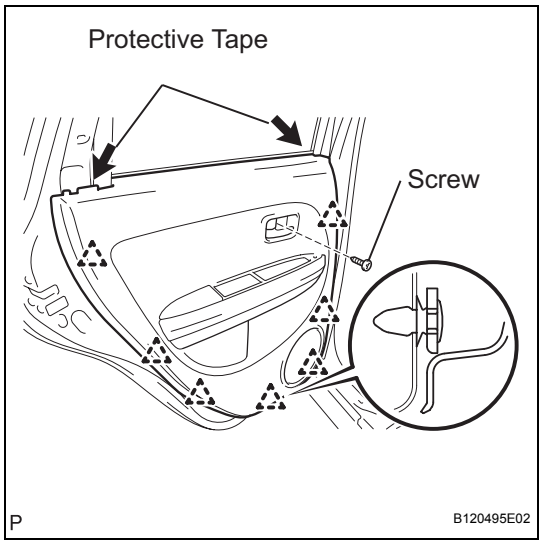


2. REMOVE REAR DOOR REAR GUIDE BRACKET GARNISH LH
(a) Using a heat light, heat the moulding.
Standard heating temperature:
20 to 30°C (68 to 86°F)
NOTICE:
Do not heat the moulding excessively.
NOTICE:
- **If planning to reuse the moulding, take care not to damage it.**
- **Be careful not to damage the body.**

(b) Using a screwdriver, detach the tape.
HINT:
Tape the screwdriver tip before use.
(c) Using a screwdriver, detach the 3 clips and 2 claws, and remove the garnish.
HINT:
Tape the screwdriver tip before use.

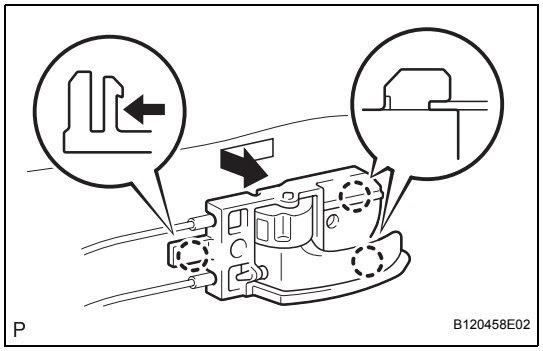


3. REMOVE REAR DOOR ARMREST BASE PANEL UPPER LH
(a) Remove the screw.
(b) Using a screwdriver, detach the 8 claws and clip, and remove the armrest base panel together with the switch.
HINT:
Tape the screwdriver tip before use.
(c) Disconnect the switch connector.
(d) Detach the 2 claws and remove the switch from the armrest base panel upper.



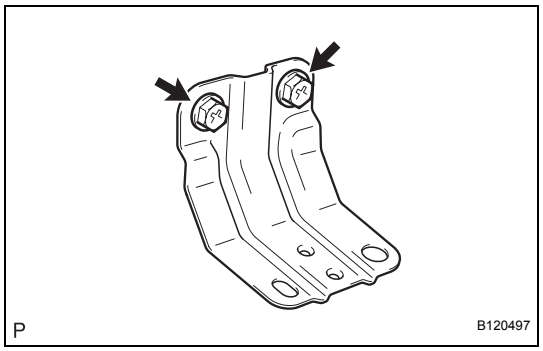
4. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH

(a) Remove the screw shown in the illustration.
(b) Using a clip remover, remove the 7 clips.
(c) Remove the trim board upward.
HINT:
In order to prevent the door panel from being damaged, use protective tape to cover the areas indicated by the arrow marks in the illustration.
(d) Using a screwdriver, detach the claws and remove the weatherstrip inner.
HINT:
Tape the screwdriver tip before use.



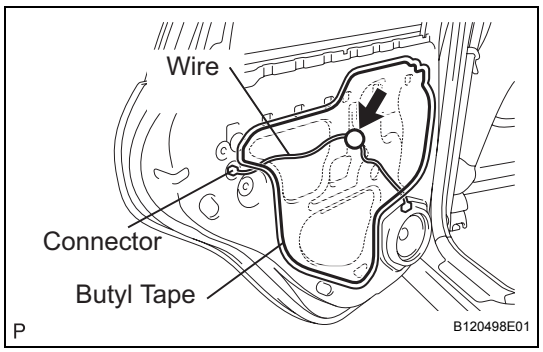
5. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY LH

(a) Using a screwdriver, disengage the claw.
HINT:
Tape the screwdriver tip before use.
(b) Move the inside handle in the direction indicated by the arrow mark in the illustration. This will release the 2 claws and allow removal of the inside handle.
(c) Disconnect the 2 cables from the inside handle.



6. REMOVE REAR DOOR SERVICE HOLE COVER LH

(a) Remove the 2 bolts and trim bracket.



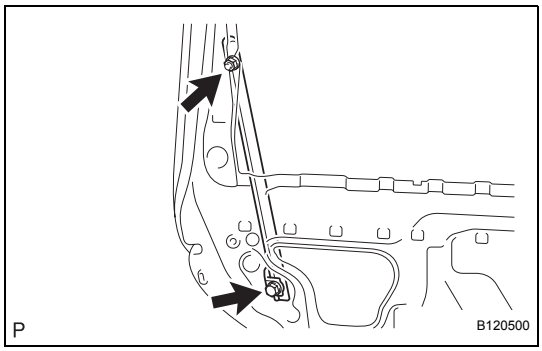
(b) Disconnect the 2 connectors.
(c) Using a screwdriver, remove the clip indicted by the arrow mark and wire.
HINT:
Tape the screwdriver tip before use.
(d) Remove the service hole cover.
NOTICE:
Remove the remaining tape on the door side.

7. REMOVE REAR DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH (See page ET-22)

8. REMOVE REAR DOOR WINDOW FRAME MOULDING REAR LH (See page ET-32)

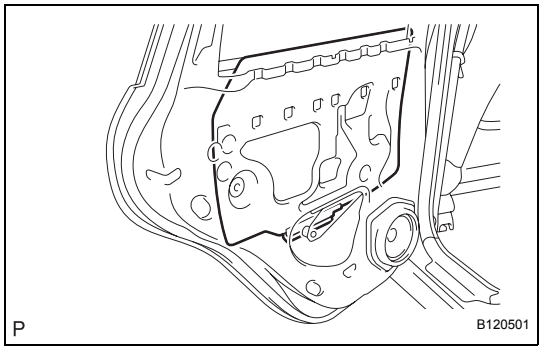
9. REMOVE REAR SPEAKER ASSEMBLY (See page AV-9)

ED



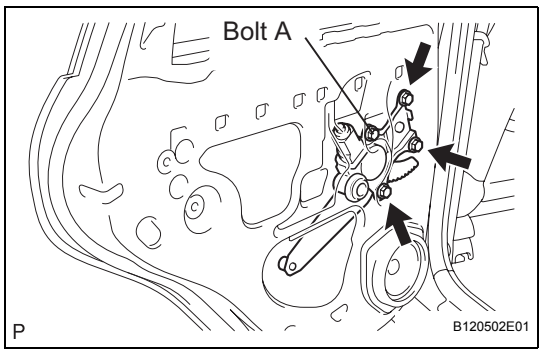
10. REMOVE REAR DOOR WINDOW FRAME SUB-ASSEMBLY REAR LOWER LH

(a) Temporarily install the power window regulator switch.
(b) Lower the glass as it lower.
(c) Remove the glass run.
(d) Remove the bolt, nut and frame.
(e) Remove the power window regulator switch.



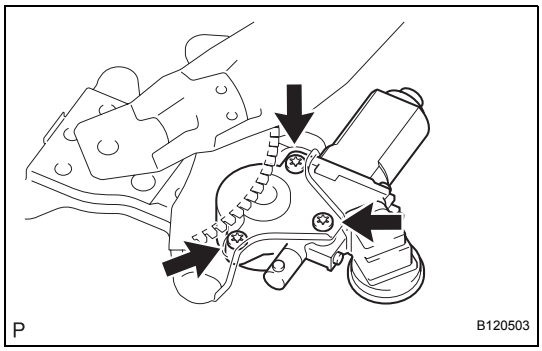
11. REMOVE REAR DOOR GLASS SUB-ASSEMBLY LH

(a) Remove the glass from the regulator.
NOTICE:
Be careful not to damage the glass.



12. REMOVE REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY LH

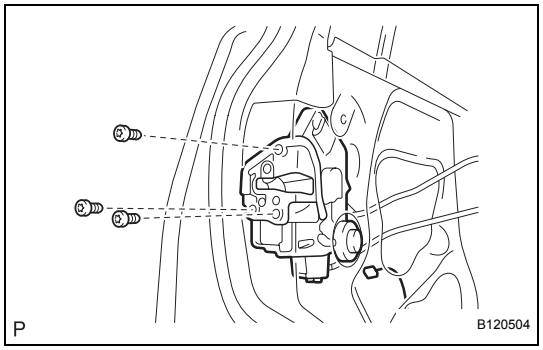
(a) Disconnect the window regulator connector.
(b) Loosen bolt A shown in the illustration.
(c) Remove the 3 bolts and window regulator.
HINT:
Remove the window regulator through the service hole.
NOTICE:
Be careful when removing the bolts as the window regulator may fall and become damaged.
(d) Remove bolt A from the window regulator.



13. REMOVE POWER WINDOW REGULATOR MOTOR ASSEMBLY LH REAR

(a) Using a T25 "torx" driver, remove the 3 screws and motor.

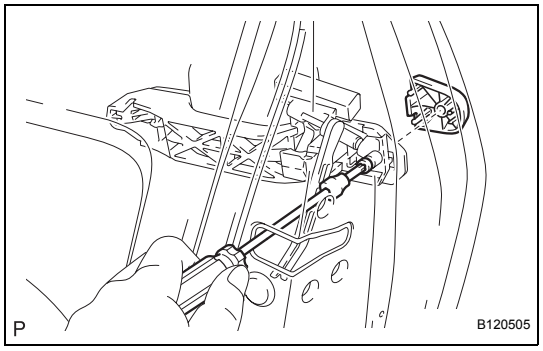
ED



14. REMOVE REAR DOOR WITH MOTOR LOCK ASSEMBLY LH

(a) Using a T30 "torx" socket wrench, remove the 3 screws and door lock.
HINT:
Remove the door lock through the service hole.
NOTICE:
Be careful when removing the bolts as the door lock may fall and become damaged.

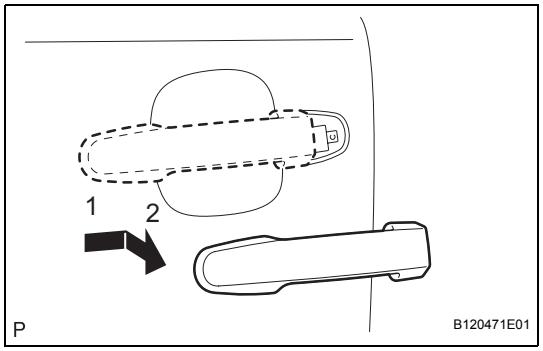
(b) Remove the door lock wire harness packing.



15. REMOVE REAR DOOR OUTSIDE HANDLE COVER LH

(a) Using a T30 "torx" socket wrench, loosen the screw.

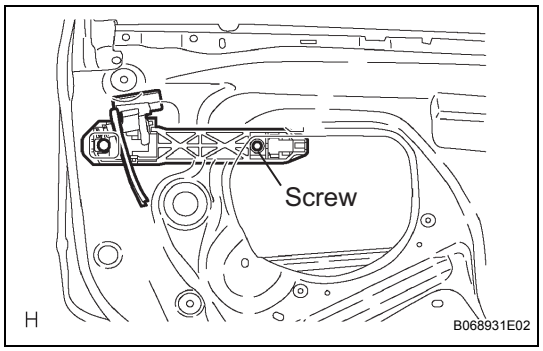
(b) Remove the cover.



16. REMOVE REAR DOOR OUTSIDE HANDLE ASSEMBLY LH

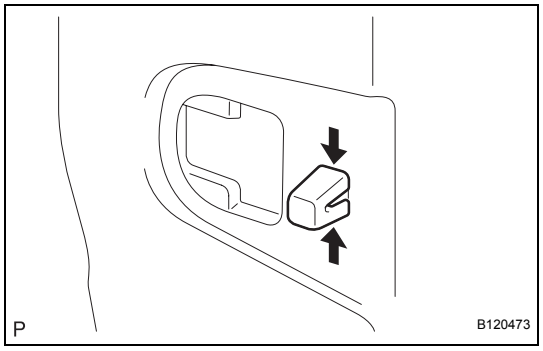
(a) Remove the handle by sliding and pulling it in the direction indicated by the arrow mark in the illustration.
NOTICE:
If the release plate is not pulled and held when removing the handle, the release plate will interfere with the handle and become damaged.

(b) Remove the outside handle pad front and rear.



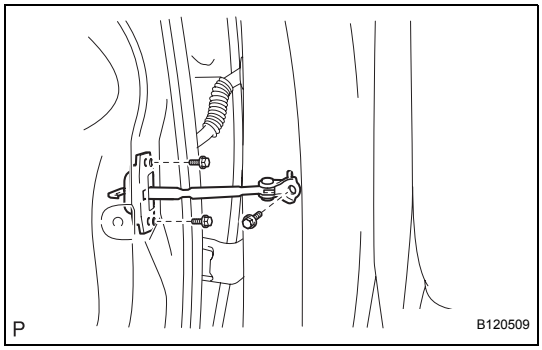
17. REMOVE REAR DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY LH

(a) Using a T30 "torx" socket wrench, loosen the screw and remove the frame.



(b) Using pliers, pinch the clip and remove the handle frame, as shown in the illustration.
HINT:
Remove the handle frame through the service hole.
NOTICE:
Be sure to remove the outside handle frame together with the clip, because the clip will be damaged if the clip remain attached to the door panel.

ED

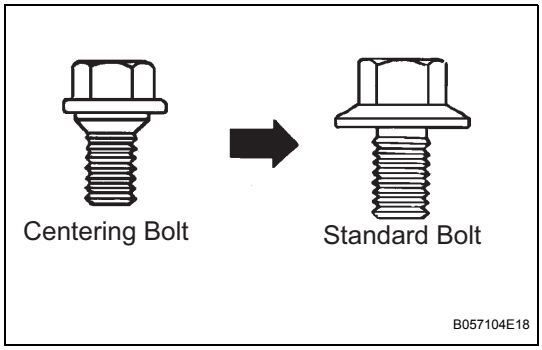


18. REMOVE REAR DOOR CHECK ASSEMBLY LH

(a) Remove the 3 bolts and door check.
HINT:
Remove the door check through the service hole.

19. REMOVE REAR DOOR WEATHERSTRIP LH

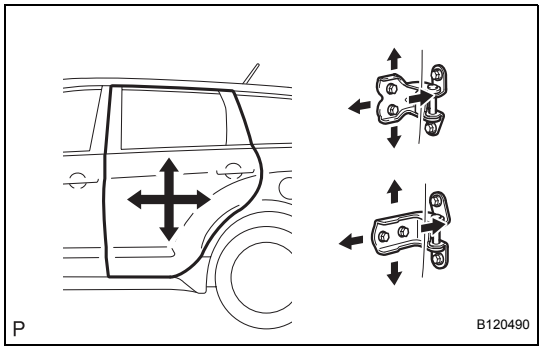
(a) Using a clip remover, detach the clips and remove the weatherstrip.
HINT:
If clips are damaged during removal, replace them.



ADJUSTMENT

HINT:

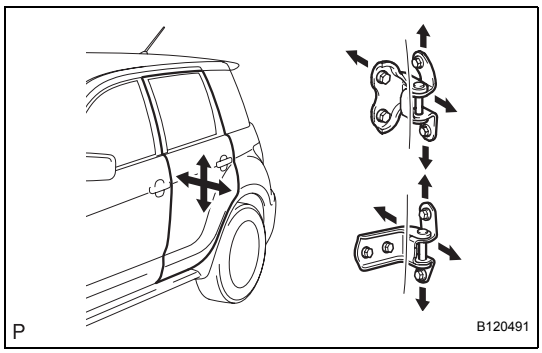
- Before adjusting the door position for vehicles equipped with side airbags and curtain shield airbags, be sure to disconnect the negative (-) terminal cable from the battery. After adjustment, inspect the SRS warning light, side airbag system and curtain shield airbag system for normal operation. Then initialize both airbag systems.
- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (w/ washers) when making adjustments.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).



1. ADJUST REAR DOOR PANEL SUB-ASSEMBLY LH

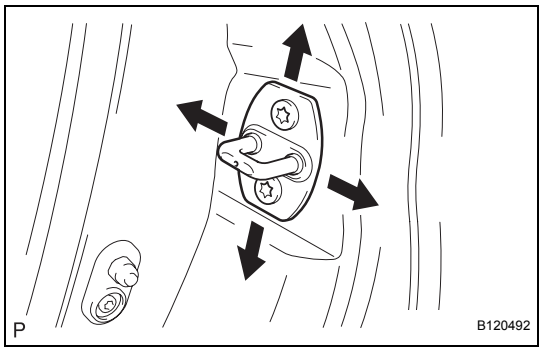
(a) Loosen the body's hinge bolts and adjust the door's position.

(b) Tighten the body side hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)



(c) Loosen the door's hinge bolts and adjust the door's position.

(d) Tighten the door side hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

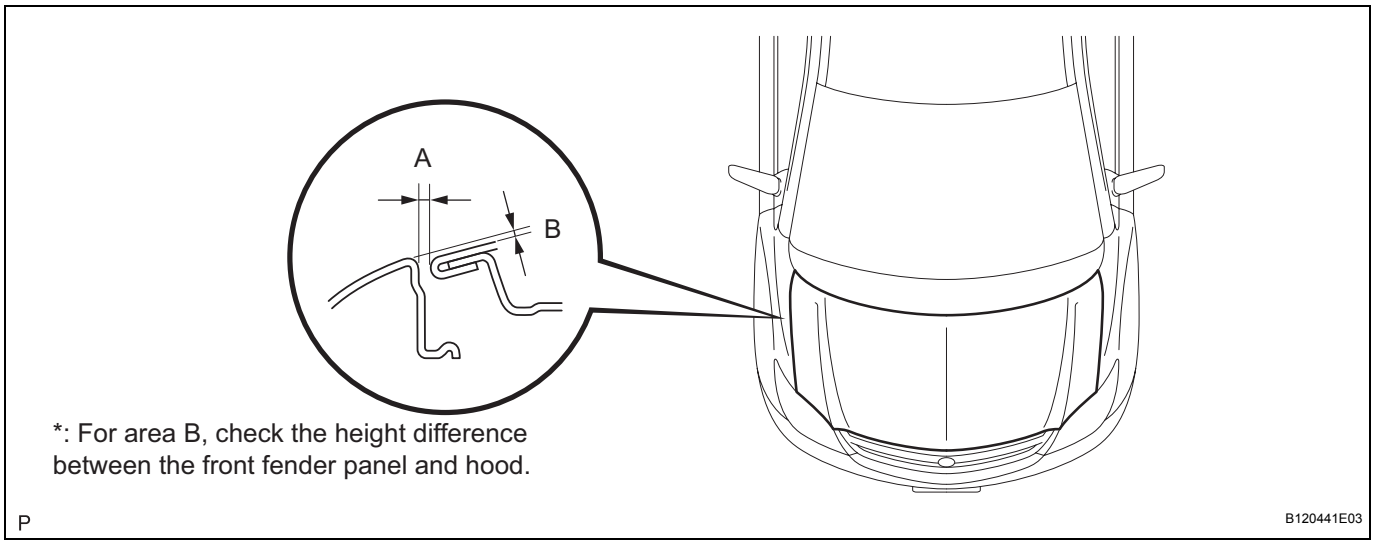


(e) Adjust the striker position by slightly loosening the striker mounting screws and hitting the striker with a plastic-faced hammer.
(f) Tighten the striker mounting screws after the adjustment.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

HOOD

ON-VEHICLE INSPECTION

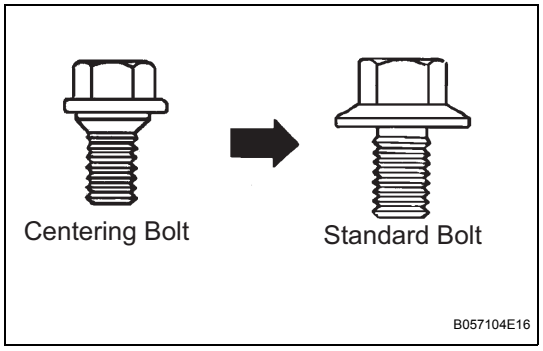
1. INSPECT HOOD SUB-ASSEMBLY



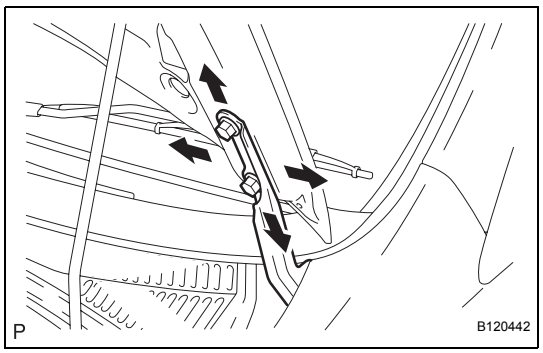
(a) Check that the clearance measurements of areas A and B are within the standard range.
Standard measurement

Area	Specified Condition
A	4.2 +-1.5 mm (0.165 +-0.059 in.)
B	0.0 +-1.5 mm (0.000 +-0.059 in.)

ADJUSTMENT



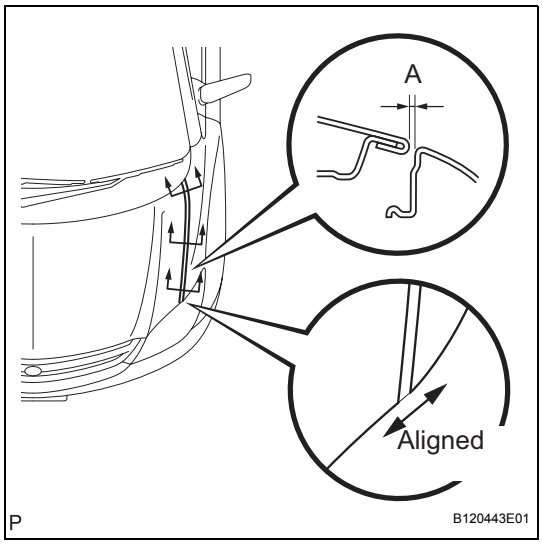
HINT:
- Centering bolts are used to mount the hood hinge and hood lock. The hood and hood lock cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (w/ washers) when making adjustments.
- A bolts without a torque specification is shown in the standard bolt chart (see page SS-2).



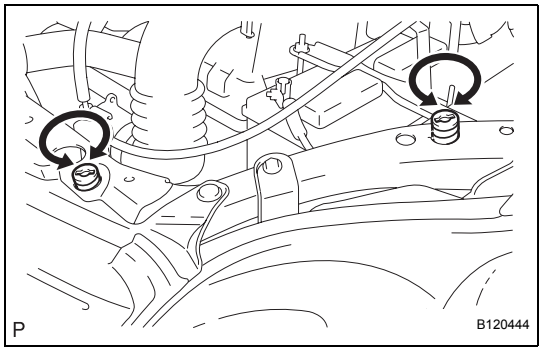
1. ADJUST HOOD SUB-ASSEMBLY

(a) Adjust the hood's position.
(1) Loosen the 4 hinge bolts on the hood side.

ED

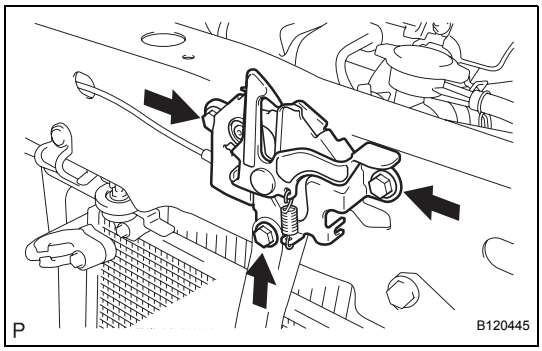


(2) Move the hood and adjust the clearance between the hood and front fender. Make sure that the clearance is within the standard range.
Standard clearance (A):
4.2 +-1.5 mm (0.138 +-0.059 in.)
(3) Tighten the hood side hinge bolts after the adjustment.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

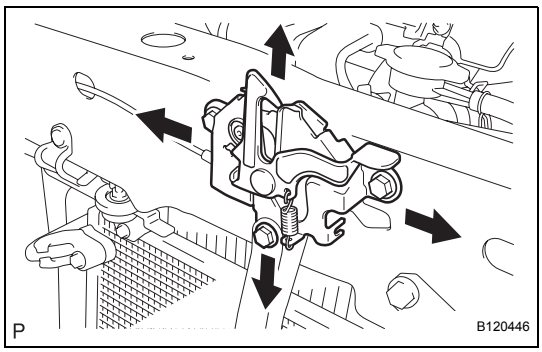


(b) Adjust the cushion rubber so that the height of the hood and fender are aligned.
(1) Raise or lower the hood's front end by turning the cushion rubber. Make sure that the clearance is within the standard range.
Standard clearance (B) :
0.0 +-1.5 mm (0.000 +-0.059 in.)

ED



(c) Adjust the hood lock.
(1) Remove the grille (see page ET-13).
(2) Loosen the 3 hood lock bolts.



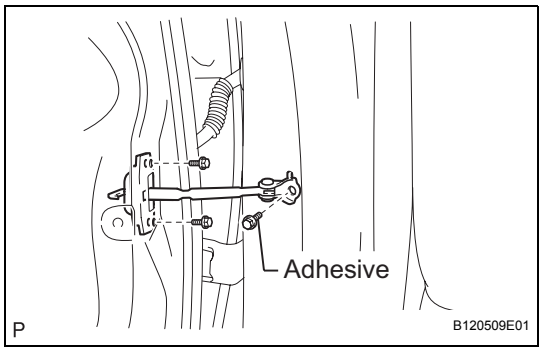
(3) Adjust the hood lock position so that the striker can enter it smoothly.
(4) Tighten the hood lock bolts after the adjustment.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

REASSEMBLY

HINT:
- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. INSTALL REAR DOOR WEATHERSTRIP LH

2. INSTALL REAR DOOR CHECK ASSEMBLY LH



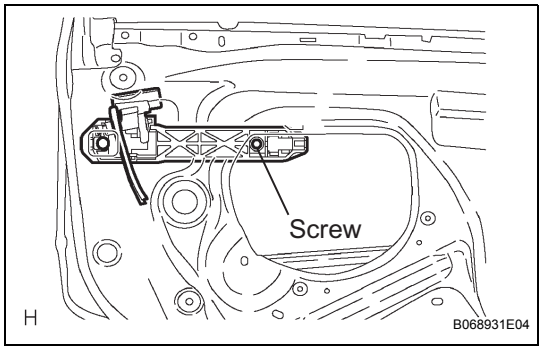
(a) Apply MP grease to the sliding areas of the door check.

(b) Install the door check to the door panel with the 2 bolts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
HINT:
Install the door check so that the rivet head is facing upward.

(c) Apply adhesive to the threads of the bolt.
Adhesive:
Part No.08833-00070, THREE BOND 1324 or equivalent

(d) Install the door check to the body panel with the bolt.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

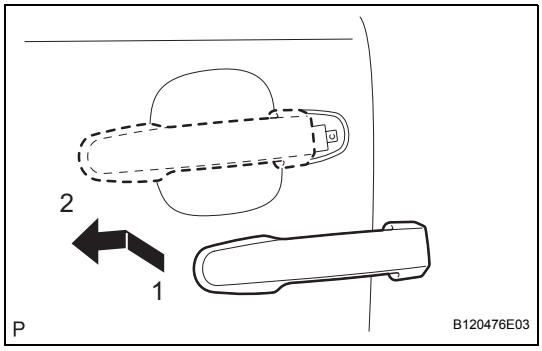
3. INSTALL REAR DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY LH



(a) Apply MP grease to the sliding areas of the frame.

(b) Using a T30 "torx" socket wrench, install the handle frame with the screw.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

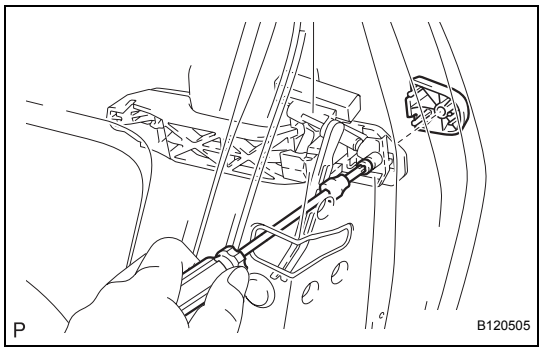
4. INSTALL REAR DOOR OUTSIDE HANDLE ASSEMBLY LH



(a) Install the outside handle pad front and rear.

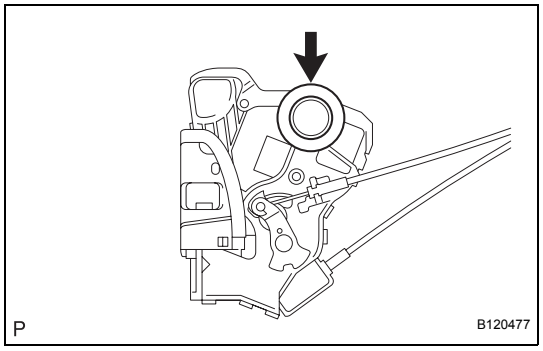
(b) Install the handle by pushing it in the direction indicated by the arrow mark in the illustration.
NOTICE:
If the release plate is not pulled and held when installing the handle, the release plate will interfere with the handle and become damaged.

ED



5. INSTALL REAR DOOR OUTSIDE HANDLE COVER LH

(a) Using a T30 "torx" socket wrench, install the outside handle cover with the screw.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

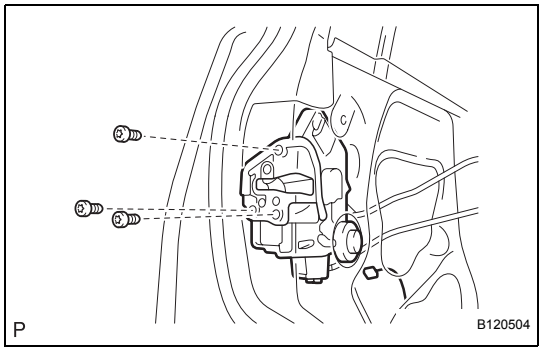


6. INSTALL REAR DOOR WITH MOTOR LOCK ASSEMBLY LH

(a) Apply MP grease to the sliding and rotating areas of the door lock.

(b) Install a new door lock wire harness packing.
NOTICE:
- **When reinstalling a door lock, always use new packing.**
- **Do not allow grease or dirt to contaminate the gap between the door panel and packing.**
- **Old packing or damaged packing cannot effectively protect against water. Water will damage the door lock.**

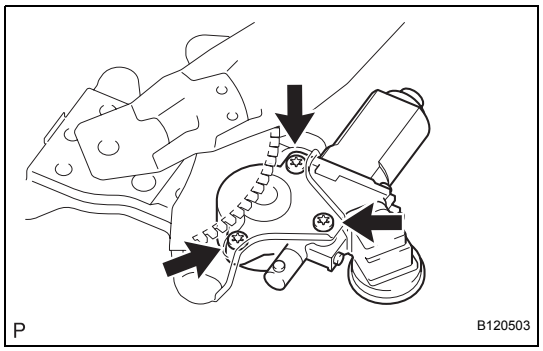
(c) Attach the door lock with the release plate of the handle, and then set it to the door panel.
NOTICE:
Make sure that the release plate of the frame is securely engaged with the door lock.



(d) Apply adhesive to the threads of the 3 screws.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent

(e) Using a T30 "torx" socket wrench, install the door lock with the 3 screws.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

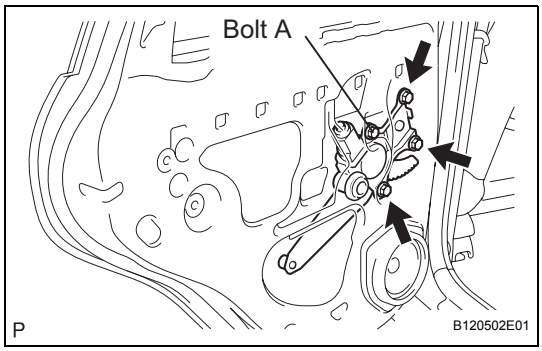
(f) Connect the door lock connector.



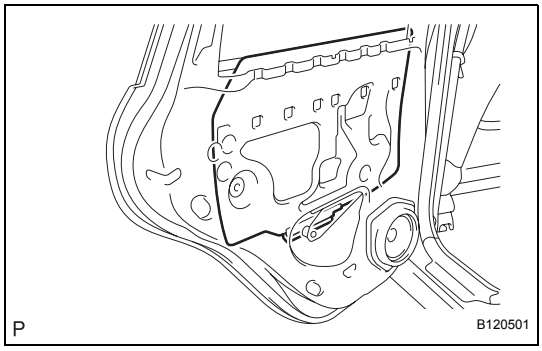
7. INSTALL POWER WINDOW REGULATOR MOTOR ASSEMBLY LH REAR

(a) Using a T25 "torx" driver, install the motor with the 3 screws.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

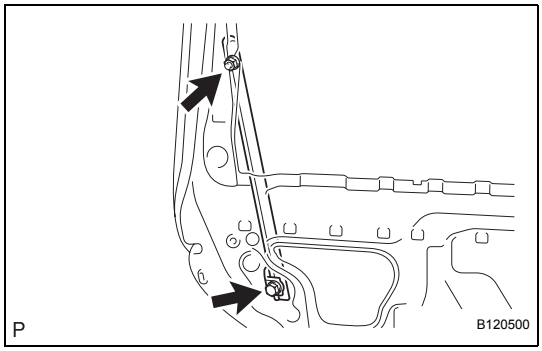
ED



8. **INSTALL REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY LH**
   (a) Apply MP grease to the sliding and rotating areas of the window regulator.
   NOTICE:
   Do not apply grease to the spring of the window regulator.
   (b) Loosely screw bolt A onto the window regulator.
   (c) Insert the window regulator into the door panel. Use bolt A to hang the window regulator on the door panel.
   (d) Install the window regulator with the 3 bolts and bolt A.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   (e) Connect the window regulator connector.
   NOTICE:
   Be careful not to drop the window regulator as it may become damaged.



9. **INSTALL REAR DOOR GLASS SUB-ASSEMBLY LH**
   (a) Install the door glass in the regulator.

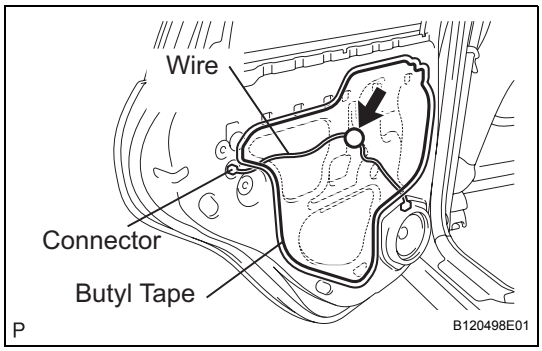


10. **INSTALL REAR DOOR WINDOW FRAME SUB-ASSEMBLY REAR LOWER LH**
    (a) Install the frame with the bolt and nut.
    Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

11. **INSTALL REAR SPEAKER ASSEMBLY (See page AV-10)**

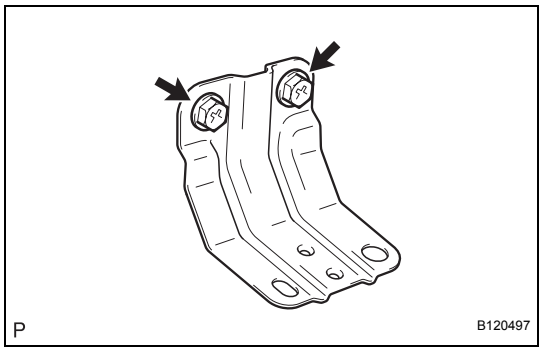
12. **INSTALL REAR DOOR WINDOW FRAME MOULDING REAR LH (See page ET-32)**

13. **INSTALL REAR DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH (See page ET-23)**

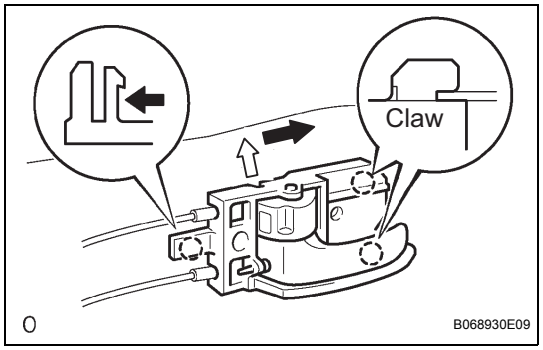


14. **INSTALL REAR DOOR SERVICE HOLE COVER LH**
    (a) Apply butyl tape to the door, as shown in the illustration.
    (b) Install the service hole cover.
    HINT:
    - When installing the service hole cover, pull out the links and connectors through the service hole cover.
    - There should be no wrinkles or folds after attaching the service hole cover.
    - After attaching the service hole cover, check the sealing quality.
    (c) Connect the 2 connectors and install the wire.

ED

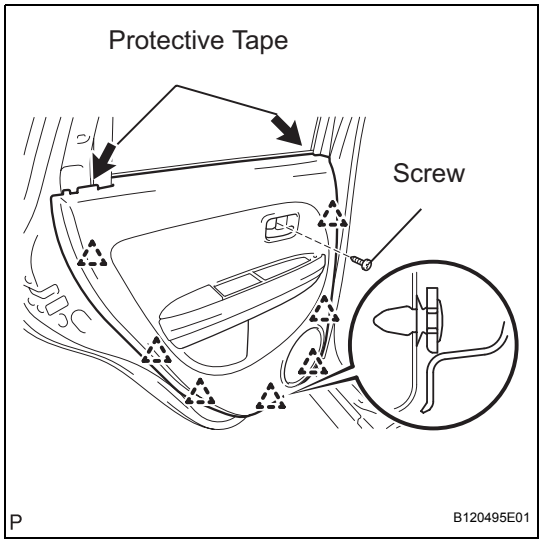


(d) Install the trim bracket with the 2 bolts.



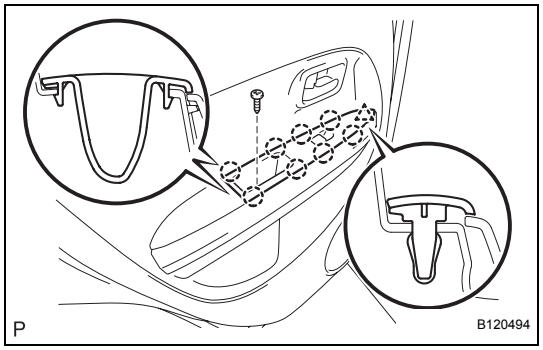
15. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY LH

(a) Move the inside handle in the direction indicated by the arrow in the illustration to install the inside handle.
(b) Connect the 2 cables to the inside handle.



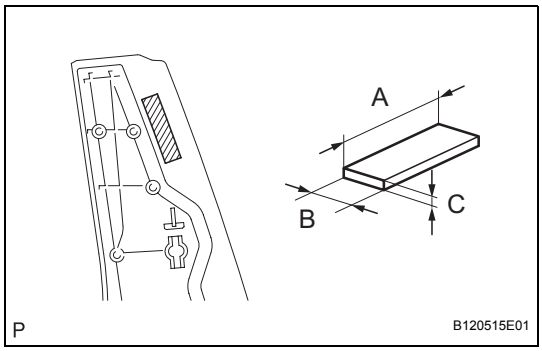
16. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH

(a) Attach the 7 clips and install the trim board.
(b) Install the screw as shown in the illustration.



17. INSTALL REAR DOOR ARMREST BASE PANEL UPPER LH

(a) Attach the 2 claws and install the switch to the armrest base panel upper.
(b) Connect the switch connector.
(c) Attach the 8 claws and clip to install the armrest base panel together with the switch.
(d) Install the screw.



18. INSTALL REAR DOOR REAR GUIDE BRACKET GARNISH LH

(a) Using a cloth, remove the tape from the garnish.

(b) Clean the contact surface of the door panel with a shop rag saturated with white gasoline.

(c) Clean the outer circumference of the garnish with white gasoline.

(d) Apply new double-sided tape to the garnish, as shown in the illustration.

Standard measurement

Area	Specified Condition
A	5.0 mm (0.197 in.)
B	2.75 mm (0.108 in.)
C	0.90 mm (0.035 in.)

(e) Using a heat light, heat the door panel and garnish.

Standard heating temperature

Item	Specified Condition
Door panel	40 to 60°C (104 to 140°F)
Garnish	20 to 30°C (68 to 86°F)

NOTICE:
Do not heat the door panel and garnish excessively.

(f) Remove the peeling paper from the moulding face.
HINT:
Be careful that dirt or foreign objects do not stick to the adhesive when removing the peeling paper.

(g) Install the garnish.
NOTICE:
Use steady pressure with your thumbs on the garnish, not excessive force.

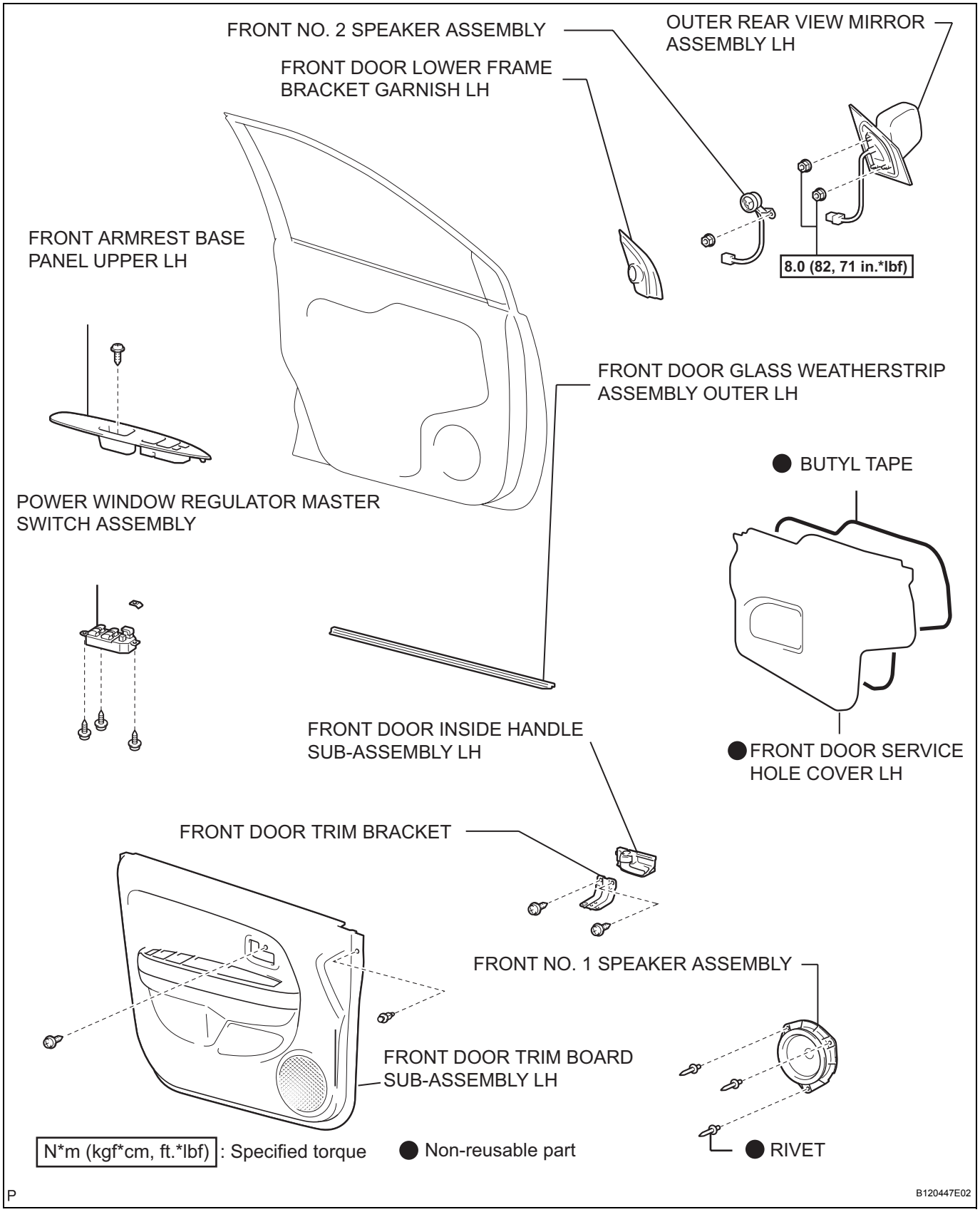
19. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

20. PERFORM INITIALIZATION

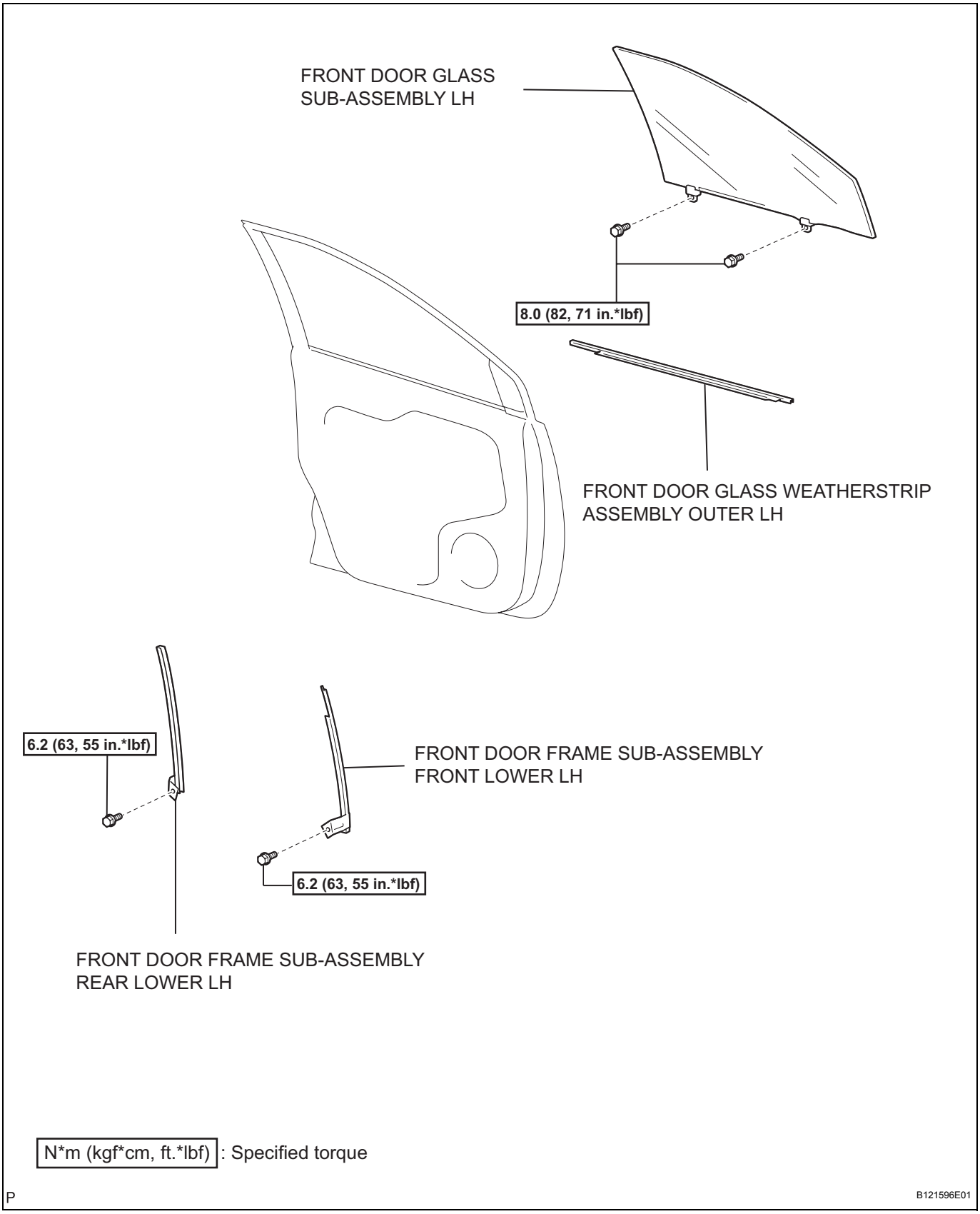
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FRONT DOOR

COMPONENTS



ED

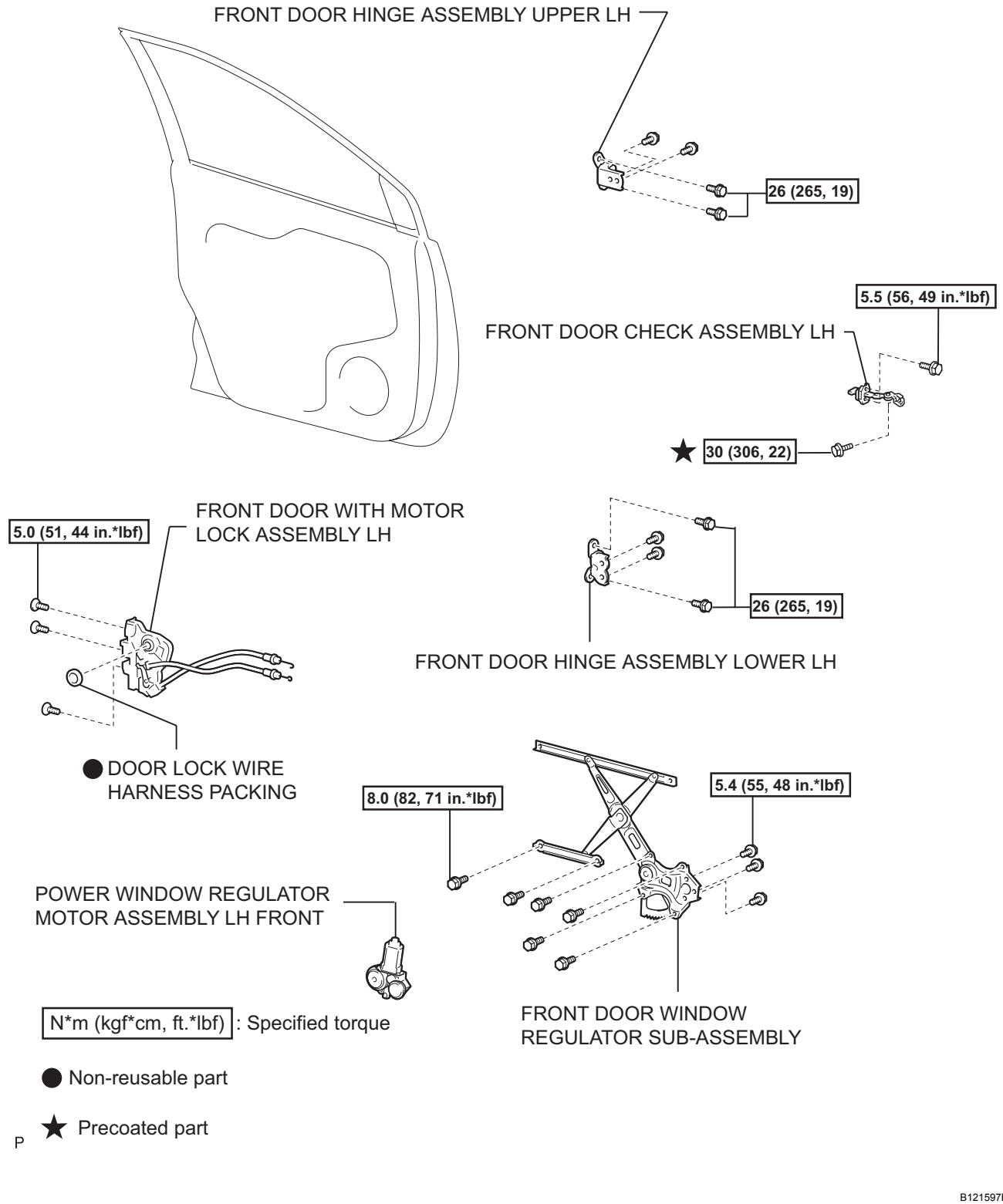


ED

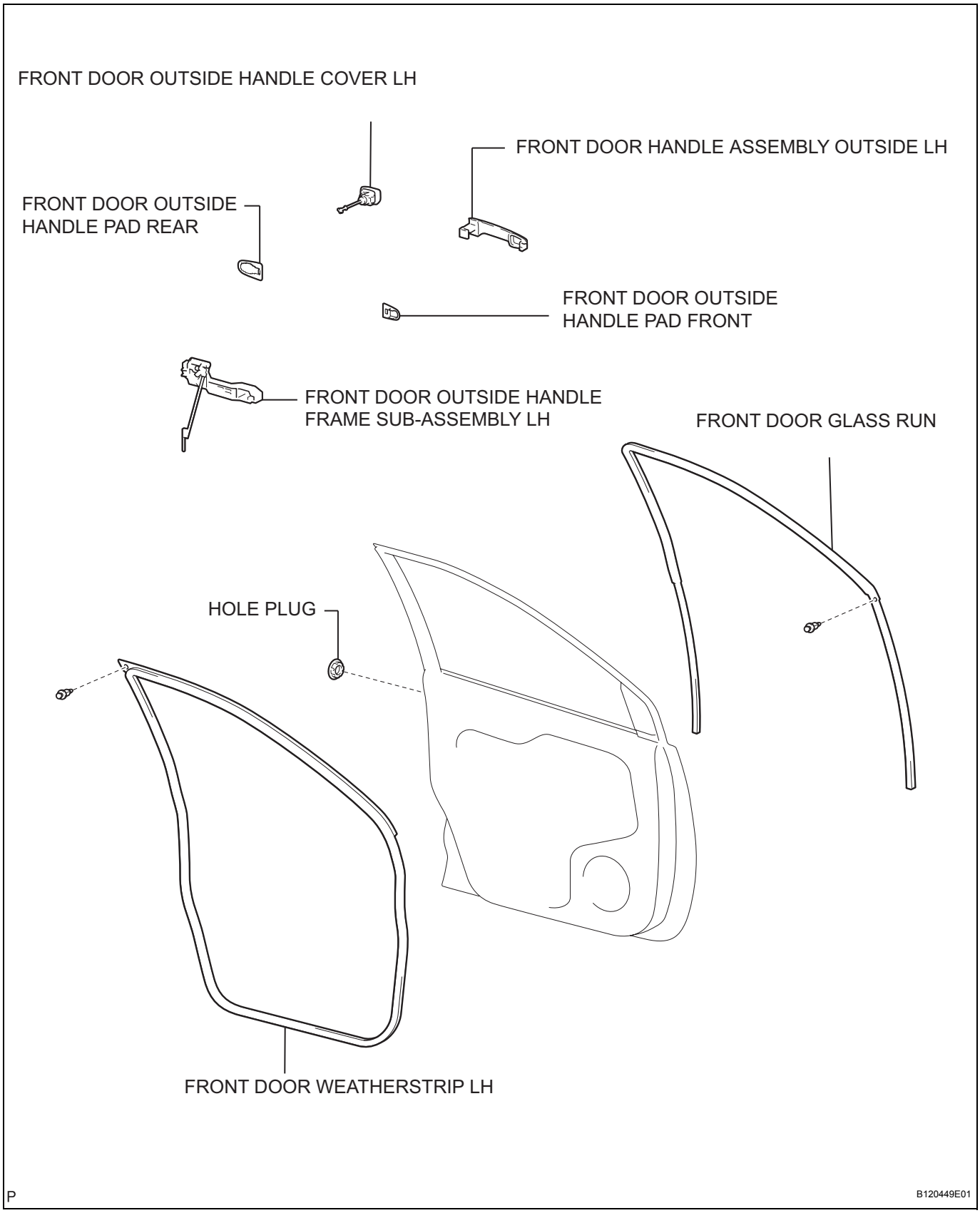
N*m (kgf*cm, ft.*lbf) : Specified torque

P

B121596E01


FRONT DOOR HINGE ASSEMBLY UPPER LH
26 (265, 19)
5.5 (56, 49 in.*lbf)
FRONT DOOR CHECK ASSEMBLY LH
★ 30 (306, 22)
5.0 (51, 44 in.*lbf)
FRONT DOOR WITH MOTOR LOCK ASSEMBLY LH
26 (265, 19)
FRONT DOOR HINGE ASSEMBLY LOWER LH
● DOOR LOCK WIRE HARNESS PACKING
8.0 (82, 71 in.*lbf)
5.4 (55, 48 in.*lbf)
POWER WINDOW REGULATOR MOTOR ASSEMBLY LH FRONT
FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
★ Precoated part
P
B121597E01

ED

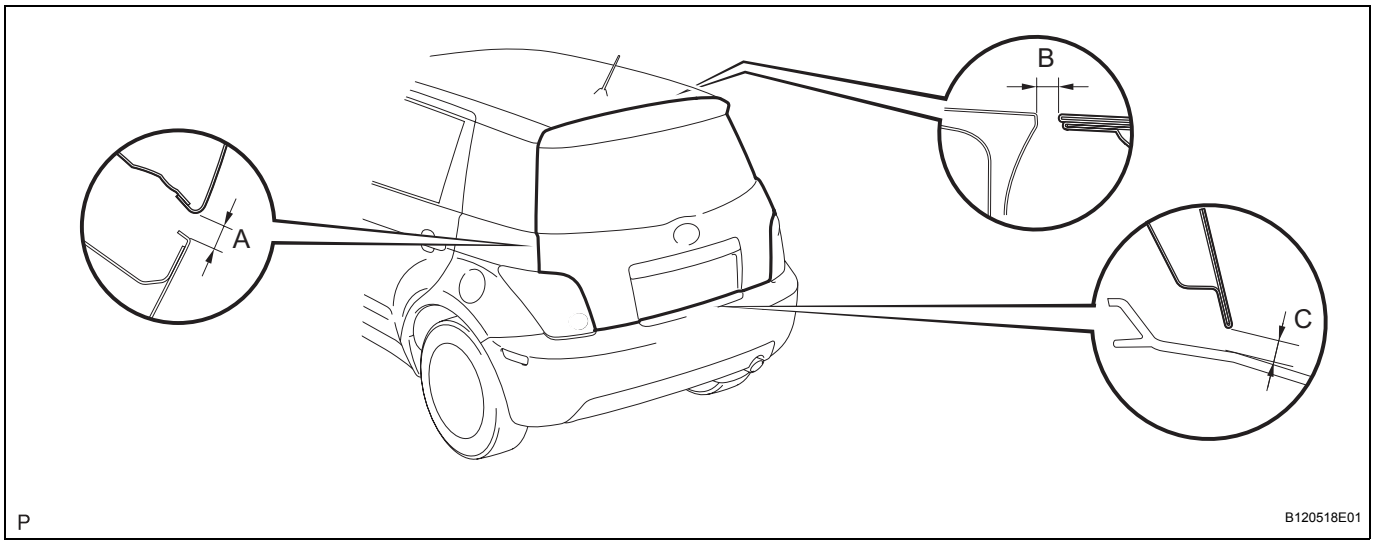

FRONT DOOR OUTSIDE HANDLE COVER LH
FRONT DOOR HANDLE ASSEMBLY OUTSIDE LH
FRONT DOOR OUTSIDE HANDLE PAD REAR
FRONT DOOR OUTSIDE HANDLE PAD FRONT
FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY LH
FRONT DOOR GLASS RUN
HOLE PLUG
FRONT DOOR WEATHERSTRIP LH
P
B120449E01

ED

ON-VEHICLE INSPECTION

1. INSPECT BACK DOOR PANEL SUB-ASSEMBLY

(a) Check that the clearance measurements of areas A to C are within the standard range.

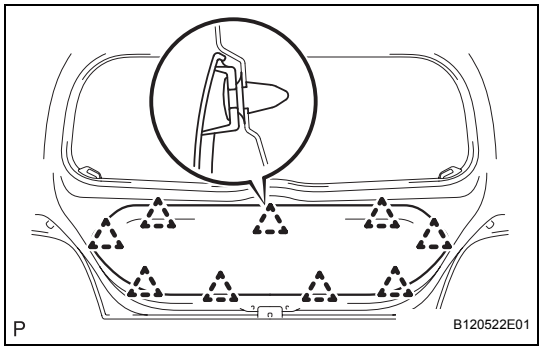


Standard measurement

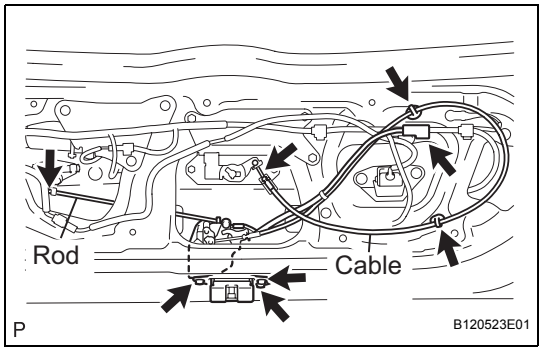
Area	Specified Condition
A	6.0 +-1.5 mm (0.236 +-0.056 in.)
B	7.6 +-1.5 mm (0.300 +-0.059 in.)
C	7.0 +-1.5 mm (0.276 +-0.059 in.)

DISASSEMBLY

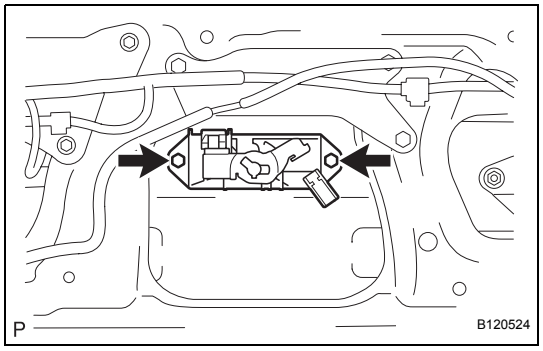
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



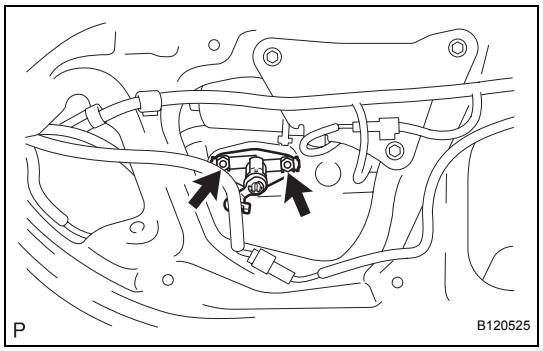
2. **REMOVE BACK DOOR TRIM BOARD ASSEMBLY**
   (a) Using a screwdriver, detach the 9 clips and remove the board.
   HINT:
   Tape the screwdriver tip before use.



3. **REMOVE BACK DOOR LOCK ASSEMBLY**
   (a) Disconnect the rod from the lock cylinder.
   (b) Disconnect the cable from the handle.
   (c) Disconnect the connector.
   (d) Remove the wire from the door panel.
   (e) Remove the 3 bolts and door lock.
   HINT:
   Remove the lock through the service hole.



4. **REMOVE BACK DOOR OUTSIDE HANDLE**
   (a) Remove the 2 nuts and handle.
   HINT:
   Remove the handle through the service hole.



5. **REMOVE BACK DOOR LOCK CYLINDER ASSEMBLY**
   (a) Remove the 2 nuts and cylinder.
   HINT:
   Remove the cylinder through the service hole.

6. **REMOVE BACK DOOR WEIGHT**
   (a) Remove the 4 bolts and weight.

7. **REMOVE BACK DOOR PANEL NO. 2 PROTECTOR**
   (a) Using a clip remover, remove the 2 clips.
   (b) Using a heat light, heat the protector.
   Standard heating temperature:
   20 to 30°C (68 to 86°F)
   NOTICE:
   Do not heat the protector excessively.

ED

(c) Using a screwdriver, remove the protector.
NOTICE:
- **If reusing the protector, take care not to damage the protector.**
- **Be careful not to damage the body.**

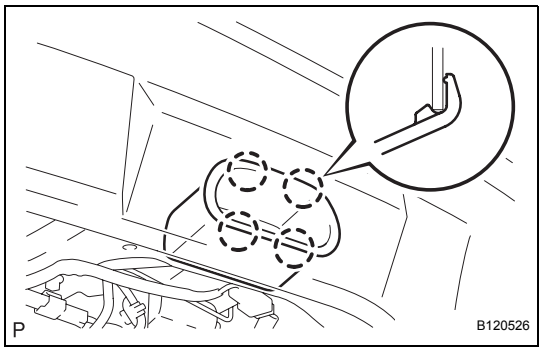
HINT:
Tape the screwdriver tip before use.

8. **REMOVE BACK DOOR PANEL NO. 1 PROTECTOR**
HINT:
Use the same procedures described for the No. 2 side.

9. **REMOVE BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY (See page ET-35)**

10. **REMOVE BACK DOOR STAY ASSEMBLY LH (See page ED-41)**

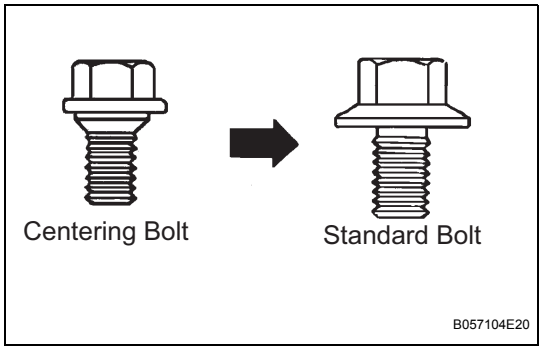
11. **REMOVE BACK DOOR STAY ASSEMBLY RH**
HINT:
Remove the RH side by the same procedures with the LH side.



12. **REMOVE DOOR PULL HANDLE**
(a) Using a screwdriver, detach the 4 claws and remove the pull handle.
HINT:
Tape the screwdriver tip before use.

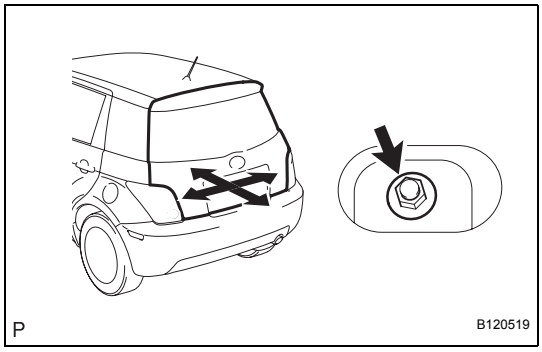
13. **REMOVE CENTER STOP LIGHT ASSEMBLY (See page LI-25)**

14. **REMOVE REAR WIPER MOTOR ASSEMBLY (See page WW-16)**

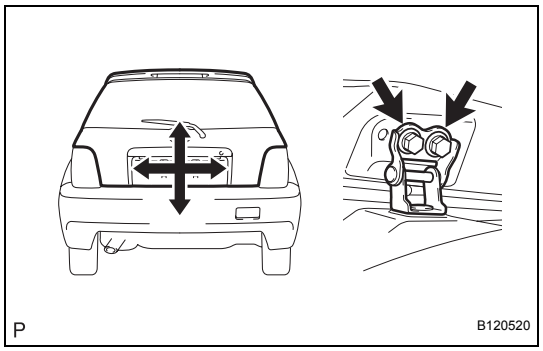


ADJUSTMENT

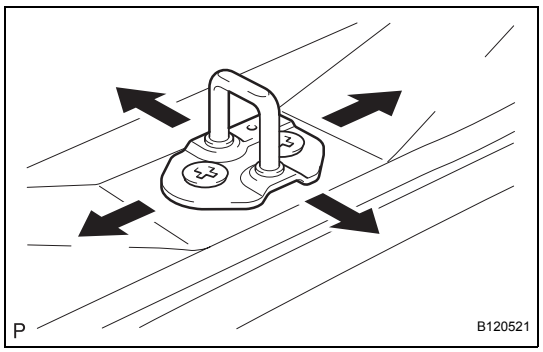
HINT:
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (w/ washers) when making adjustments.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).



1. **ADJUST BACK DOOR PANEL SUB-ASSEMBLY**
(a) Remove the roof headlining (see page IR-7).
(b) As shown in the illustration, adjust the door on the horizontal plane by loosening the body side hinge nuts.
(c) Tighten the body side hinge nuts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)



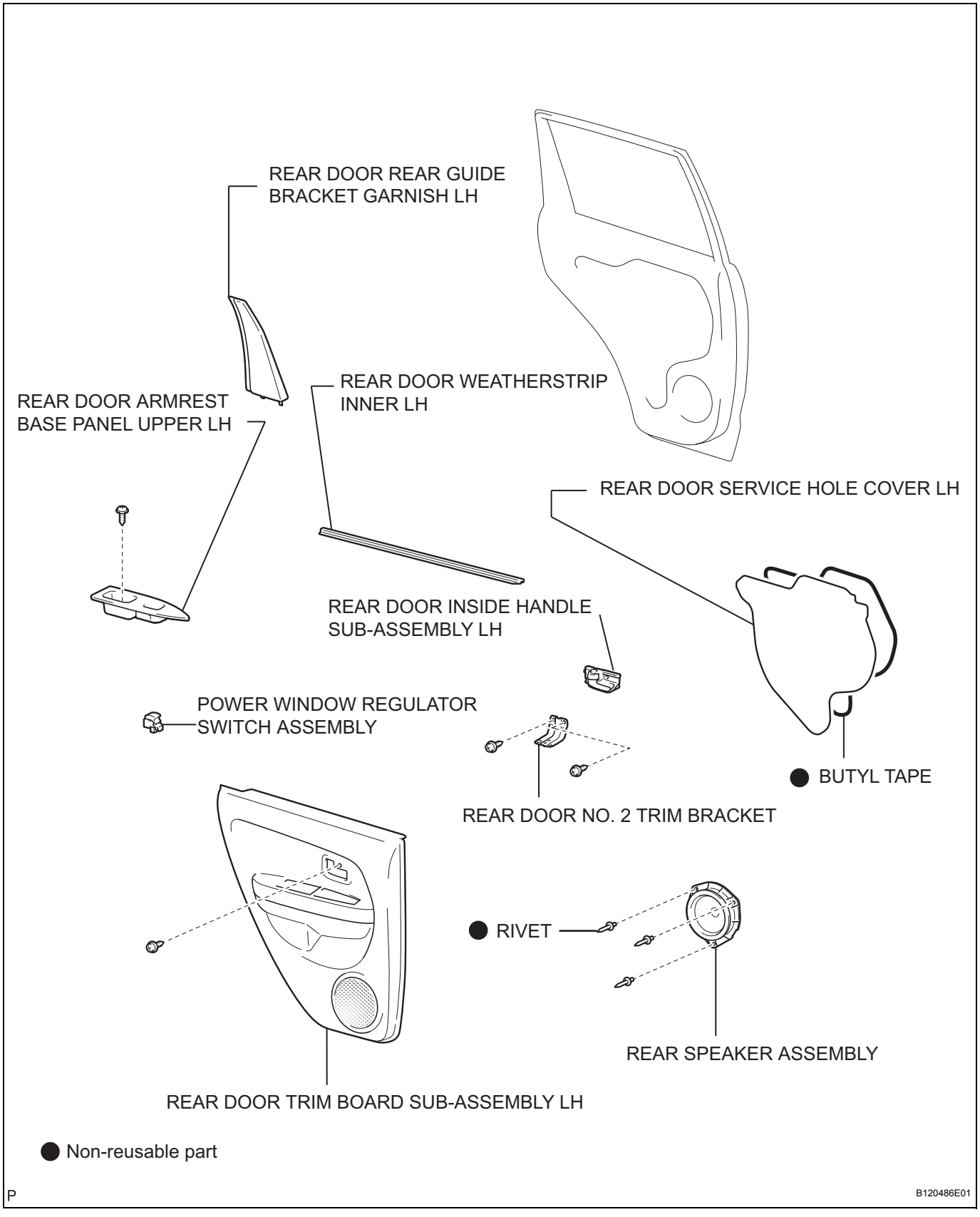
(d) Horizontally and vertically adjust the door by loosening the door side hinge bolts.
(e) Tighten the door side hinge bolts after the adjustment.
Torque: 11.5 N*m (117 kgf*cm, 8.5 ft.*lbf)



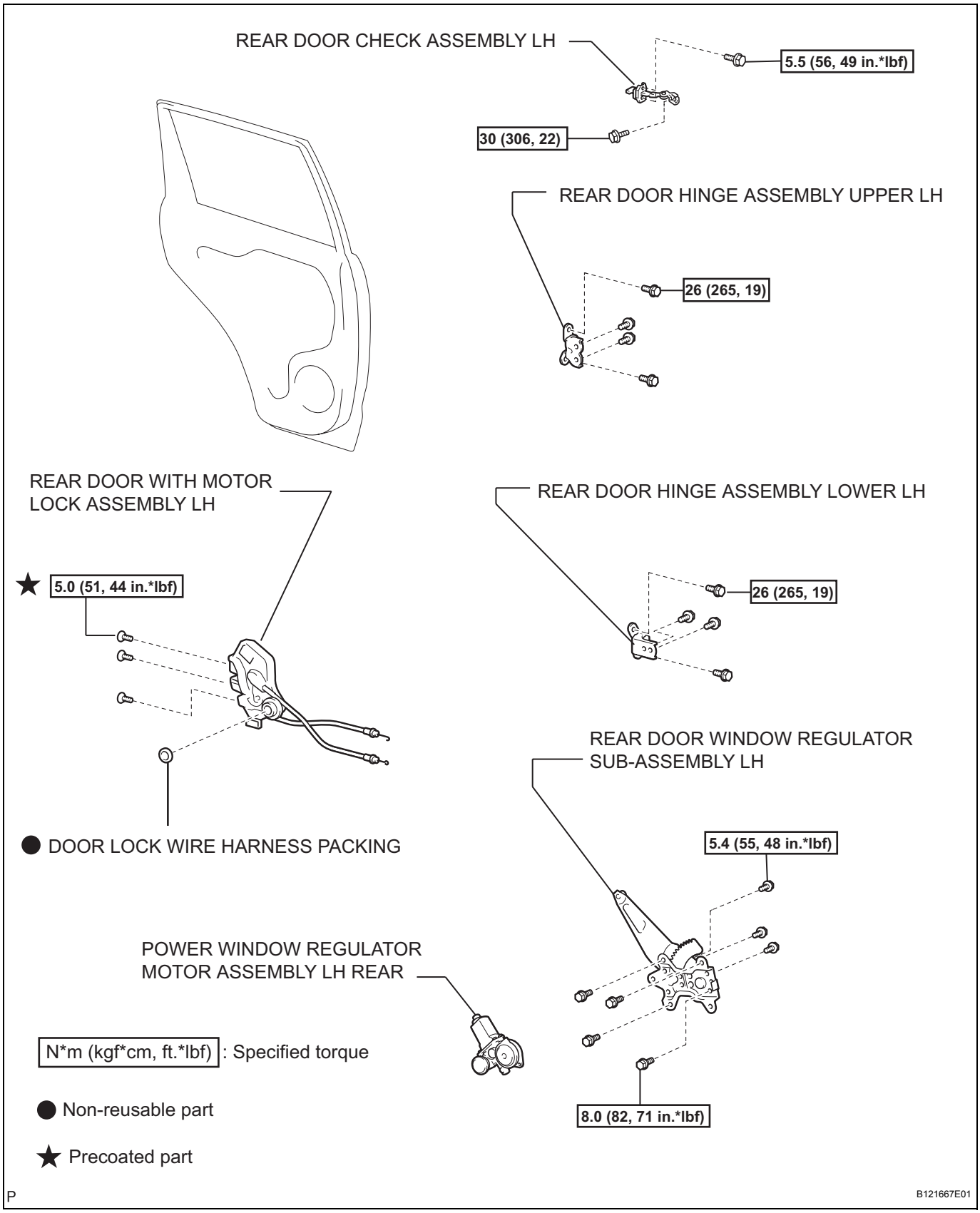
(f) Remove the deck trim cover rear (see page IR-7).
(g) Adjust the striker position by slightly loosening the striker mounting screws and hitting the striker with a plastic-faced hammer.
(h) Tighten the striker mounting screws after the adjustment.
Torque: 11.5 N*m (117 kgf*cm, 8.5 ft.*lbf)

REAR DOOR

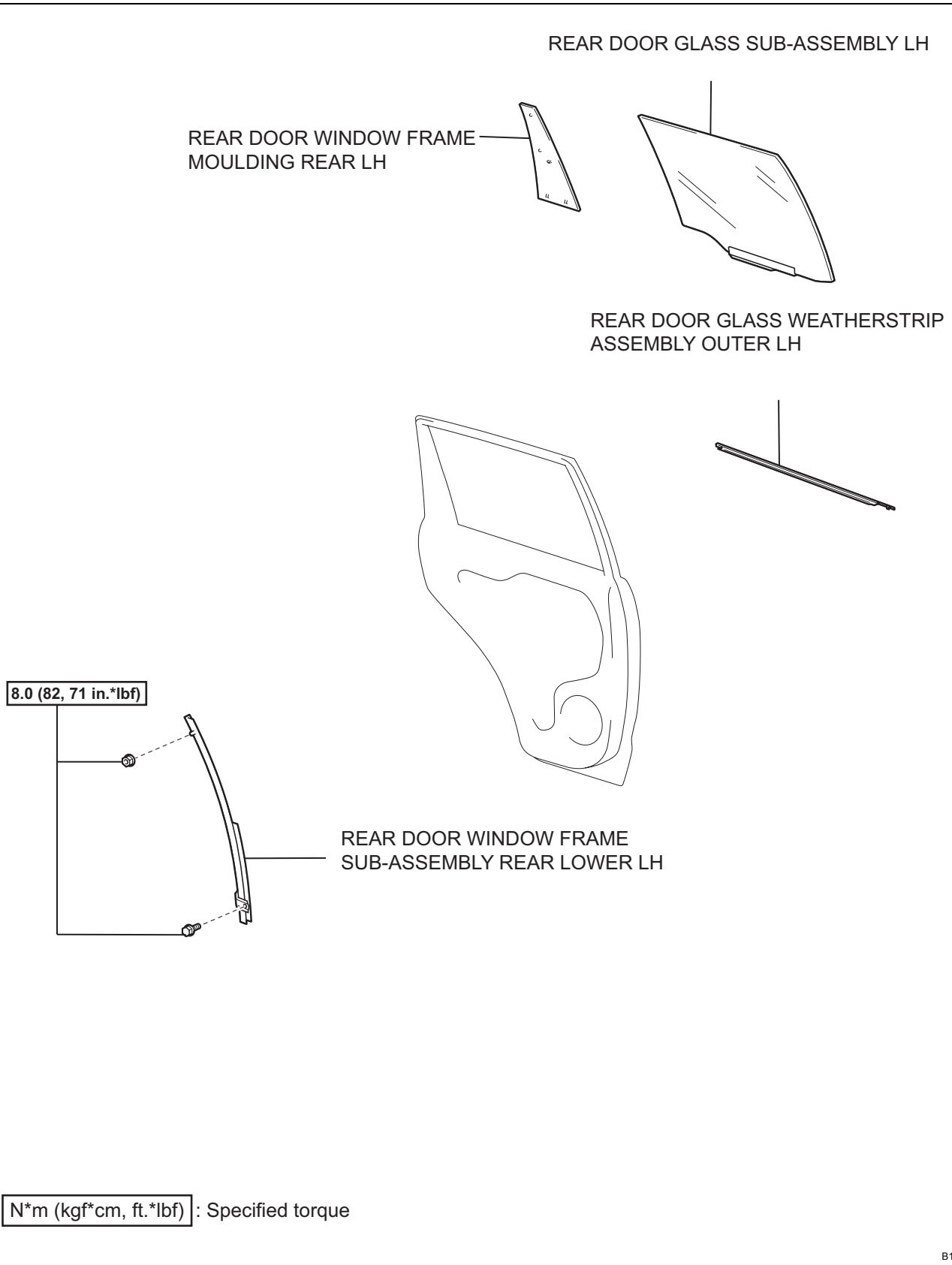
COMPONENTS



ED


REAR DOOR CHECK ASSEMBLY LH
5.5 (56, 49 in.*lbf)
30 (306, 22)
REAR DOOR HINGE ASSEMBLY UPPER LH
26 (265, 19)
REAR DOOR WITH MOTOR LOCK ASSEMBLY LH
★ 5.0 (51, 44 in.*lbf)
REAR DOOR HINGE ASSEMBLY LOWER LH
26 (265, 19)
● DOOR LOCK WIRE HARNESS PACKING
REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY LH
5.4 (55, 48 in.*lbf)
POWER WINDOW REGULATOR MOTOR ASSEMBLY LH REAR
8.0 (82, 71 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
★ Precoated part
P
B121667E01

ED

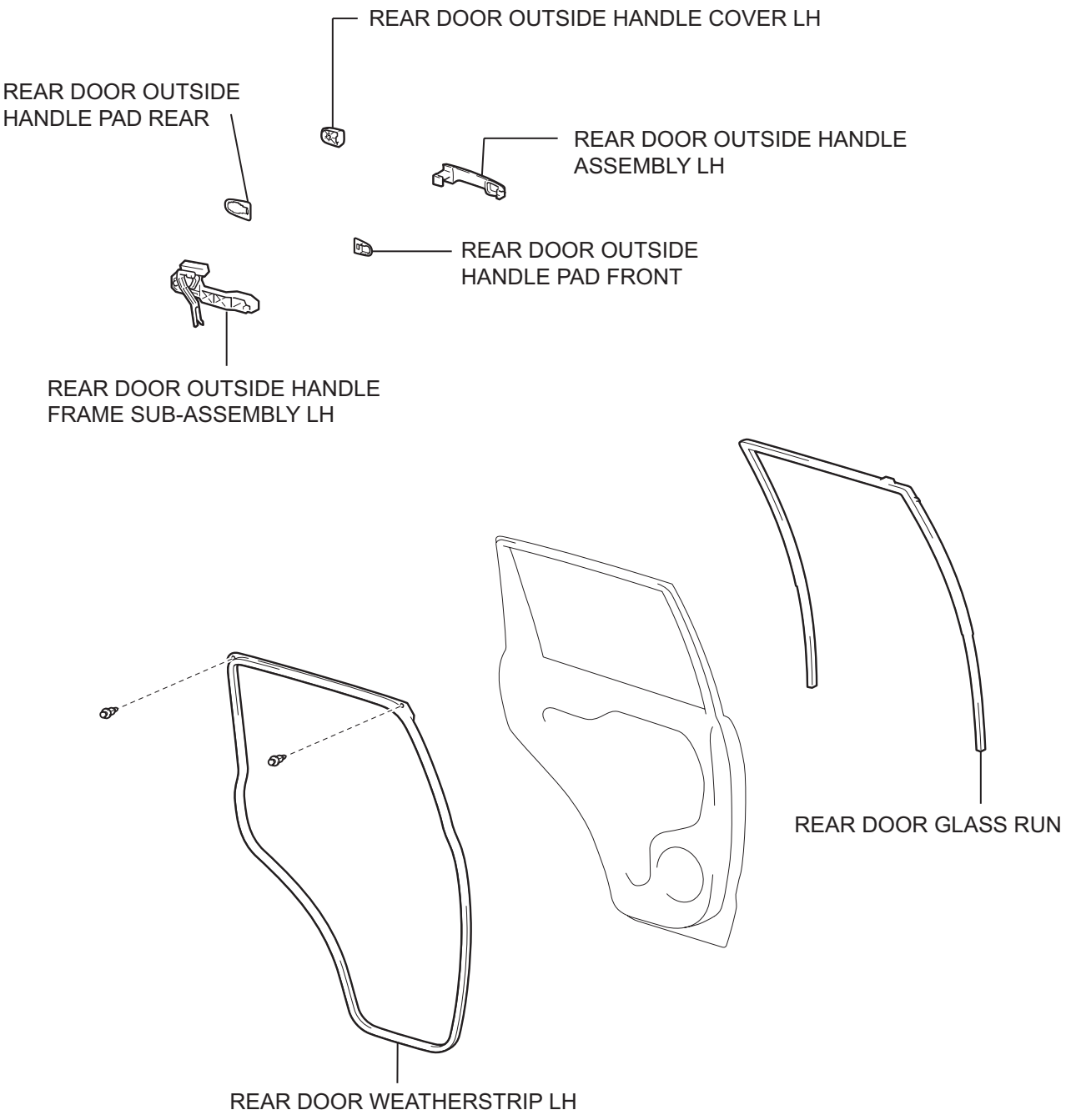


N*m (kgf*cm, ft.*lbf) : Specified torque

P

B121666E01

ED



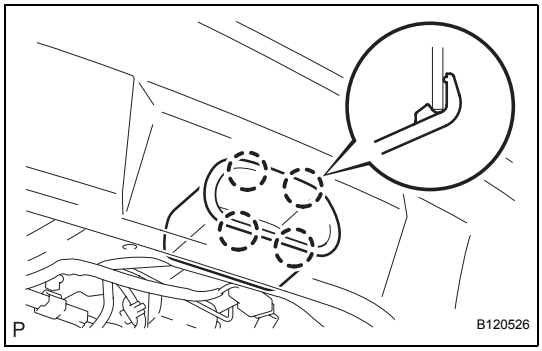
P

B120488E01

REASSEMBLY

HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. **INSTALL REAR WIPER MOTOR ASSEMBLY (See page WW-17)**
2. **INSTALL CENTER STOP LIGHT ASSEMBLY (See page LI-25)**
3. **INSTALL DOOR PULL HANDLE**
   (a) Attach the 4 claws and install the pull handle.

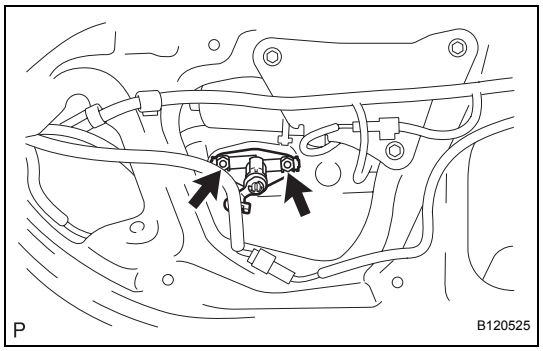


4. **INSTALL BACK DOOR STAY ASSEMBLY LH (See page ED-41)**
5. **INSTALL BACK DOOR STAY ASSEMBLY RH**
   HINT:
   Use the same procedures described for the LH side.
6. **INSTALL BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY (See page ET-35)**
7. **INSTALL BACK DOOR PANEL NO. 2 PROTECTOR**
   (a) Clean the contact surface of the door panel with a shop rag saturated with white gasoline.
   (b) Using a heat light, heat the door panel and new protector.
   Standard heating temperature

Item	Specified Condition
Door panel	40 to 60°C (104 to 140°F)
Protector	20 to 30°C (68 to 86°F)

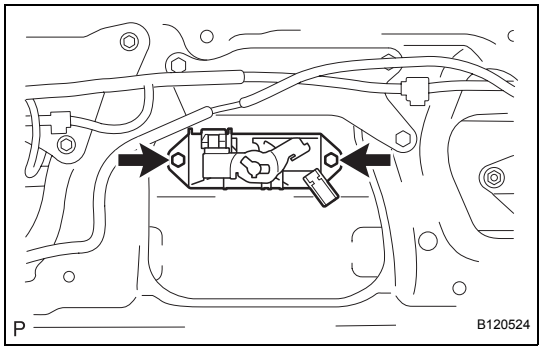
   NOTICE:
   Do not heat the door panel and protector excessively.
   (c) Remove peeling paper from the protector face.
   HINT:
   Be careful that dirt or foreign objects do not stick to the adhesive when removing the peeling paper.
   (d) Install the protector.
   NOTICE:
   Use steady pressure with your thumbs on the protector, not excessive force.
8. **INSTALL BACK DOOR PANEL NO. 1 PROTECTOR**
   HINT:
   Use the same procedures described for the No. 2 side.
9. **INSTALL BACK DOOR WEIGHT**
   (a) Install the weight with the 4 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

ED



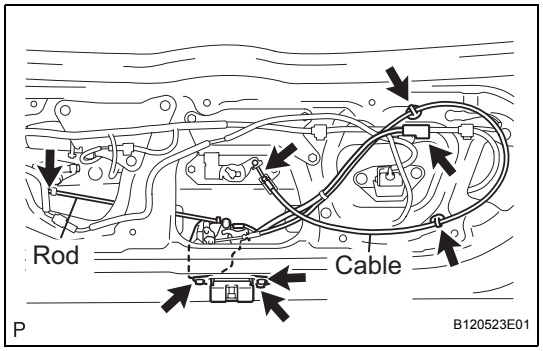
10. INSTALL BACK DOOR LOCK CYLINDER ASSEMBLY

(a) Install the cylinder with the 2 nuts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



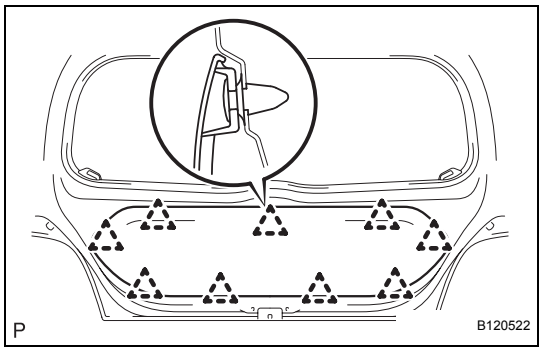
11. INSTALL BACK DOOR OUTSIDE HANDLE

(a) Install the handle with the 2 nuts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



12. INSTALL BACK DOOR LOCK ASSEMBLY

(a) Install the lock with the 3 bolts.
Torque: 7.0 N*m (71 kgf*cm, 44 in.*lbf)
(b) Connect the connector.
(c) Install the cable to the handle.
(d) Connect the rod to the cylinder.



13. INSTALL BACK DOOR TRIM BOARD ASSEMBLY

(a) Attach the 9 clips and install the board.

14. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

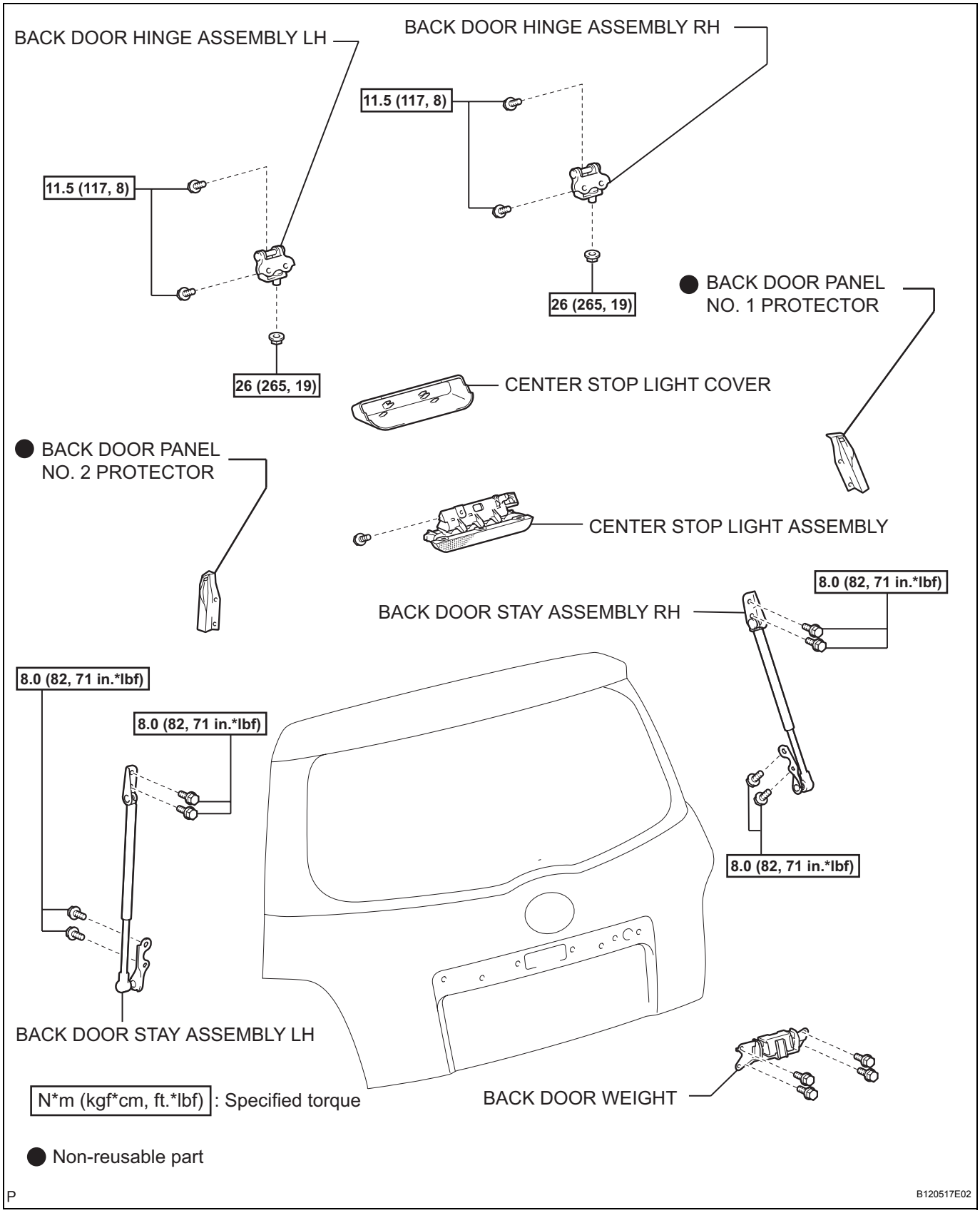
15. PERFORM INITIALIZATION

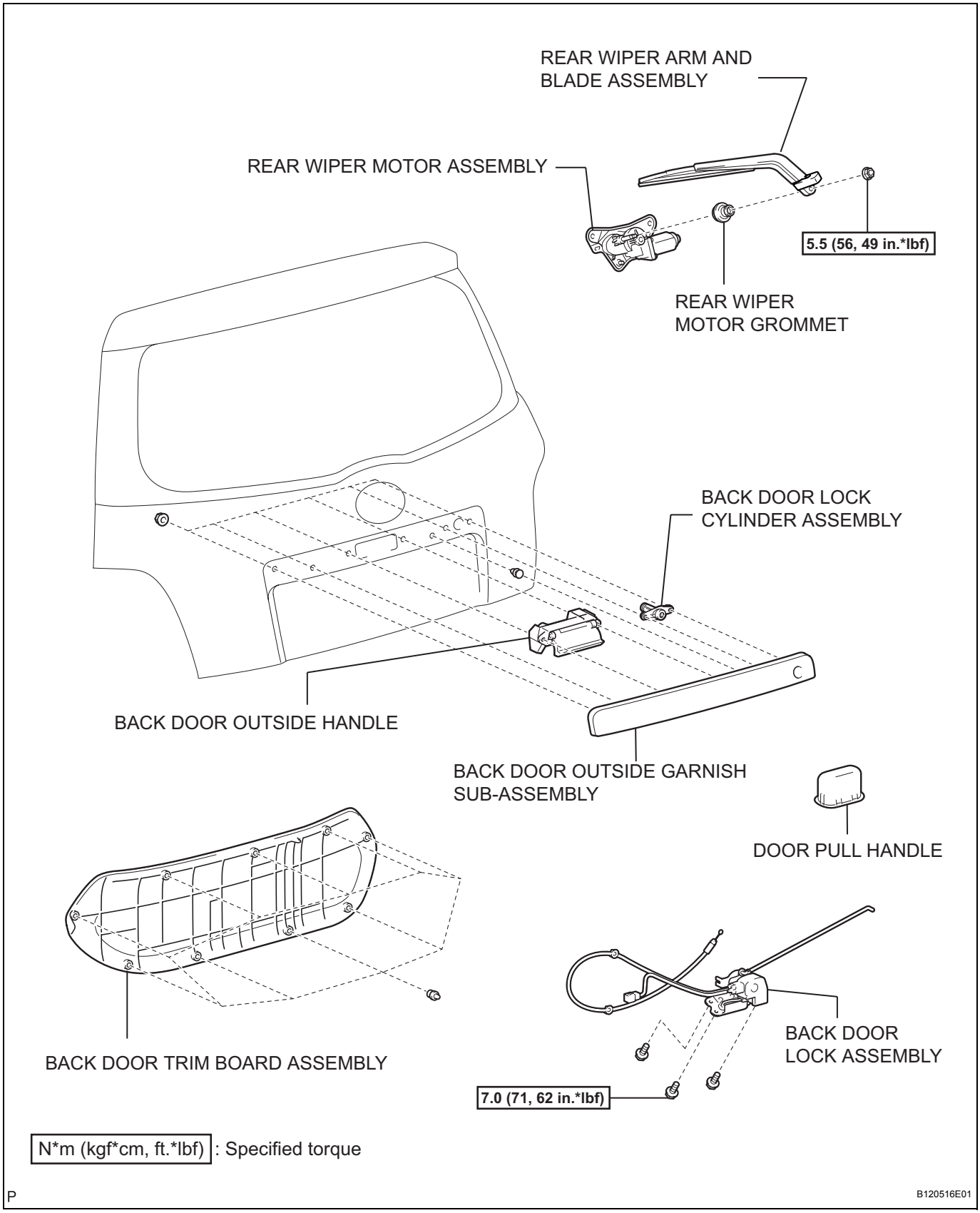
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

ED

BACK DOOR

COMPONENTS





N*m (kgf*cm, ft.*lbf) : Specified torque

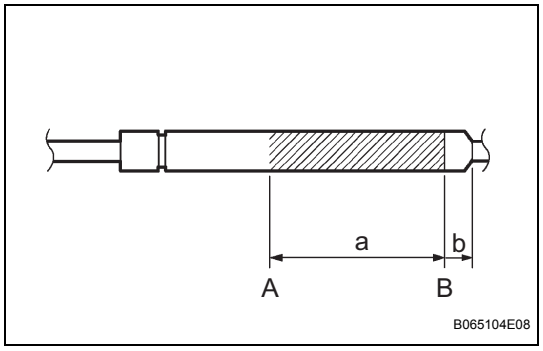
P

B120516E01

ED

DISPOSAL

HINT:
Use the same procedure for the RH side and LH side.



1. DISPOSE OF BACK DOOR STAY ASSEMBLY LH

(a) Horizontally fix the stay in a vise with the piston-rod pulled out.

(b) Using a metal saw, gradually cut any area between A and B to release the gas.

Standard measurement

Area	Specified Condition
a	80 mm (3.15 in.)
b	20 mm (0.80 in.)

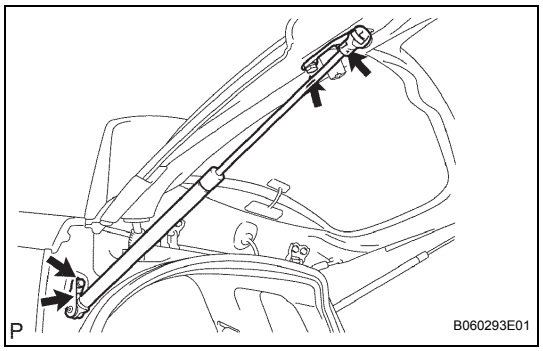
CAUTION:
As metal debris may be blown outward by the gas, you must:
- **Wear protective glasses.**
- **Cover the area being cut.**

NOTICE:
The gas is colorless, odorless and harmless.

BACK DOOR SUPPORT

REMOVAL

HINT:
- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.



1. REMOVE BACK DOOR STAY ASSEMBLY LH

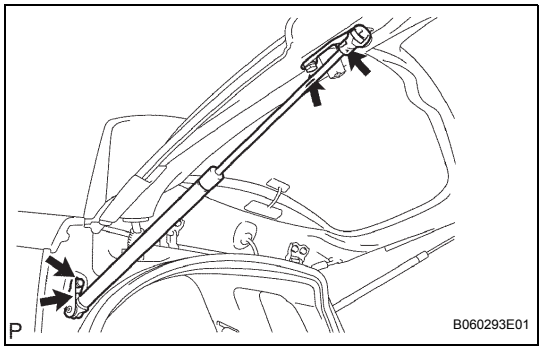
(a) Remove the 2 bolts and stay from the door panel.
HINT:
Remove the door stay while supporting the back door with your hands.

(b) Remove the 2 bolts and stay from the body panel.

INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedures listed below are for the LH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).



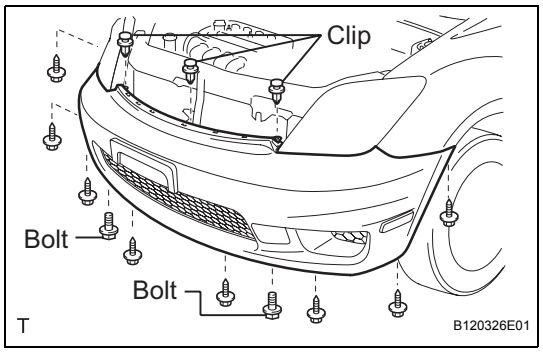
1. INSTALL BACK DOOR STAY ASSEMBLY LH

(a) Install the stay with the 4 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

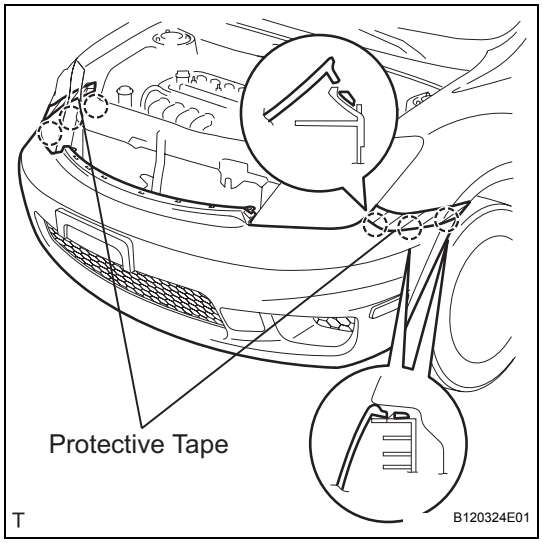
REMOVAL

1. **REMOVE RADIATOR GRILLE (See page ET-13)**

2. **REMOVE FRONT BUMPER COVER**
   (a) Remove the 8 screws and 2 bolts.
   (b) Using a clip remover, remove the 3 clips.



   (c) Apply protective tape under the front fender.
   (d) Detach the 6 claws and remove the bumper cover.

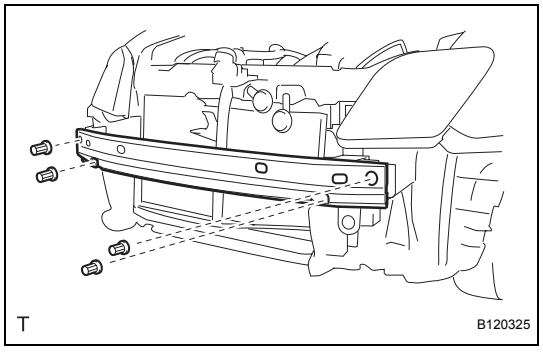


3. **REMOVE FRONT BUMPER ENERGY ABSORBER**

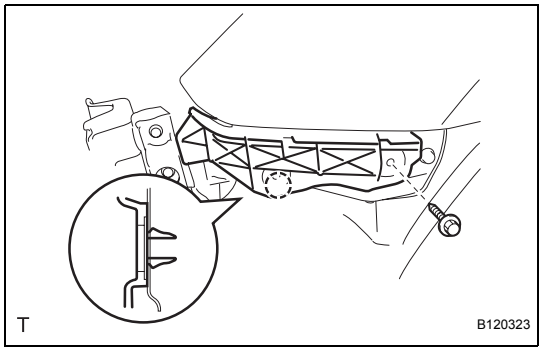
4. **REMOVE FRONT BUMPER REINFORCEMENT**
   (a) Remove the 4 nuts and reinforcement.

5. **REMOVE HEADLIGHT ASSEMBLY LH (See page LI-10)**

6. **REMOVE HEADLIGHT ASSEMBLY RH (See page LI-10)**



7. **REMOVE FRONT BUMPER SIDE SUPPORT LH**
   (a) Remove the screw.
   (b) Using a screwdriver, detach the claw and remove the side support.
   HINT:
   Tape the screwdriver tip before use.



8. **REMOVE FRONT BUMPER SIDE SUPPORT RH**
   HINT:
   Use the same procedures described for the LH side.

ET

DISASSEMBLY

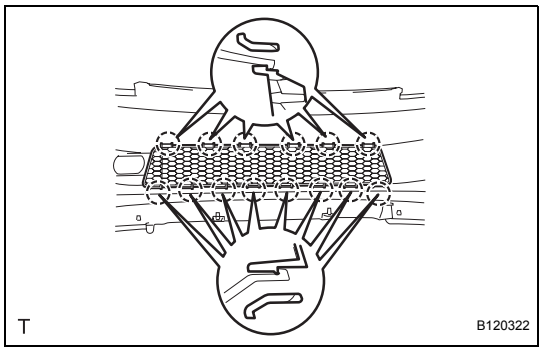
1. REMOVE FRONT SPOILER PAD LH
(a) Remove the 3 screws and spoiler pad.

2. REMOVE FRONT SPOILER PAD RH
(a) Remove the 3 screws and spoiler pad.

3. REMOVE FRONT LICENSE PLATE MOUNTING BRACKET
(a) Remove the 2 screws and mounting bracket.

4. REMOVE FOG LIGHT COVER LH
(a) Using a screwdriver, detach the claws and remove the cover.
HINT:
Tape the screwdriver tip before use.

5. REMOVE FOG LIGHT COVER RH
(a) Using a screwdriver, detach the claws and remove the cover.
HINT:
Tape the screwdriver tip before use.



6. REMOVE RADIATOR GRILLE LOWER
(a) Using a screwdriver, detach the 14 claws and remove the radiator grille lower.
HINT:
Tape the screwdriver tip before use.

7. REMOVE FRONT SIDE MARKER LIGHT ASSEMBLY LH
(a) Remove the 2 retainers and light.

8. REMOVE FRONT SIDE MARKER LIGHT ASSEMBLY RH
(a) Remove the 2 retainers and light.

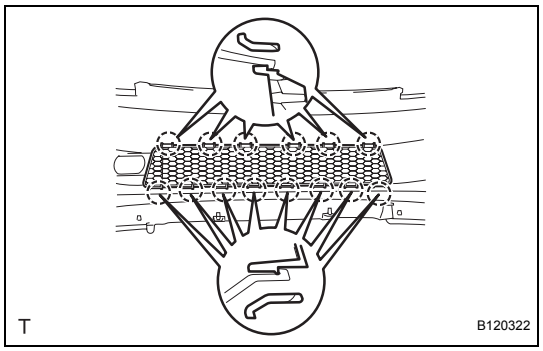
9. REMOVE FRONT BUMPER HOLE COVER
(a) Using a screwdriver, detach the claws and remove the cover.
HINT:
Tape the screwdriver tip before use.

REASSEMBLY

1. INSTALL FRONT BUMPER HOLE COVER
(a) Attach the claws to install the cover.

2. INSTALL FRONT SIDE MARKER LIGHT ASSEMBLY LH
(a) Install the light with the 2 retainers.

3. INSTALL FRONT SIDE MARKER LIGHT ASSEMBLY RH
(a) Install the light with the 2 retainers.



4. INSTALL RADIATOR GRILLE LOWER
(a) Attach the 14 claws to install the radiator grille lower.

5. INSTALL FOG LIGHT COVER LH
(a) Attach the claws to install the cover.

6. INSTALL FOG LIGHT COVER RH
(a) Attach the claws to install the cover.

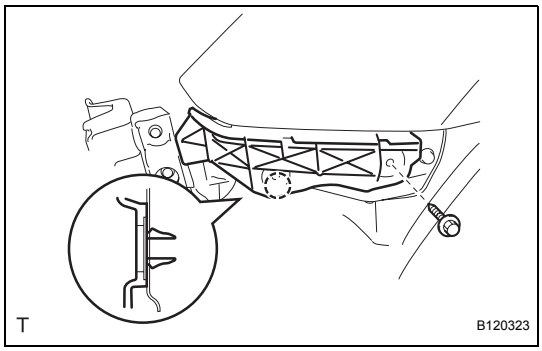
7. INSTALL FRONT LICENSE PLATE MOUNTING BRACKET
(a) Install the mounting bracket with the 2 screws.

8. INSTALL FRONT SPOILER PAD LH
(a) Install the spoiler pad with the 3 screws.

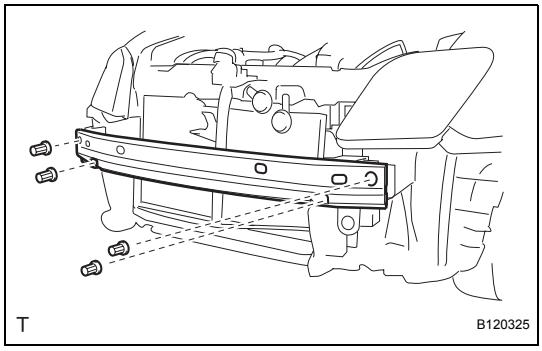
9. INSTALL FRONT SPOILER PAD RH
(a) Install the spoiler pad with the 3 screws.

INSTALLATION

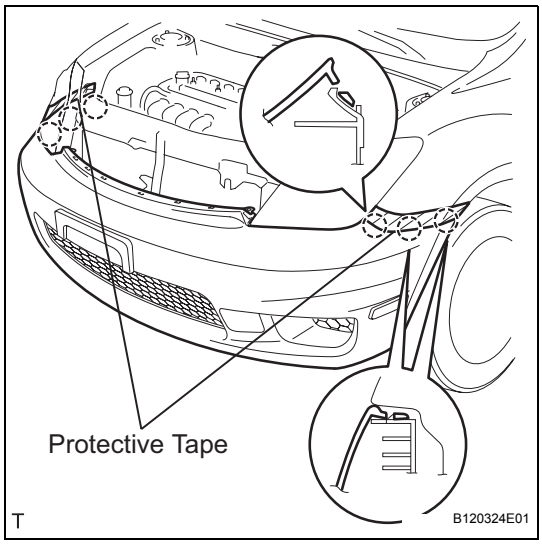
HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).



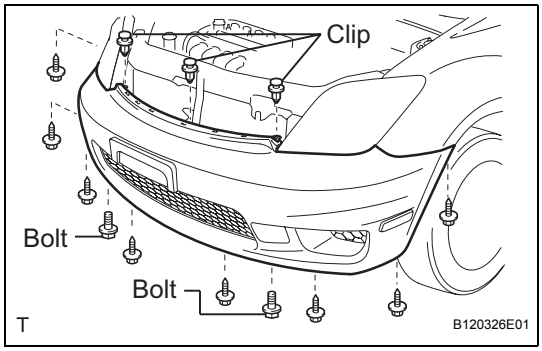
1. **INSTALL FRONT BUMPER SIDE SUPPORT LH**
   (a) Attach the claw to install the side support.
   (b) Install the screw.
2. **INSTALL FRONT BUMPER SIDE SUPPORT RH**
   HINT:
   Use the same procedures described for the LH side.
3. **INSTALL HEADLIGHT ASSEMBLY LH (See page LI-13)**
4. **INSTALL HEADLIGHT ASSEMBLY RH (See page LI-13)**



5. **INSTALL FRONT BUMPER REINFORCEMENT**
   (a) Install the reinforcement with the 4 nuts.
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
6. **INSTALL FRONT BUMPER ENERGY ABSORBER**

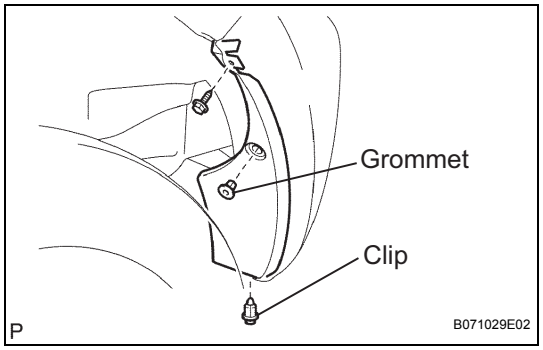


7. **INSTALL FRONT BUMPER COVER**
   (a) Put protective tape under the front fender.
   (b) Attach the 6 claws to install the bumper cover.



   (c) Install the 8 screws, 2 bolts and 3 clips.
8. **INSTALL RADIATOR GRILLE (See page ET-14)**

ET



REMOVAL

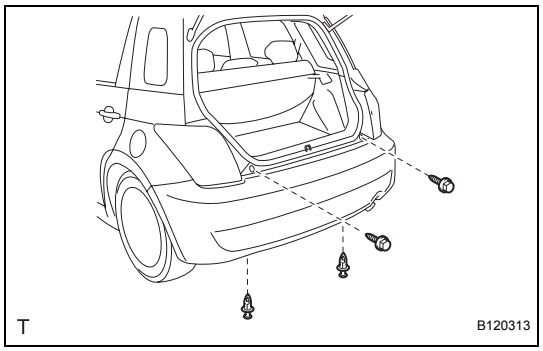
1. REMOVE REAR BUMPER SIDE SEAL LH

(a) Remove the screw.

(b) Using a screwdriver, remove the clip and grommet. Then remove the side seal.
HINT:
Tape the screwdriver tip before use.

2. REMOVE REAR BUMPER SIDE SEAL RH

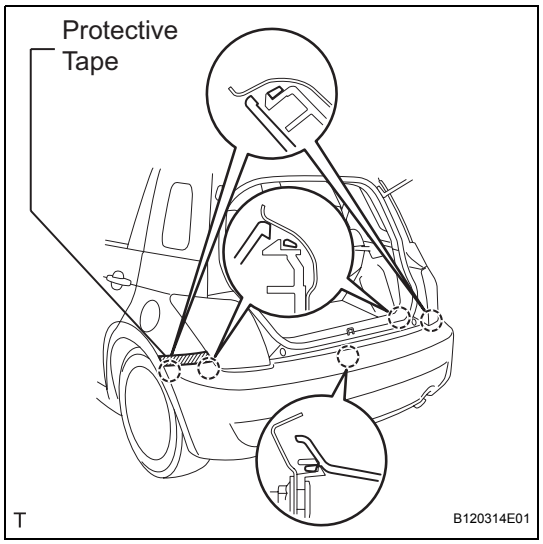
HINT:
Use the same procedures described for the LH side.



3. REMOVE REAR BUMPER COVER

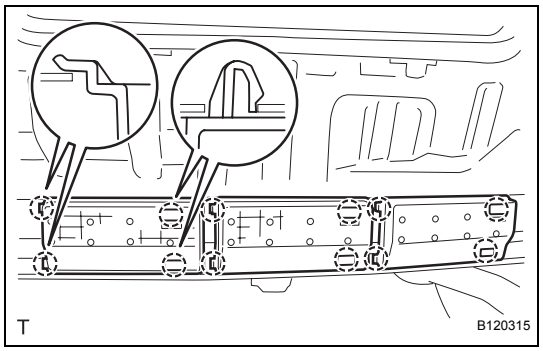
(a) Remove the 2 bolts.

(b) Using a clip remover, remove the 2 clips.



(c) Put protective tape under the quarter panel.

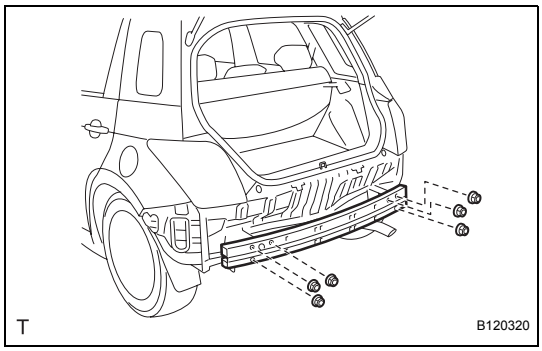
(d) Detach the 5 claws and remove the cover.



4. REMOVE REAR BUMPER SHIELD BRACKET CENTER

(a) Using a screwdriver, detach the 12 claws and remove the 3 brackets.

ET



5. REMOVE REAR BUMPER REINFORCEMENT

(a) Remove the 6 nuts and reinforcement.

6. REMOVE REAR BUMPER SIDE SUPPORT LH

(a) Remove the screw and detach the claw. Then remove the side support.

7. REMOVE REAR BUMPER SIDE SUPPORT RH

(a) Remove the screw and detach the claw. Then remove the side support.

8. REMOVE REAR BUMPER SIDE RETAINER LH

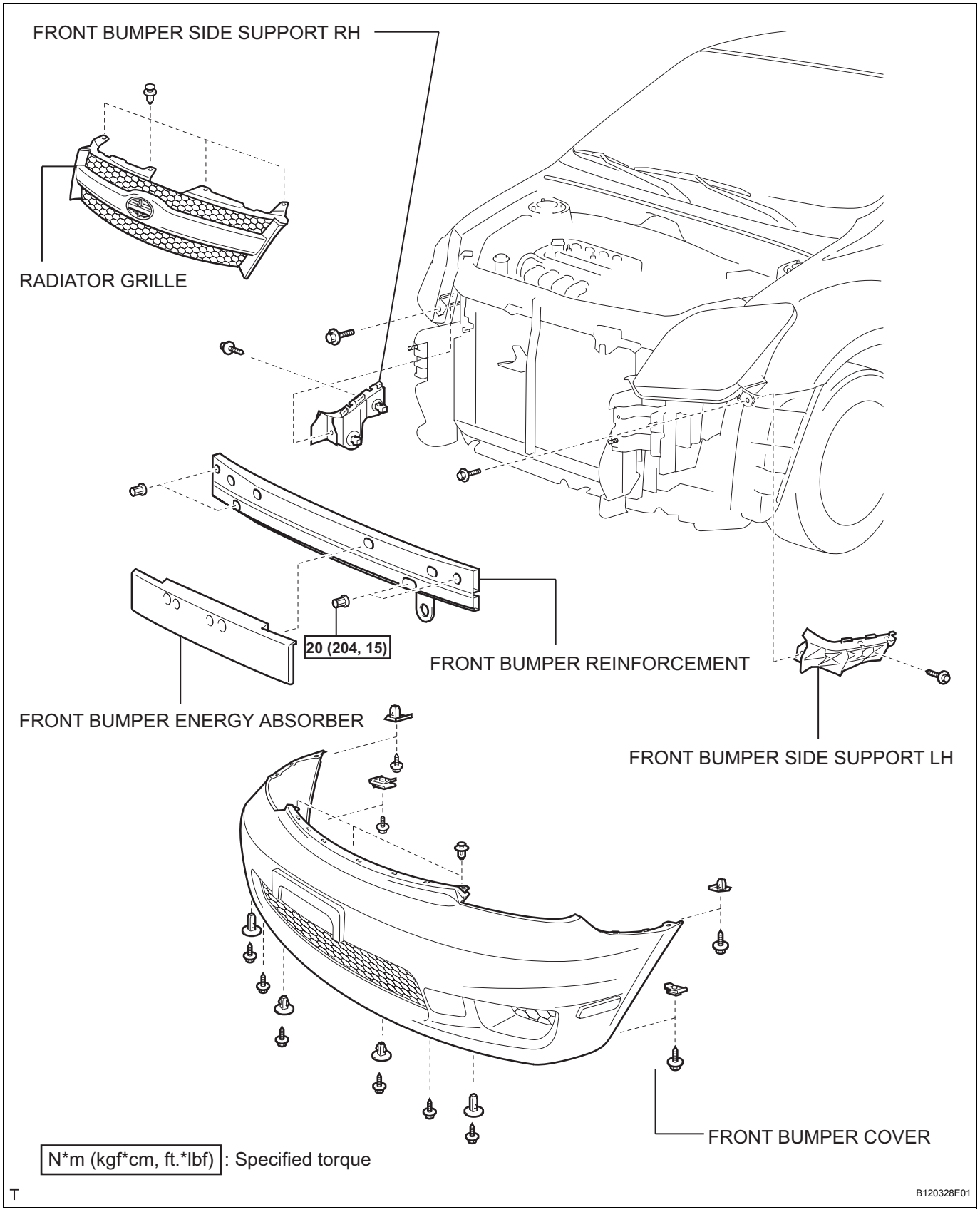
(a) Remove the screw and detach the claw. Then remove the side support.

9. REMOVE REAR BUMPER SIDE RETAINER RH

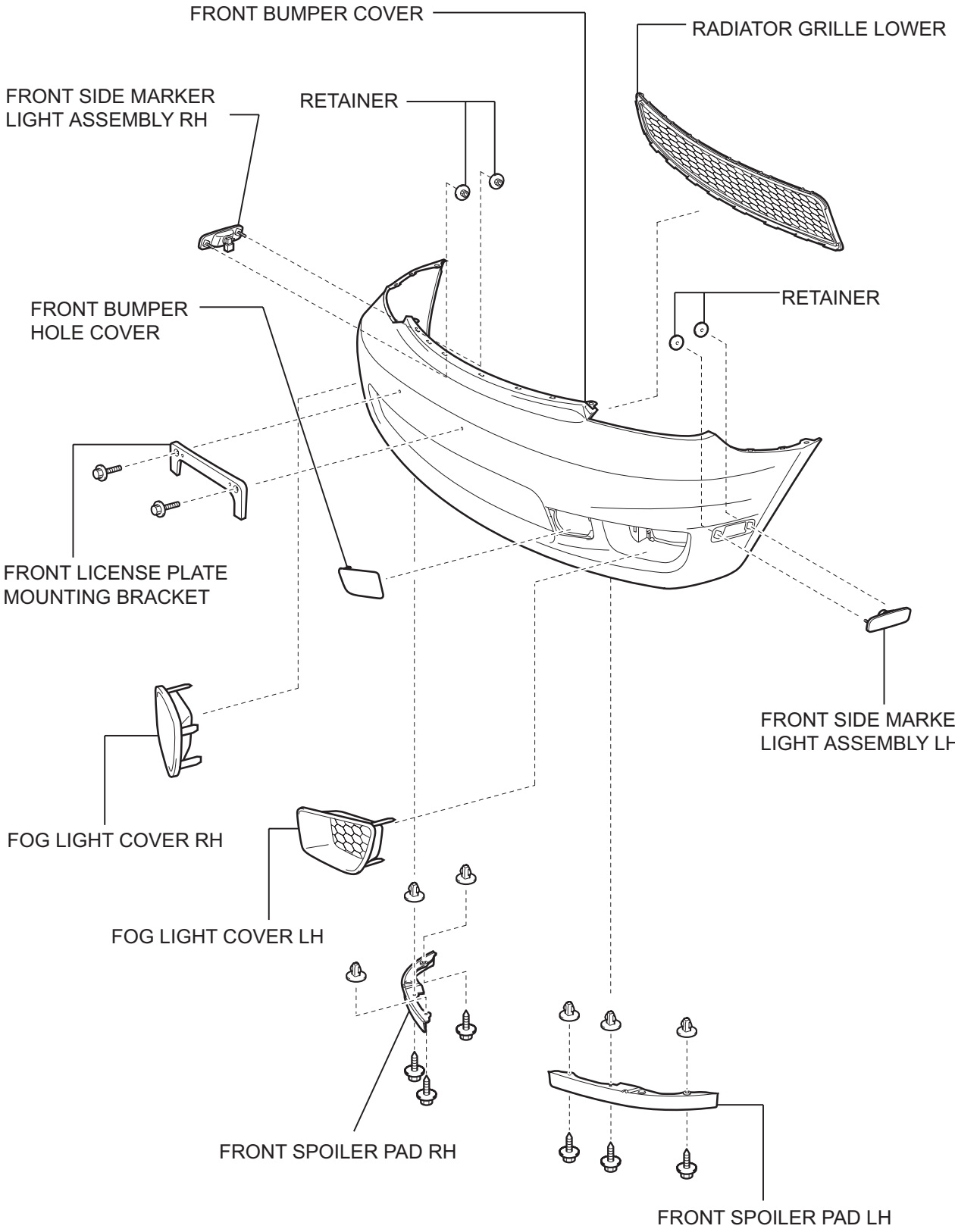
(a) Remove the screw and detach the claw. Then remove the side support.

FRONT BUMPER

COMPONENTS



ET



T

B120327E01

INSTALLATION

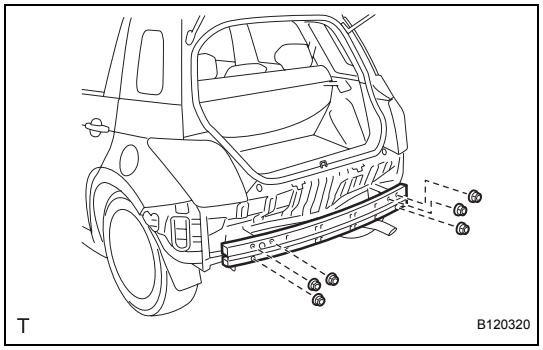
HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

1. **INSTALL REAR BUMPER SIDE RETAINER LH**
   (a) Attach the claw and install the side support with the screw.

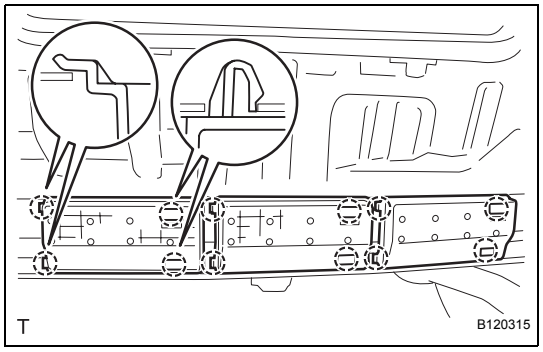
2. **INSTALL REAR BUMPER SIDE RETAINER RH**
   (a) Attach the claw and install the side support with the screw.

3. **INSTALL REAR BUMPER SIDE SUPPORT LH**
   (a) Attach the claw and install the side support with the screw.

4. **INSTALL REAR BUMPER SIDE SUPPORT RH**
   (a) Attach the claw and install the side support with the screw.

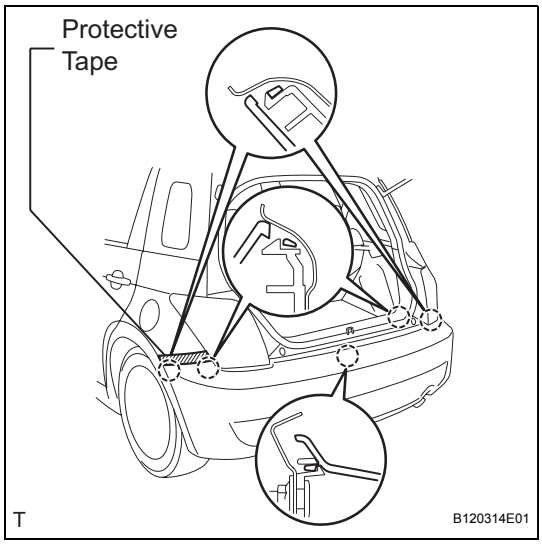


5. **INSTALL REAR BUMPER REINFORCEMENT**
   (a) Install the reinforcement with the 6 nuts.
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



6. **INSTALL REAR BUMPER SHIELD BRACKET CENTER**
   (a) Attach the 12 claws to install the 3 brackets.

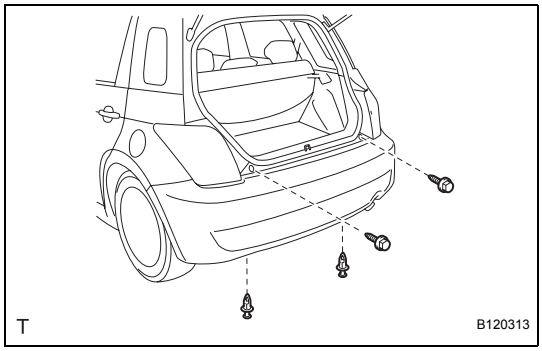
ET



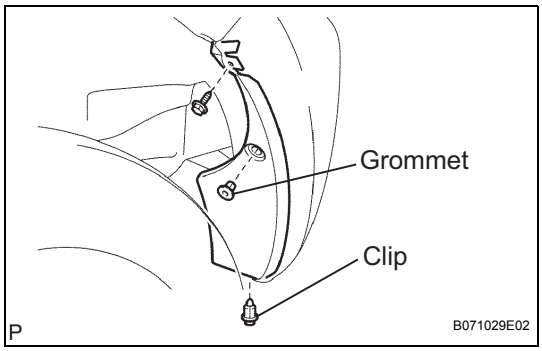
7. INSTALL REAR BUMPER COVER

(a) Put protective tape under the quarter panel.

(b) Attach the 5 claws to install the cover.



(c) Install the 2 bolts and 2 clips.



8. INSTALL REAR BUMPER SIDE SEAL LH

(a) Install the side seal with the screw, grommet and clip.

9. INSTALL REAR BUMPER SIDE SEAL RH

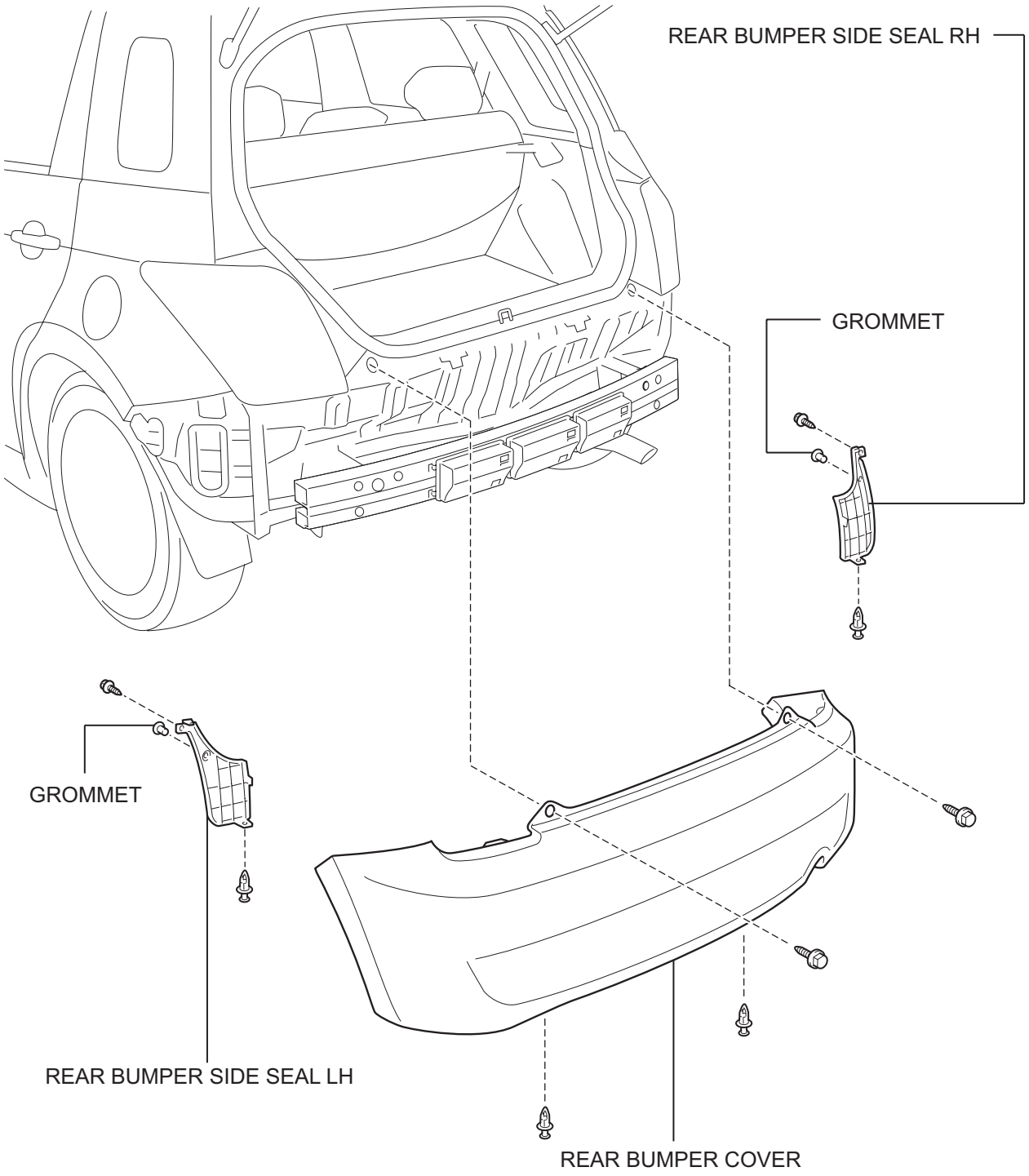
HINT:

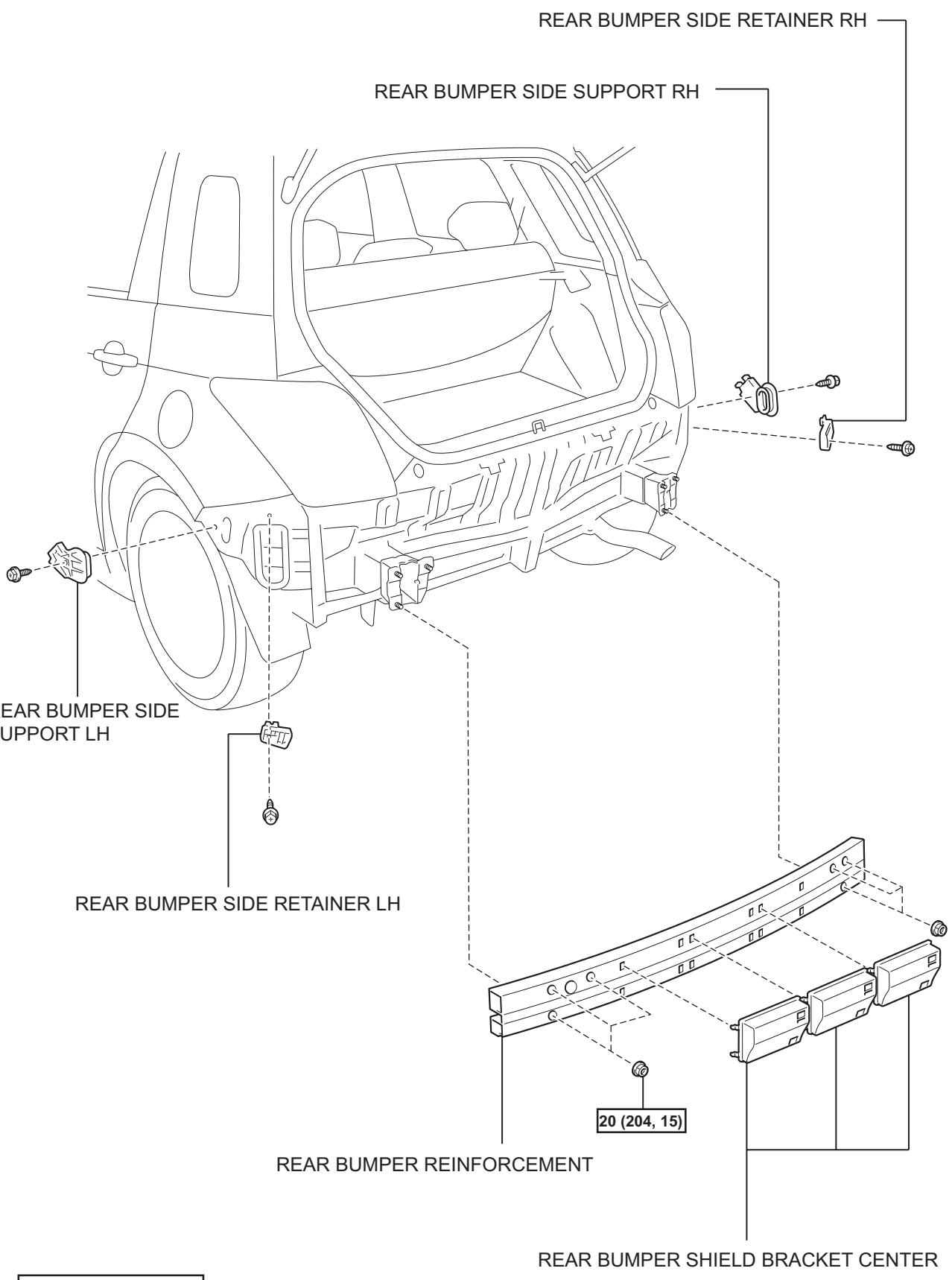
Use the same procedures described for the LH side.

ET

REAR BUMPER

COMPONENTS





N*m (kgf*cm, ft.*lbf) : Specified torque

T

B120312E01

INSTALLATION

HINT:
When installing the name plate, heat the vehicle body and name plate using a heat light.

Standard heating temperature

Item	Specified Condition
Vehicle Body	40 to 60°C (104 to 140°F)
Name Plate	20 to 30°C (68 to 86°F)

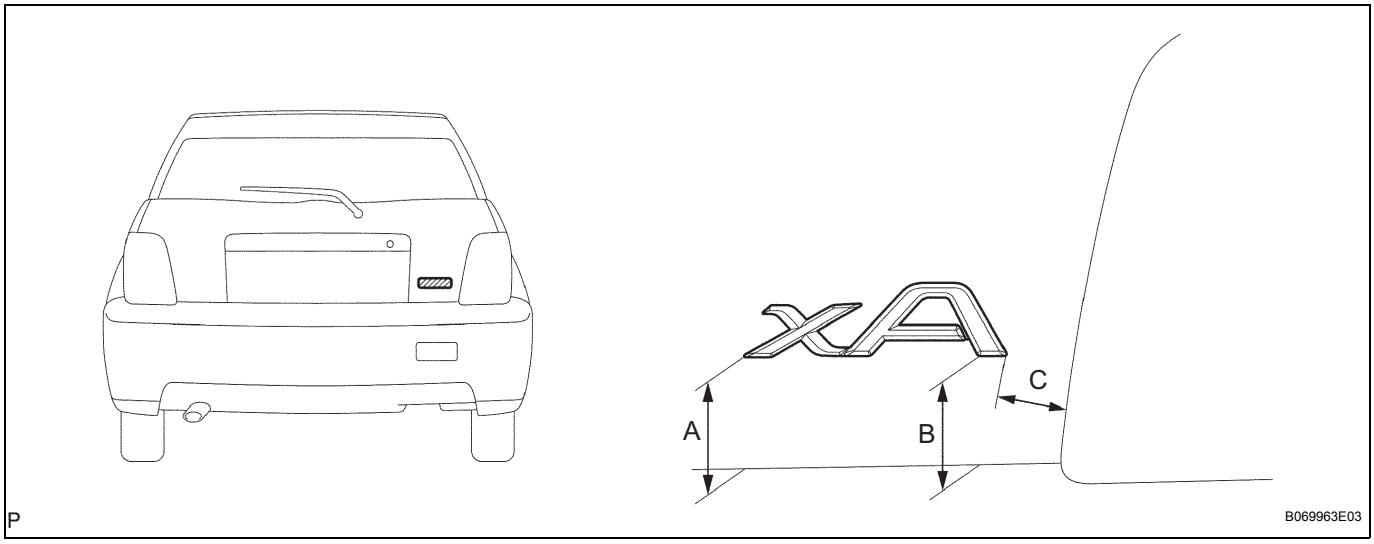
NOTICE:
Do not heat the vehicle body and name plate excessively.

1. INSTALL BACK DOOR NAME PLATE

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with white gasoline.

(b) If reusing the name plate:
Clean the name plate.
  (1) Using a heat light, heat the name plate.
  (2) Remove the double-sided tape from the name plate.
  (3) Wipe off any tape adhesive residue with white gasoline.
  (4) Apply new double-sided tape to the name plate.

(c) Install the name plate.
  (1) Using a heat light, heat the vehicle body and name plate.
  (2) Remove the peeling paper from the face of the name plate.
  HINT:
  After removing the peeling paper, keep the exposed adhesive free from foreign matter.
  (3) Install the name plate.
  NOTICE:
  Install the name plate exactly according to the specifications below.

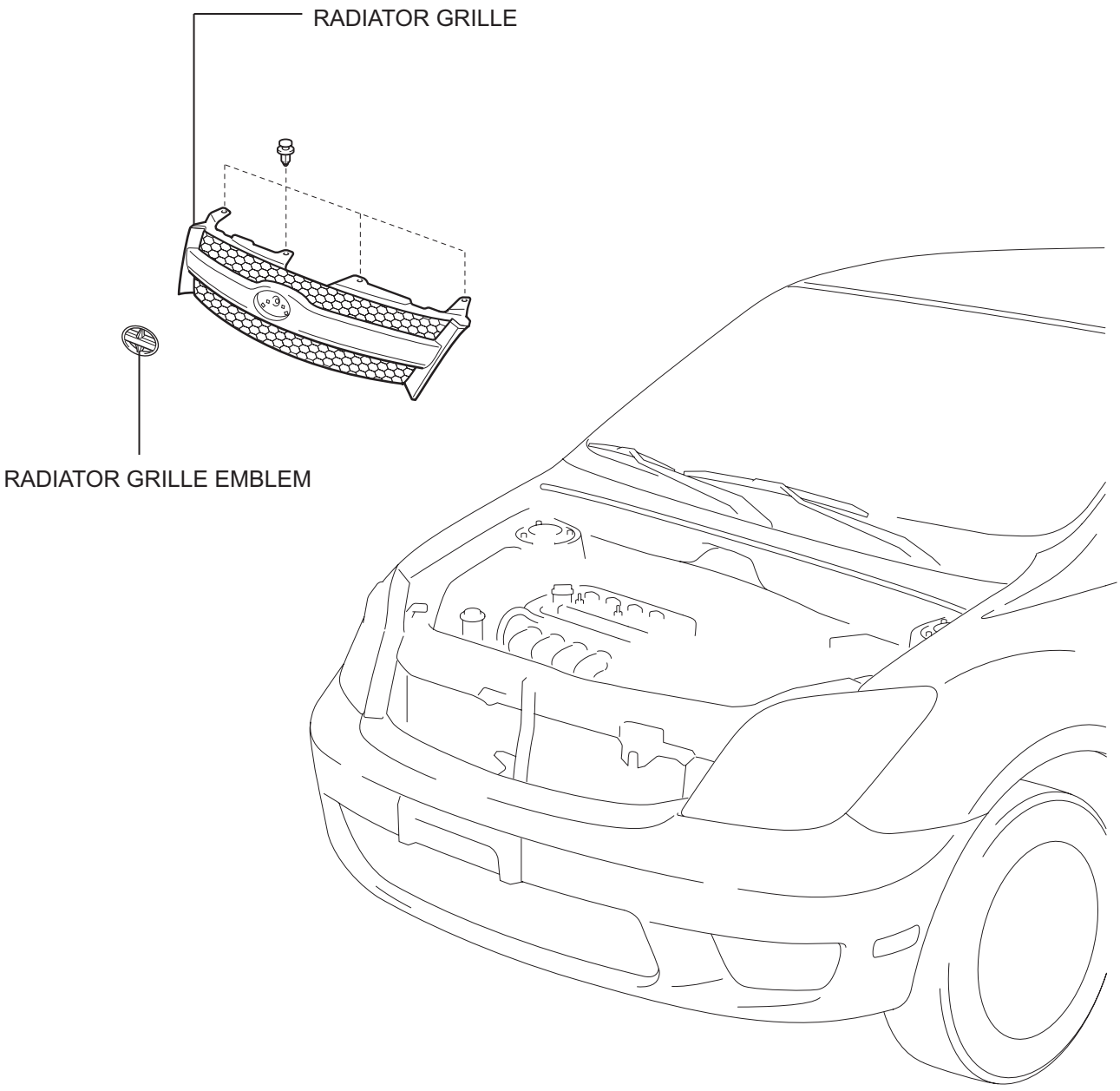


Standard measurement

Area	Specified Condition
A	50.3 mm (1.980 in.)
B	51.2 mm (2.016 in.)
C	39.4 mm (1.551 in.)

RADIATOR GRILLE

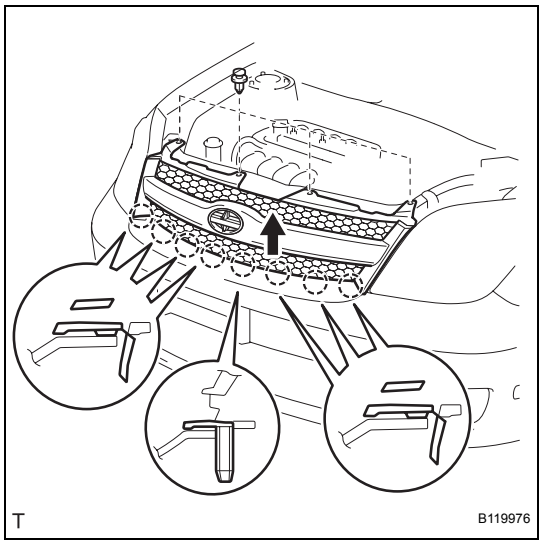
COMPONENTS



ET

T

B119973E01

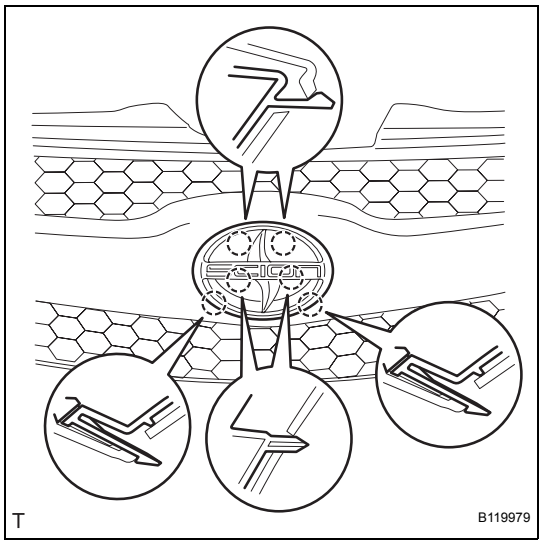


REMOVAL

1. REMOVE RADIATOR GRILLE

(a) Using a clip remover, remove the 4 clips.

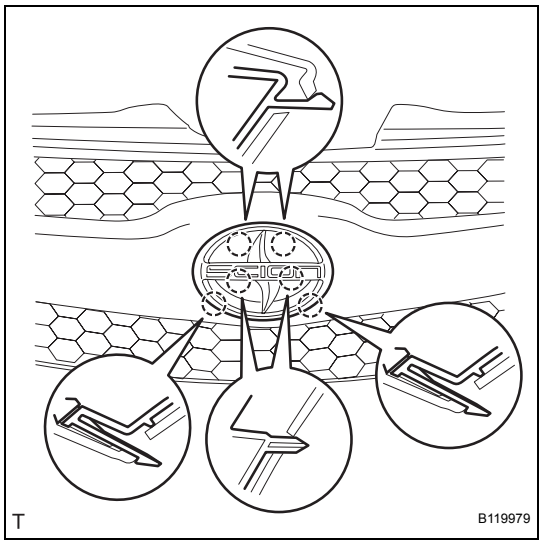
(b) Pull the radiator grille in the direction indicated by the arrow in the illustration to detach the 8 claws and remove the radiator grille.



DISASSEMBLY

1. REMOVE RADIATOR GRILLE EMBLEM

(a) Using a screwdriver, detach the 6 claws and remove the emblem from the radiator grille.
HINT:
Tape the screwdriver tip before use.

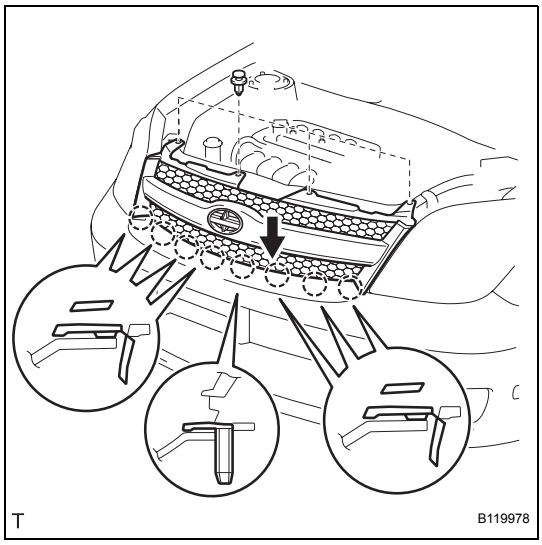


REASSEMBLY

1. INSTALL RADIATOR GRILLE EMBLEM

(a) Attach the 6 claws to install the emblem.

ET



INSTALLATION

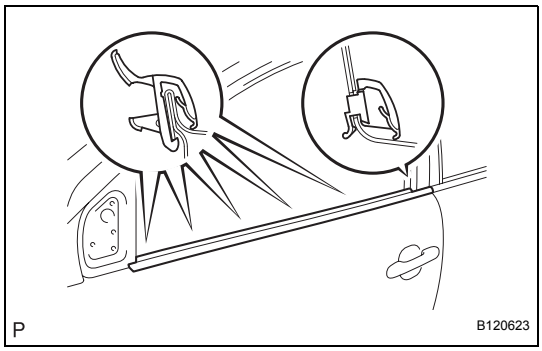
1. INSTALL RADIATOR GRILLE

(a) Push the radiator grille in the direction indicated by the arrow in the illustration to attach the 8 claws and install the radiator grille.

(b) Install the 4 clips.

INSTALLATION

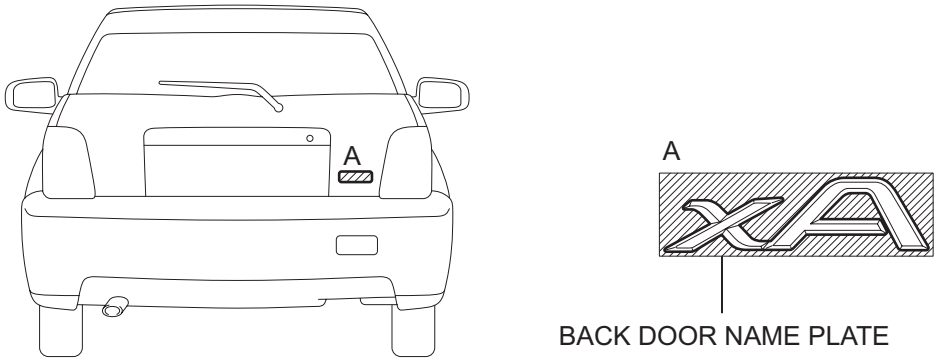
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. **INSTALL FRONT DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH**
   (a) Attach the claws to install the weatherstrip.
2. **INSTALL OUTER REAR VIEW MIRROR ASSEMBLY LH (See page MI-9)**
3. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (See page AV-8)**
4. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-17)**
5. **INSTALL FRONT ARMREST BASE PANEL UPPER LH (See page ED-18)**
6. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-18)**
7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
8. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

NAME PLATE

COMPONENTS



T

B120616E01

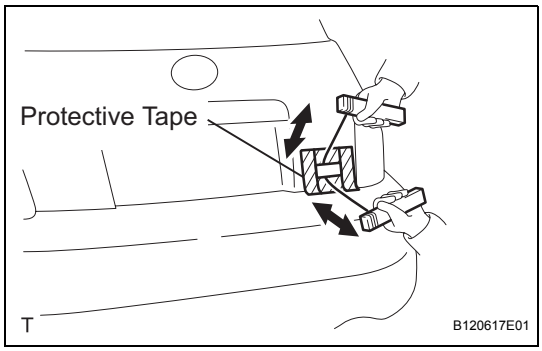
REMOVAL

HINT:
When removing the name plate, heat the vehicle body and name plate using a heat light.

Standard heating temperature

Item	Specified Condition
Vehicle Body	40 to 60°C (104 to 140°F)
Name Plate	20 to 30°C (68 to 86°F)

NOTICE:
Do not heat the vehicle body and name plate excessively.



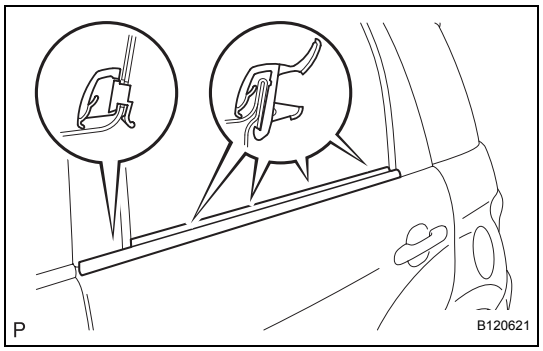
1. REMOVE BACK DOOR NAME PLATE

(a) Put protective tape around the name plate.
(b) Insert a piano wire between the vehicle body and name plate.
(c) Tie objects that can serve as handles (for example, wooden blocks) to both wire ends.
(d) Pull the piano wire and scrape off the double-sided tape that holds the name plate to the vehicle body.
NOTICE:
- **If reusing the name plate, take care not to damage the name plate.**
- **Be careful not to damage the vehicle body.**

INSTALLATION

HINT:

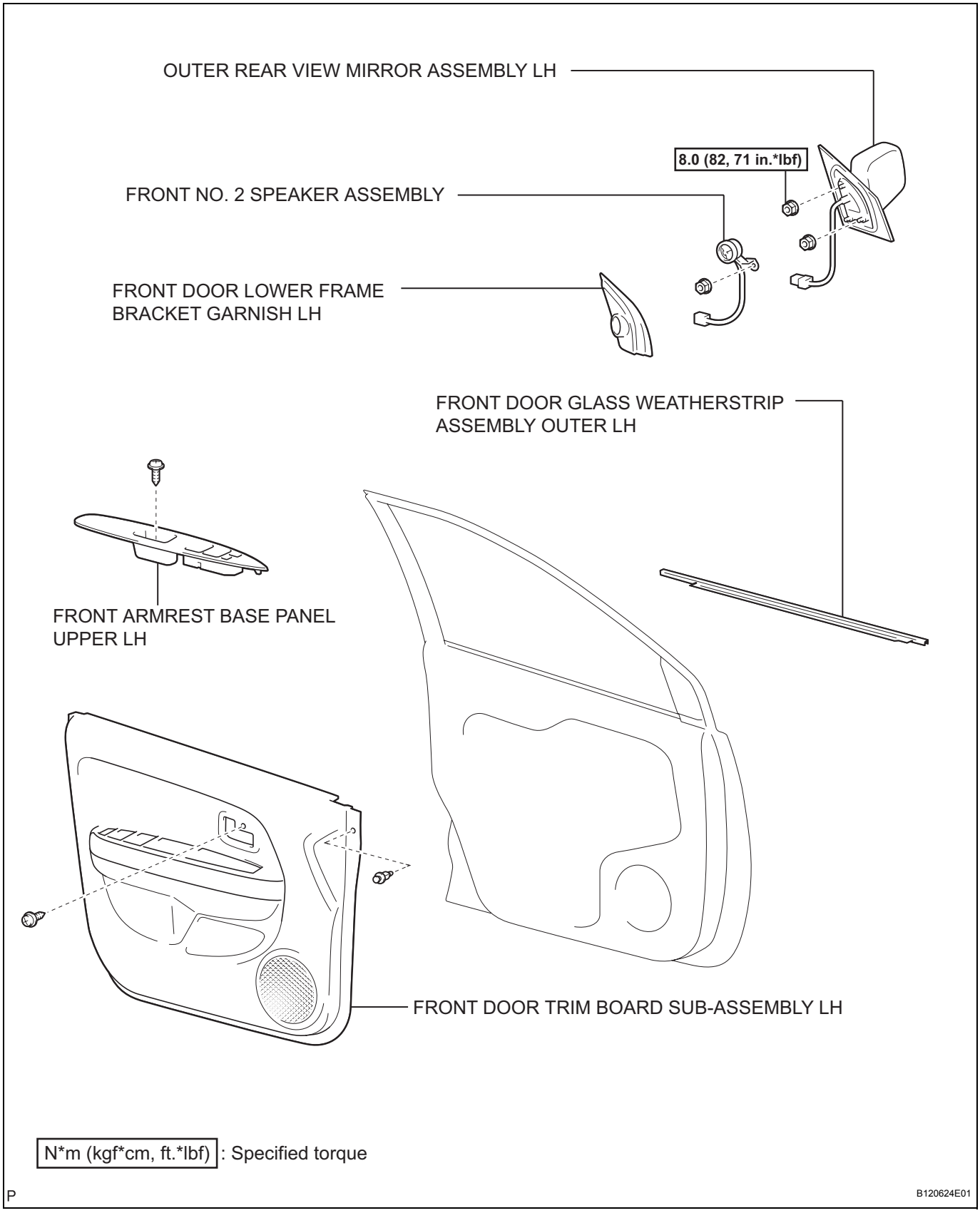
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. **INSTALL REAR DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH**
   (a) Attach the claws to install the weatherstrip.
2. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH**
3. **INSTALL REAR DOOR ARMREST BASE PANEL UPPER LH**
4. **INSTALL REAR DOOR REAR GUIDE BRACKET GARNISH LH**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

FRONT DOOR GLASS WEATHERSTRIP

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B120624E01

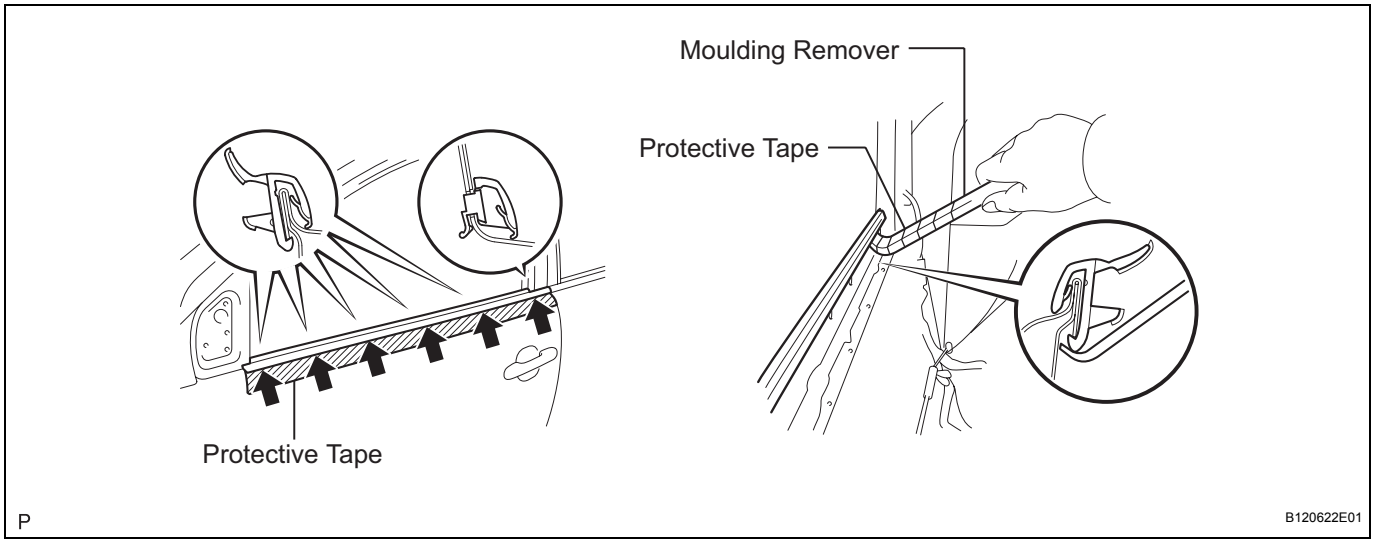
ET

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH LH (See page ED-8)**
3. **REMOVE FRONT ARMREST BASE PANEL UPPER LH (See page ED-8)**
4. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-9)**
5. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (See page AV-7)**
6. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY LH (See page MI-7)**
7. **REMOVE FRONT DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH**
   (a) Put protective tape under the weatherstrip.
   (b) Using a moulding remover, detach the claws to remove the weatherstrip as shown in the illustration.
   HINT:
   Tape the remover tip before use.

ET



INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- When installing the clip, heat the vehicle body and clip using a heat light.

Standard heating temperature

Item	Specified Condition
Vehicle Body	40 to 60°C (104 to 140°F)
Clip	20 to 30°C (68 to 86°F)

NOTICE:
Do not heat the vehicle body and clip excessively.

1. REPLACE ROOF DRIP SIDE FINISH MOULDING CLIP

HINT:
Use the procedures below to replace damaged or accidentally removed clips. If this step is not necessary, go to the next step.

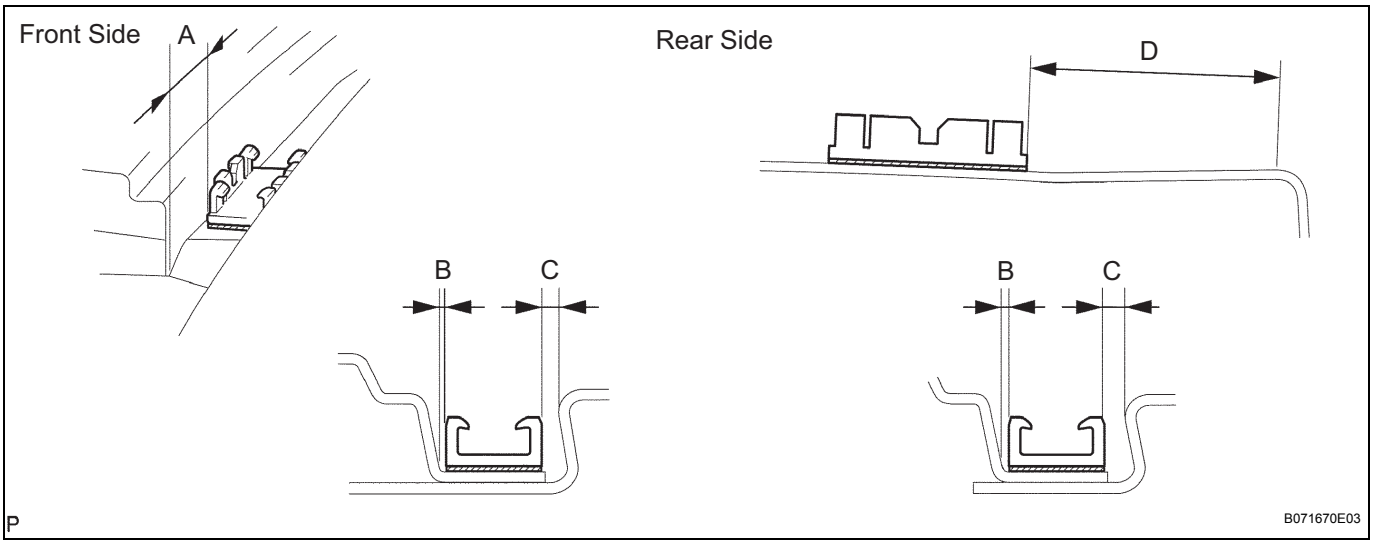
NOTICE:
After press-fitting the clips, wait 30 minutes or more before installing the moulding.

HINT:
- Minimum hardening time: 30 minutes
- Time needed for complete hardening: 24 hours

(a) Remove the double-sided tape that remains on the moulding installation area of the vehicle body, and then clean the surface with white gasoline.

(b) Heat the clip installation surfaces of the vehicle body and the installation part of the clips.

(c) Install new clips in the positions shown in the illustration. Press-fit the clips by hand.

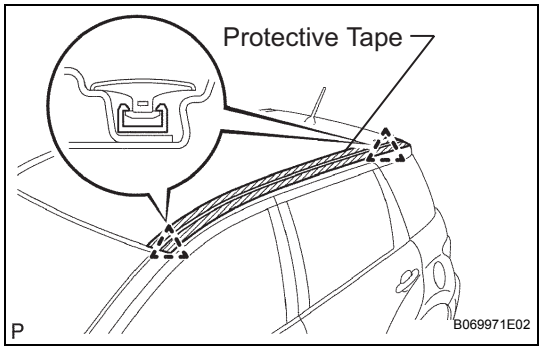


Standard measurement

Area	Specified Condition
A	14.3 mm (0.563 in.)
B	0.8 mm (0.031 in.)
C	2.2 mm (0.087 in.)

ET

Area	Specified Condition
D	27.2 mm (1.071 in.)



2. INSTALL ROOF DRIP SIDE FINISH MOULDING LH

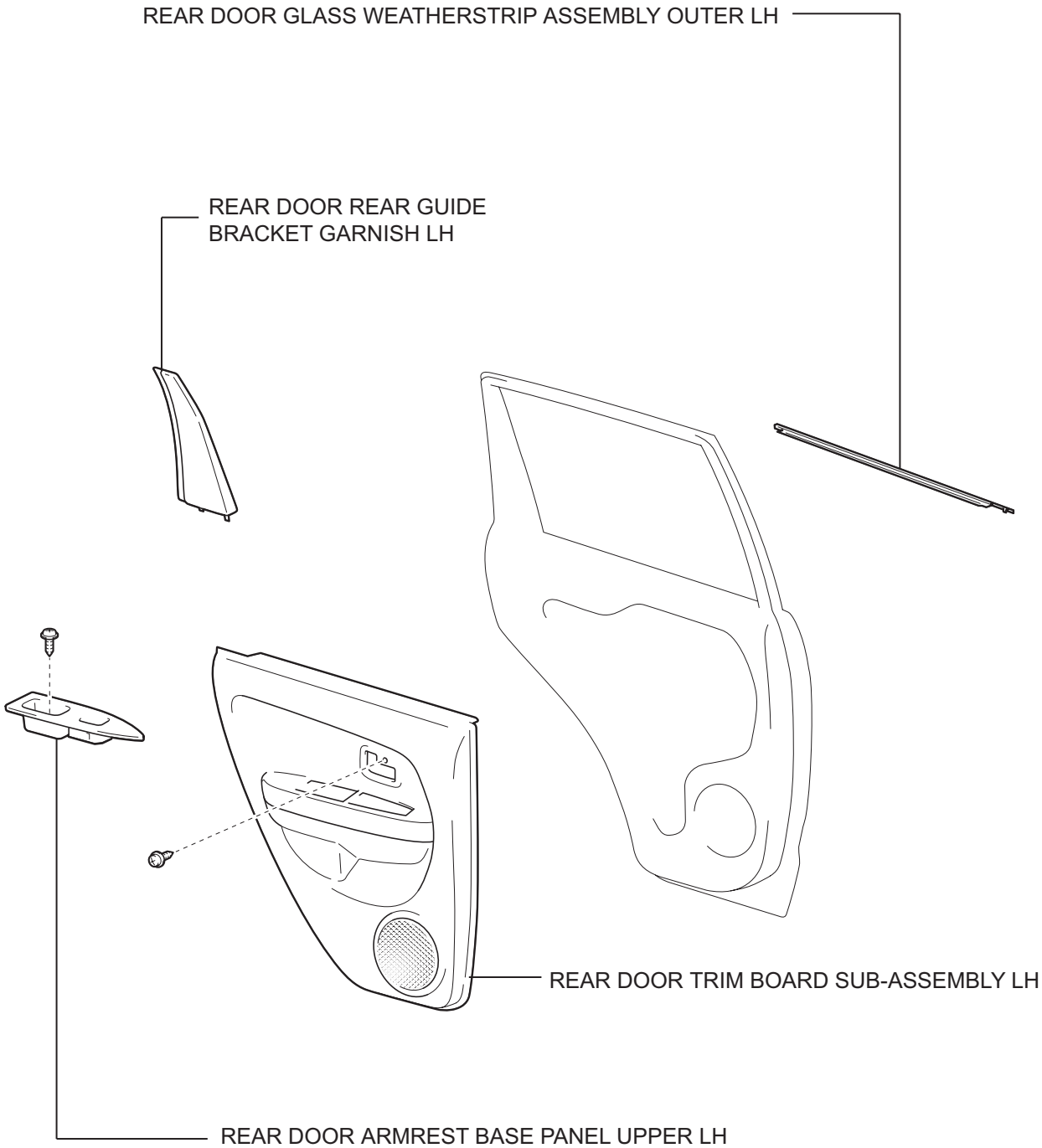
(a) Apply protective tape around the edges of the moulding.

(b) Adjust the position of the moulding so that the front and rear ends attach to the vehicle's 2 clips, and install the moulding.

(c) Remove the protective tape from the edges of the moulding.

REAR DOOR GLASS WEATHERSTRIP

COMPONENTS

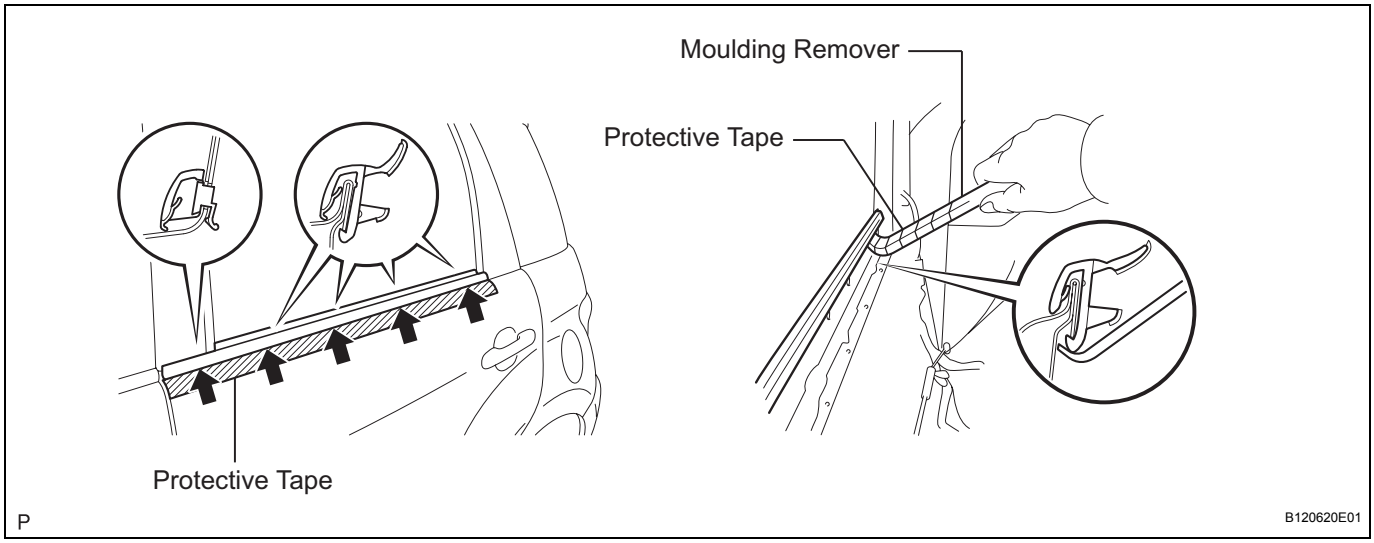


ET

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE REAR DOOR REAR GUIDE BRACKET GARNISH LH (See page ED-24)**
3. **REMOVE REAR DOOR ARMREST BASE PANEL UPPER LH (See page ED-24)**
4. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-24)**
5. **REMOVE REAR DOOR GLASS WEATHERSTRIP ASSEMBLY OUTER LH**
   (a) Put protective tape under the weatherstrip.
   (b) Using a moulding remover, detach the claws to remove the weatherstrip as shown in the illustration.
   HINT:
   Tape the remover tip before use.



ET

INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL SIDE MUDGUARD PROTECTOR LH

(a) Clean the side mudguard surface.

(1) Using a heat light, heat the side mudguard surface.

Standard heating temperature

Item	Specified Condition
Side mudguard	20 to 30°C (68 to 86°F)

NOTICE:
Do not heat the side mudguard excessively.

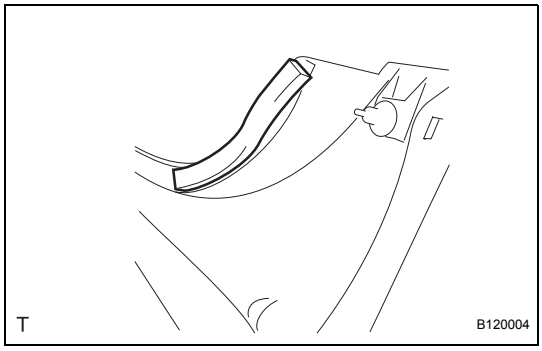
(2) Remove the double-sided tape from the side mudguard.

(3) Wipe off any tape adhesive residue with white gasoline.

(b) Install a new side mudguard protector.

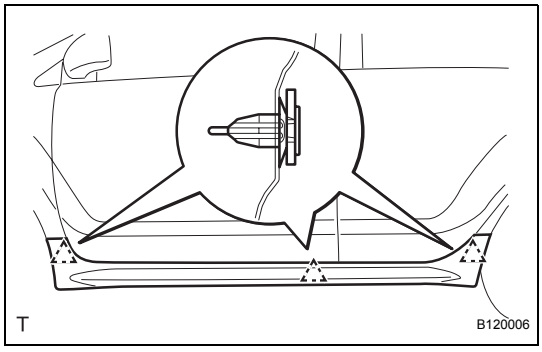
(1) Remove the peeling paper from the side mudguard protector.
HINT:
After removing the peeling paper, keep the exposed adhesive free from foreign matter.

(2) Install the side mudguard protector to the side mudguard as shown in the illustration.

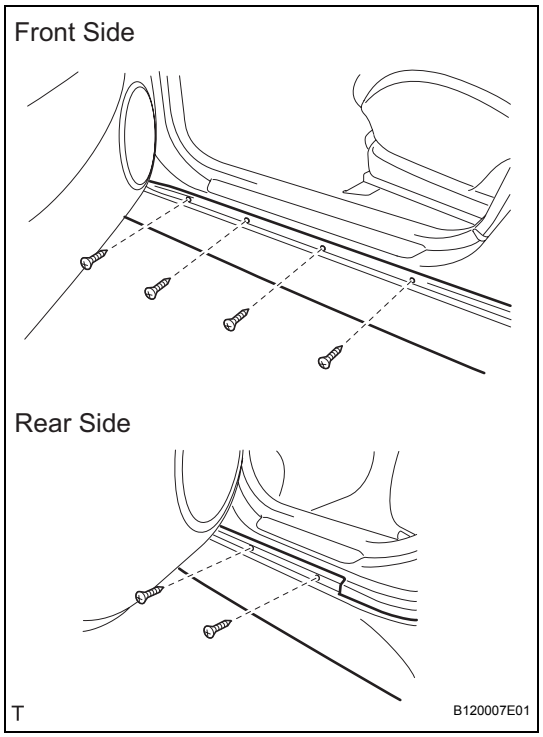


2. INSTALL SIDE MUDGUARD LH

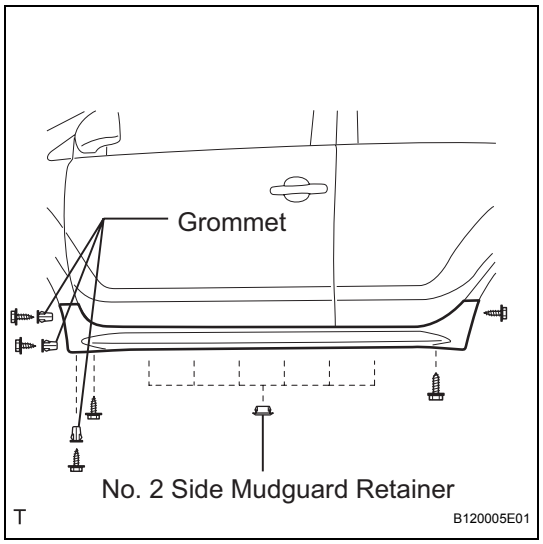
(a) Attach the 3 clips to install the side mudguard.



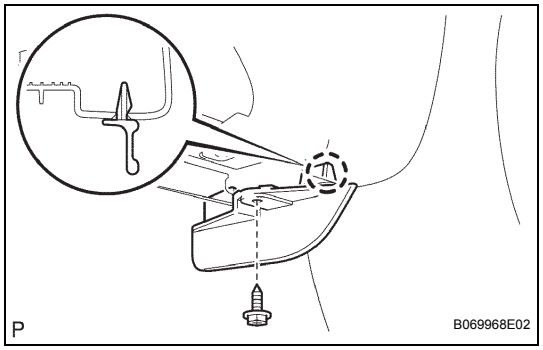
ET



(b) Install the 6 screws.



(c) Install the 3 grommets, 6 screws and 6 No. 2 side mudguard retainers.



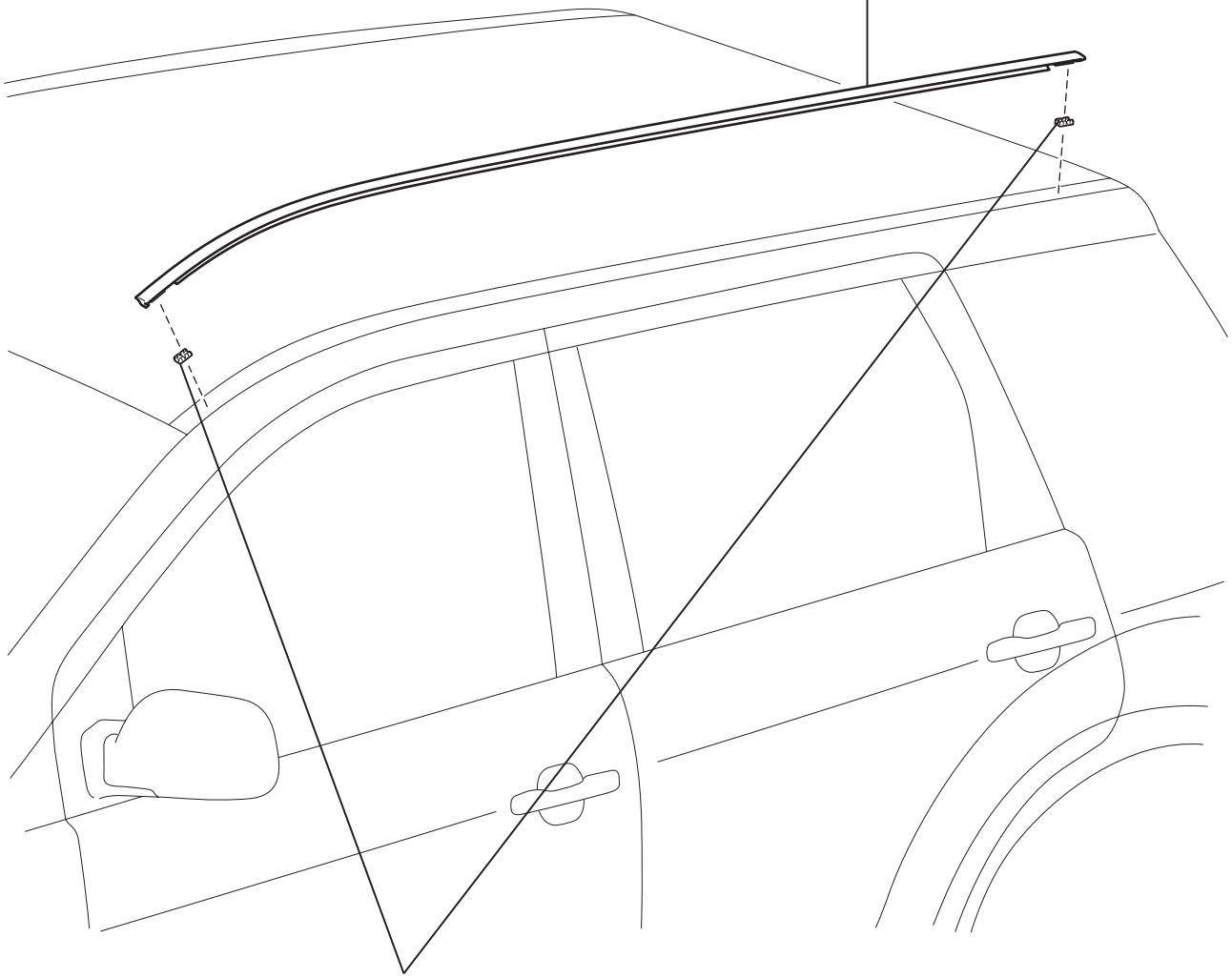
3. INSTALL REAR WHEEL HOUSE PLATE FRONT LH

(a) Install the plate with the screw.

ET

ROOF DRIP SIDE FINISH MOULDING

COMPONENTS



● Non-reusable part

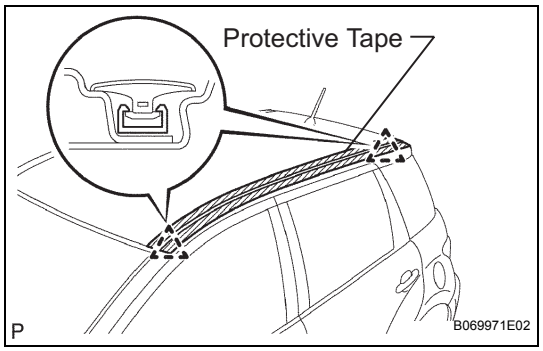
T

B120615E01

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. REMOVE ROOF DRIP SIDE FINISH MOULDING LH

(a) Apply protective tape around the edges of the moulding.

(b) Using a moulding remover, detach the clips both in the front and rear ends of the moulding, and then remove the moulding.

NOTICE:

- **Do not remove the clips.**
- **If the clips are damaged or removed accidentally, replace them.**

INSTALLATION

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- When installing the moulding, heat the moulding and vehicle body using a heat light.
  Standard heating temperature

Item	Specified Condition
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

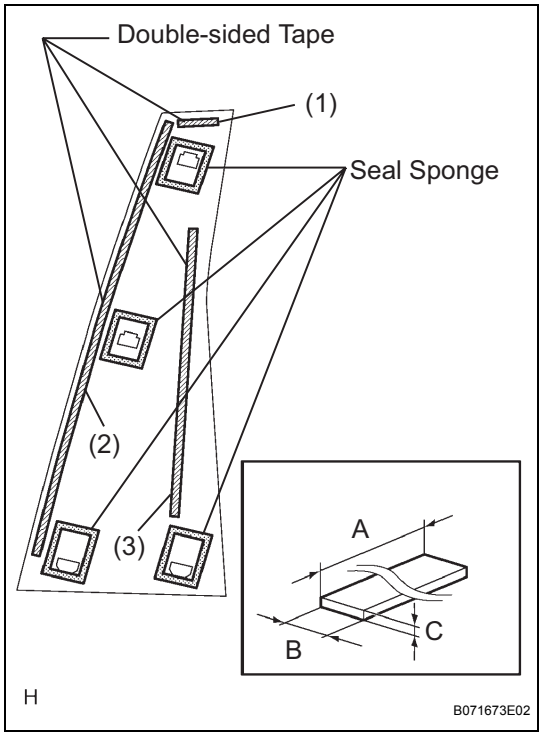
NOTICE:
Do not heat the vehicle body and moulding excessively.

1. INSTALL REAR DOOR WINDOW FRAME MOULDING REAR LH

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with white gasoline.

(b) If reusing the moulding:
Clean the moulding and install new double-sided tape.
  (1) Using a heat light, heat the moulding.
  (2) Remove the double-sided tape from the moulding.
  (3) Wipe off any tape adhesive residue with white gasoline.

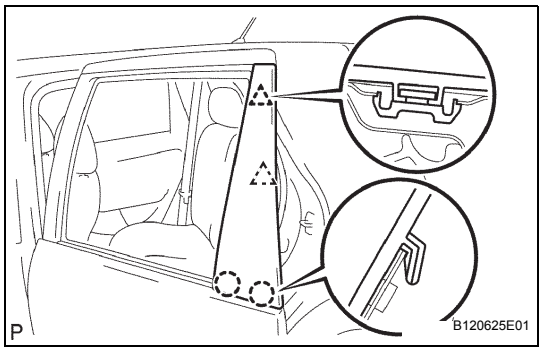
(4) Install new double-sided tape to the moulding.
NOTICE:
Install the double-sided tape exactly according to the specifications below.
Standard measurement



Area	Specified Condition
A	(1) 30.0 mm (1.181 in.) (2) 370.0 mm (14.567 in.) (3) 235.0 mm (9.252 in.)
B	5.0 mm (0.197 in.)
C	0.8 mm (0.031 in.)

(c) Install the moulding.
  (1) Using a heat light, heat the vehicle body and moulding.
  (2) Remove the peeling paper from the face of the name plate.
  NOTICE:
  After removing the peeling paper, keep the exposed adhesive free from foreign matter.

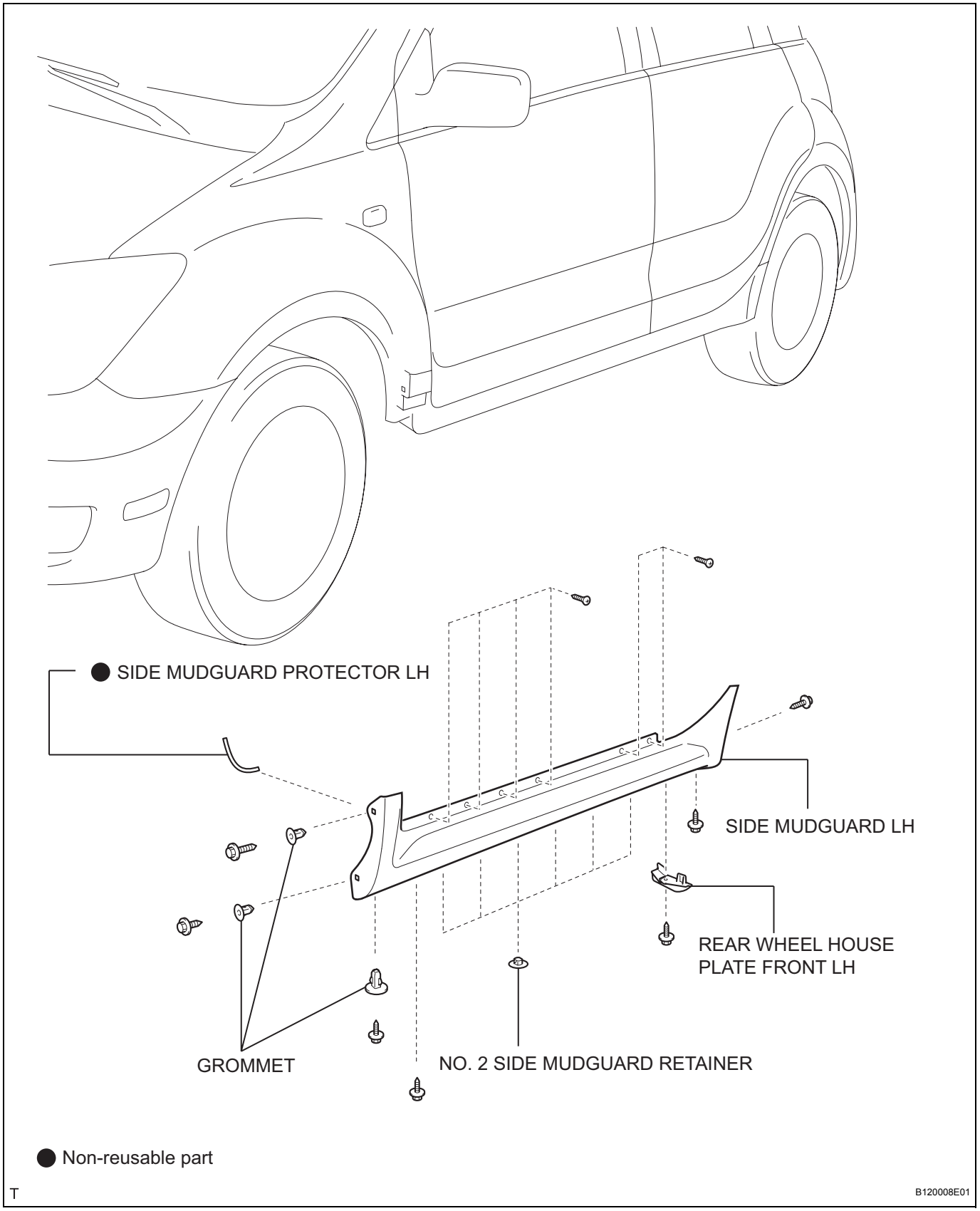
ET



(3) Attach the 2 claws and 2 clips to install the moulding.
NOTICE:
Do not apply excessive force to the moulding. Apply steady pressure with your thumbs.

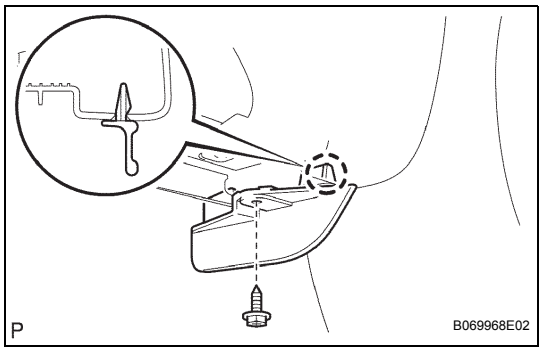
SIDE MUDGUARD

COMPONENTS

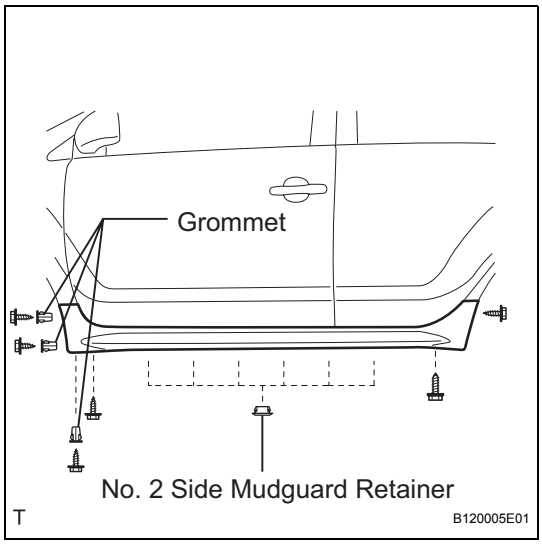


REMOVAL

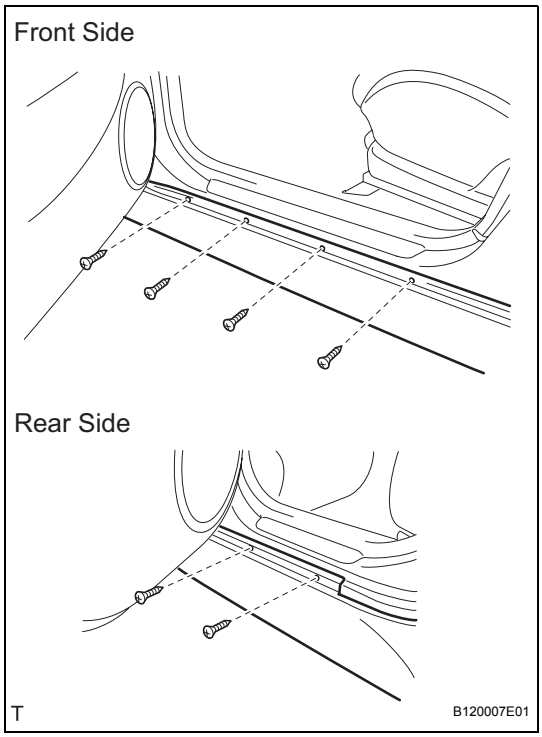
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.



1. REMOVE REAR WHEEL HOUSE PLATE FRONT LH
(a) Remove the screw.
(b) Detach the claw and remove the plate.

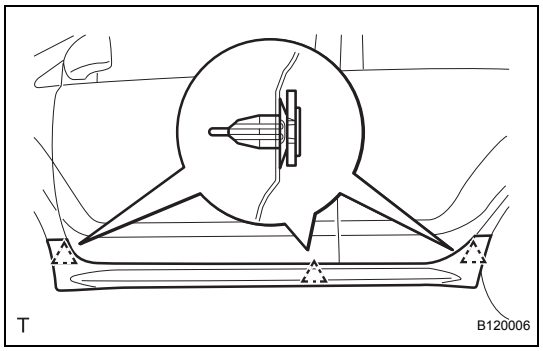


2. REMOVE SIDE MUDGUARD LH
(a) Using a screwdriver, remove the 6 No. 2 side mudguard retainers.
HINT:
Tape the screwdriver tip before use.
(b) Remove the 6 screws and 3 grommets.



(c) Remove the 6 screws.

ET

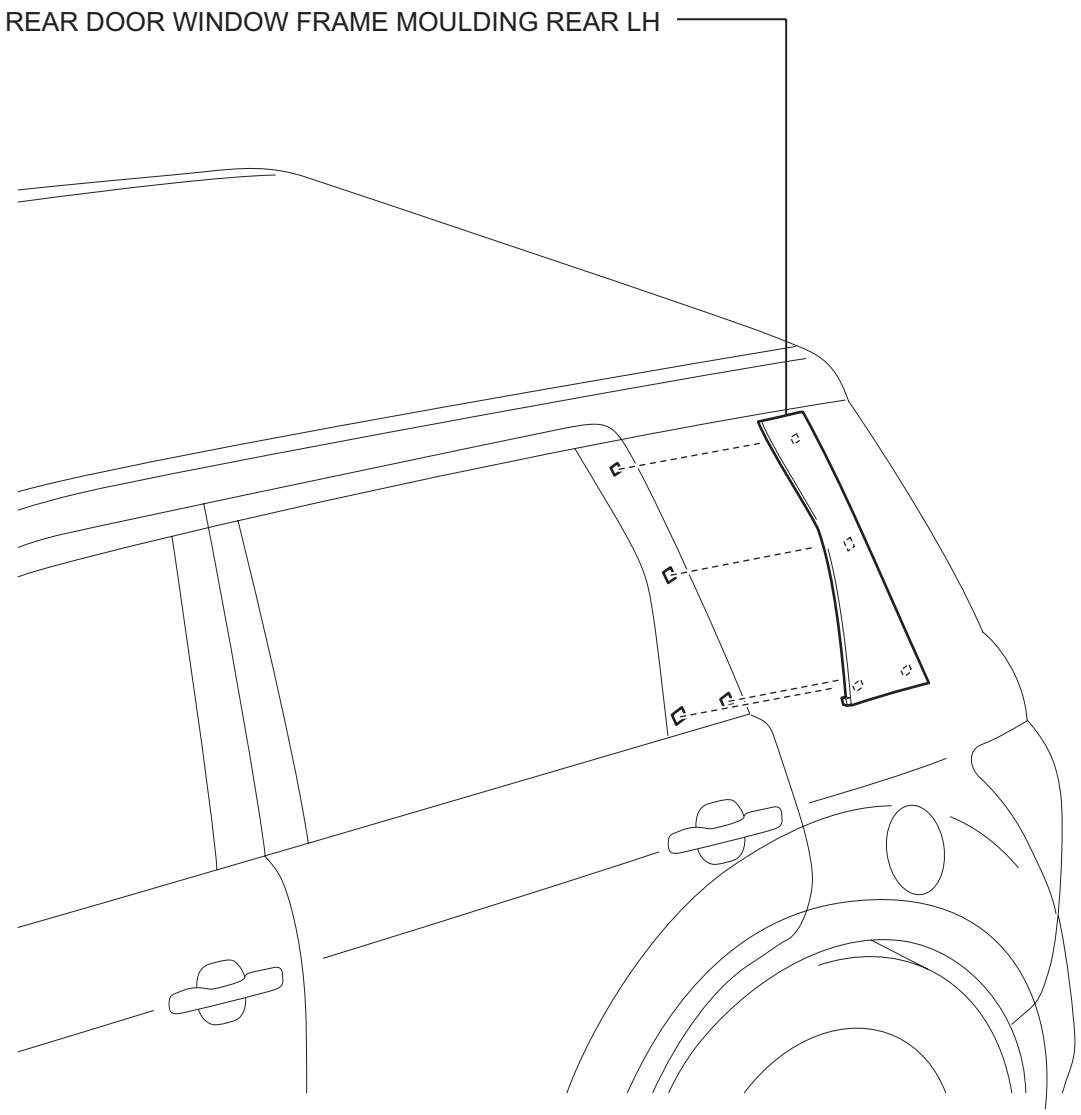


(d) Detach the 3 clips and remove the side mudguard.

3. REMOVE SIDE MUDGUARD PROTECTOR LH

REAR DOOR WINDOW FRAME MOULDING

COMPONENTS



T

B120614E01

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- When removing the moulding, heat the moulding and vehicle body using a heat light.

Standard heating temperature

Item	Specified Condition
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

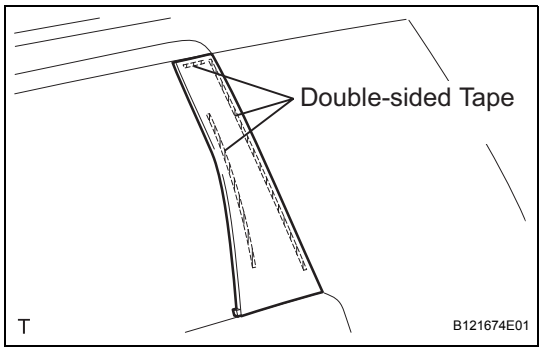
NOTICE:
Do not heat the vehicle body and moulding excessively.

1. REMOVE REAR DOOR WINDOW FRAME MOULDING REAR LH

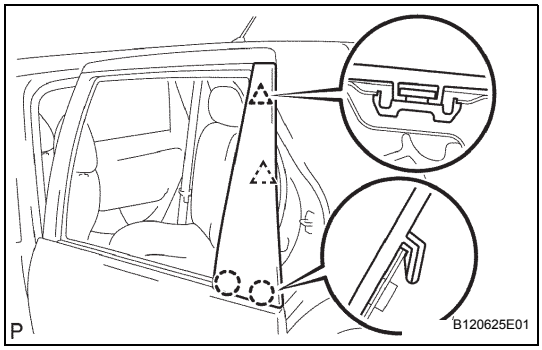
(a) Using a heat light, heat the moulding and vehicle body.

(b) Cut the double-sided tape that holds the moulding to the vehicle body with a knife.

NOTICE:
- **If reusing the moulding, take care not to damage the moulding.**
- **Be careful not to damage the vehicle body.**



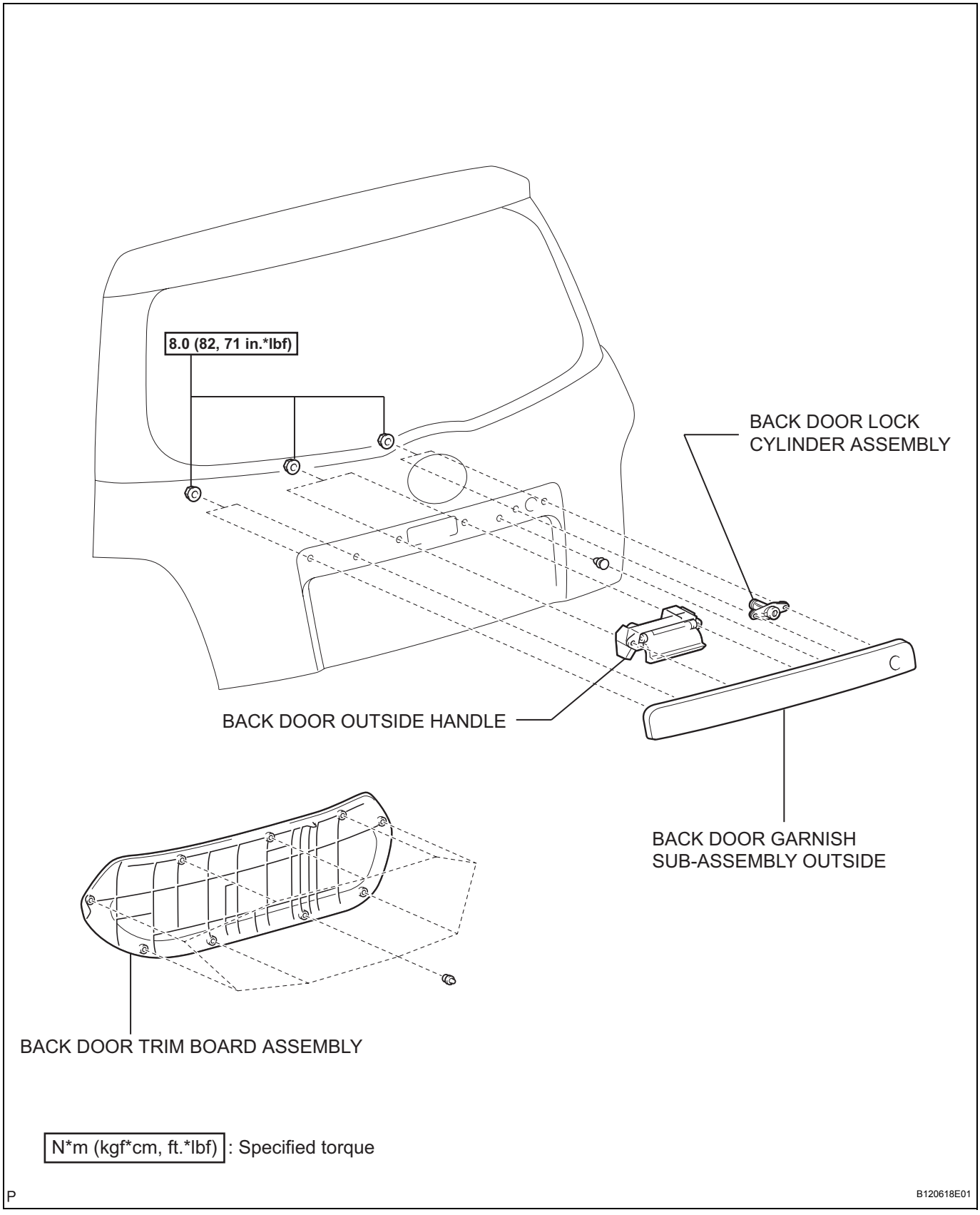
(c) Detach the 2 clips and 2 claws, and remove the moulding.



ET

BACK DOOR OUTSIDE GARNISH

COMPONENTS



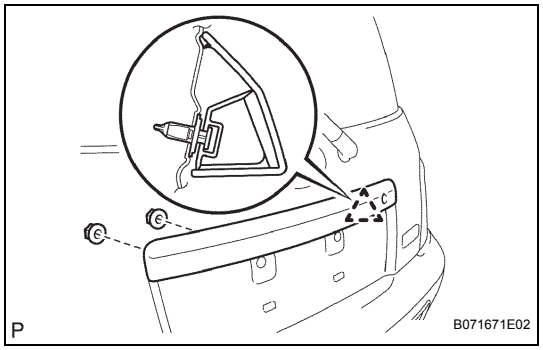
N*m (kgf*cm, ft.*lbf) : Specified torque

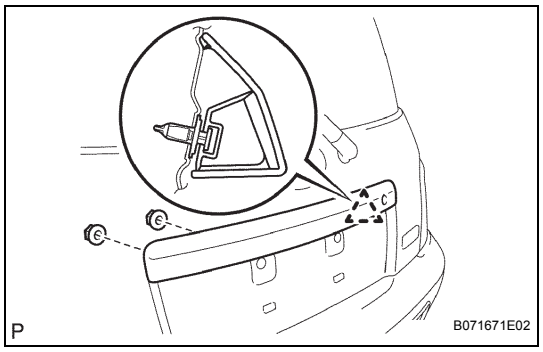
P

B120618E01

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE BACK DOOR TRIM BOARD ASSEMBLY (See page ED-36)**
3. **REMOVE BACK DOOR OUTSIDE HANDLE (See page ED-37)**
4. **REMOVE BACK DOOR LOCK CYLINDER ASSEMBLY (See page ED-37)**
5. **REMOVE BACK DOOR GARNISH SUB-ASSEMBLY OUTSIDE**
   (a) Remove the 2 nuts.
   (b) Detach the clip and remove the garnish.



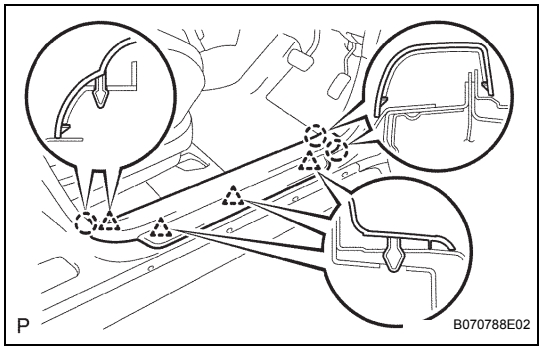


INSTALLATION

1. **INSTALL BACK DOOR GARNISH SUB-ASSEMBLY OUTSIDE**
   (a) Attach the clip and install the garnish with the 2 nuts.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
2. **INSTALL BACK DOOR LOCK CYLINDER ASSEMBLY (See page ED-40)**
3. **INSTALL BACK DOOR OUTSIDE HANDLE (See page ED-40)**
4. **INSTALL BACK DOOR TRIM BOARD ASSEMBLY (See page ED-40)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

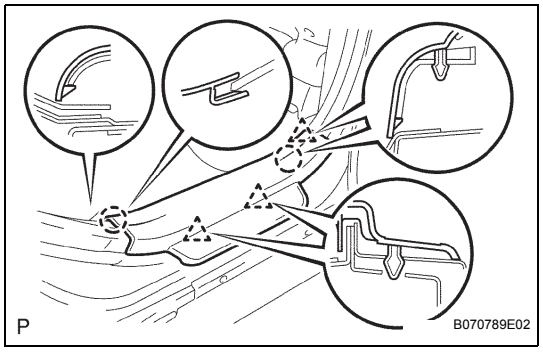
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



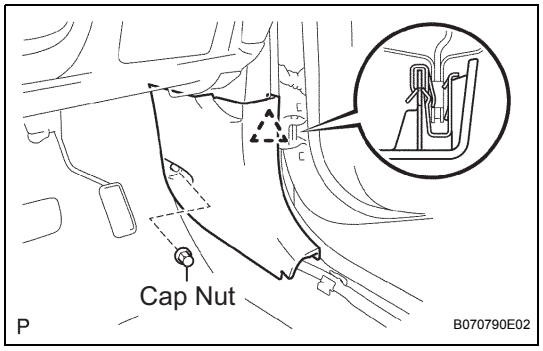
2. **REMOVE FRONT DOOR SCUFF PLATE RH**
   (a) Using a screwdriver, detach the 3 claws and 4 clips, and remove the scuff plate.
   HINT:
   Tape the screwdriver tip before use.

3. **REMOVE FRONT DOOR SCUFF PLATE LH**
   HINT:
   Use the same procedures described for the RH side.



4. **REMOVE REAR DOOR SCUFF PLATE RH**
   (a) Using a screwdriver, detach the 2 claws and 3 clips, and remove the scuff plate.
   HINT:
   Tape the screwdriver tip before use.

5. **REMOVE REAR DOOR SCUFF PLATE LH**
   HINT:
   Use the same procedures described for the RH side.



6. **REMOVE COWL SIDE TRIM BOARD RH**
   (a) Remove the cap nut.
   (b) Using a screwdriver, detach the clip and remove the trim board.
   HINT:
   Tape the screwdriver tip before use.

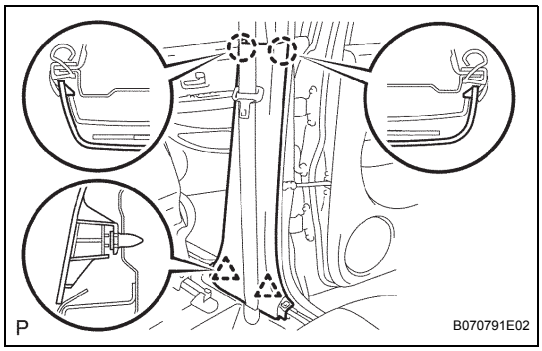
7. **REMOVE COWL SIDE TRIM BOARD LH**
   HINT:
   Use the same procedures described for the RH side.

8. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**

9. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH**

10. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**

11. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**



12. **REMOVE CENTER PILLAR GARNISH LOWER RH**
    (a) Remove the floor anchor cover.
    (b) Remove the bolt and front seat outer belt floor anchor.
    (c) Detach the 2 clips and 2 claws, and remove the center pillar garnish.

13. **REMOVE CENTER PILLAR GARNISH LOWER LH**
    HINT:
    Use the same procedures described for the RH side.

14. **REMOVE CENTER PILLAR GARNISH UPPER RH**
    (a) Remove the shoulder anchor cover.
    (b) Remove the bolt and front seat outer belt shoulder anchor.
    (c) w/o Curtain shield airbag:
    Detach the claw and clip, and remove the center pillar garnish by pulling it up.
    (d) w/ Curtain shield airbag:
    Detach the 2 clips and remove the center pillar garnish.

15. **REMOVE CENTER PILLAR GARNISH UPPER LH**
    HINT:
    Use the same procedures described for the RH side.

16. **REMOVE REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-12)**

17. **REMOVE REAR SEATBACK ASSEMBLY RH (See page SE-12)**

18. **REMOVE REAR SEATBACK ASSEMBLY LH (See page SE-12)**

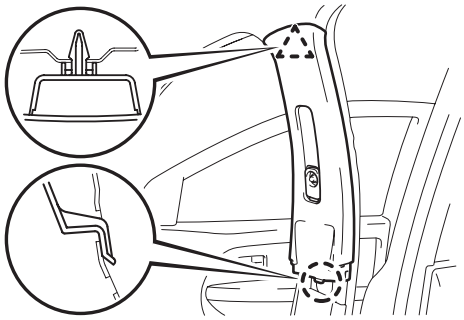
19. **REMOVE TONNEAU COVER ASSEMBLY**

20. **REMOVE NO. 1 DECK BOARD**

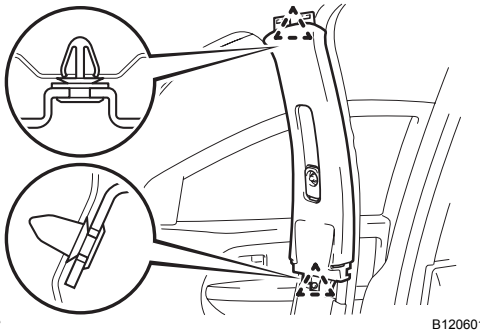
21. **REMOVE DECK FLOOR BOX RH**
    (a) Remove the 2 bolts and floor box.

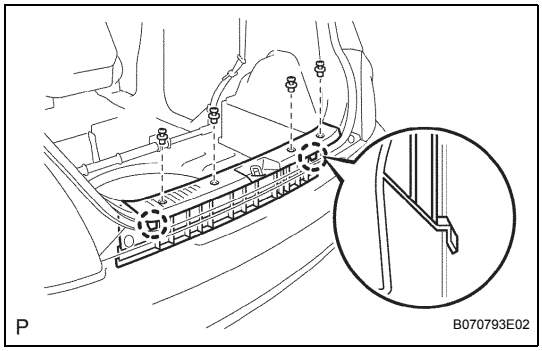
22. **REMOVE SPARE WHEEL COVER ASSEMBLY**

w/o Curtain Shield Airbag



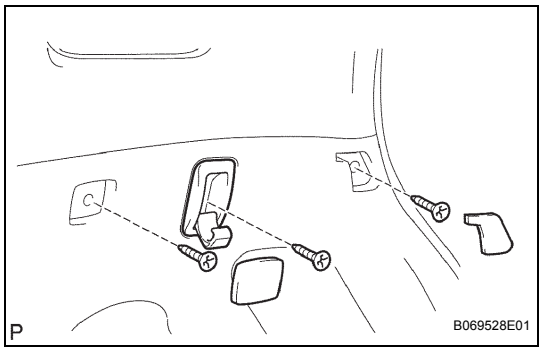
w/ Curtain Shield Airbag





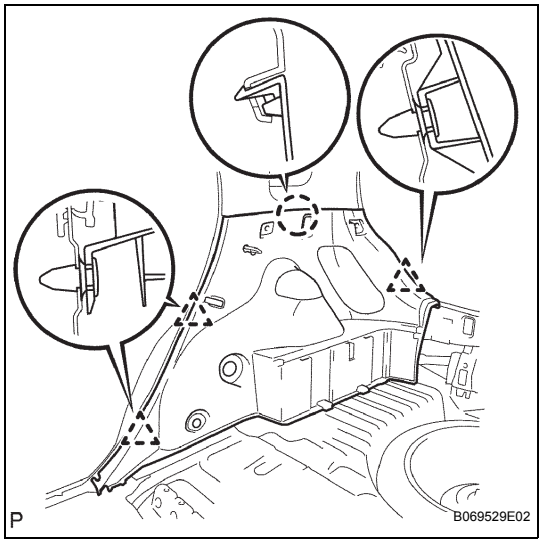
23. **REMOVE DECK TRIM COVER REAR**
    (a) Remove the 4 clips.
    (b) Detach the 2 claws and remove the trim cover.

24. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY**
    (a) Remove the 4 bolts and anchor bracket.



25. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH

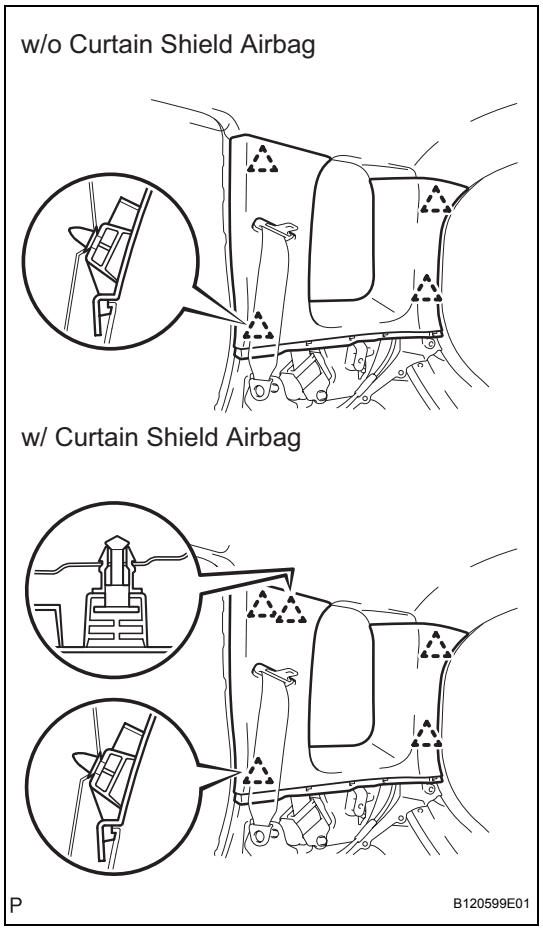
(a) Remove the 2 covers and 2 screws.
(b) Remove the screw and compartment trim hook.
(c) Remove the bolt and seatback hinge.
(d) Remove the bolt and rear seat 3 point type belt floor anchor.



(e) Using a screwdriver, detach the 3 clips and claw, and remove the side panel.
HINT:
Tape the screwdriver tip before use.

26. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH

HINT:
Use the same procedures described for the RH side.



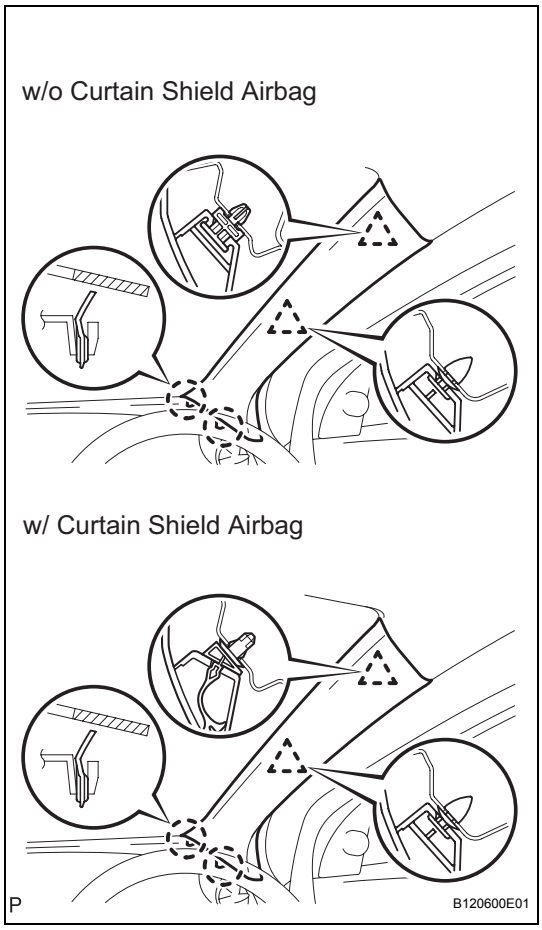
27. REMOVE ROOF SIDE GARNISH INNER RH

(a) w/o Curtain shield airbag:
Using a screwdriver, detach the 4 clips and remove the side garnish.
HINT:
Tape the screwdriver tip before use.
(b) w/ Curtain shield airbag:
Using a screwdriver, detach the 5 clips and remove the side garnish.
HINT:
Tape the screwdriver tip before use.

28. REMOVE ROOF SIDE GARNISH INNER LH

HINT:
Use the same procedures described for the RH side.

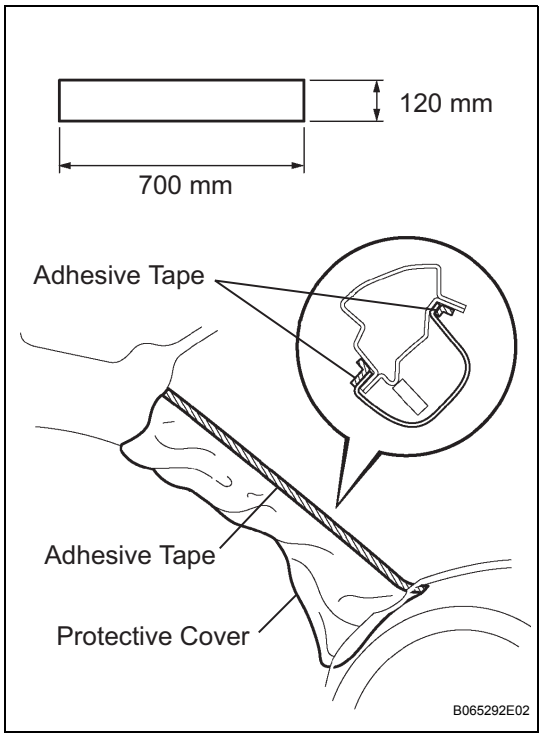
IR



29. REMOVE FRONT PILLAR GARNISH RH

(a) Using a screwdriver, detach the 2 clips.
HINT:
Tape the screwdriver tip before use.

(b) Detach the 2 claws by pulling up the garnish and remove the garnish.



(c) w/ Curtain shield airbag:
Protect the curtain shield airbag.

(1) Thoroughly cover the airbag with cloth or nylon that is 700 mm (27.56 in.) x 120 mm (4.72 in.) and fix the ends of the cover with adhesive tape, as shown in the illustration.
NOTICE:
Cover the curtain shield airbag with a protective cover as soon as the front pillar garnish is removed.

30. REMOVE FRONT PILLAR GARNISH LH

HINT:
Use the same procedures described for the RH side.

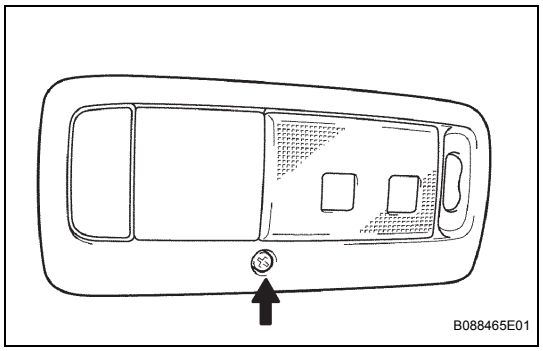
31. REMOVE RH VISOR ASSEMBLY

(a) Remove the 2 screws and visor.

32. REMOVE LH VISOR ASSEMBLY

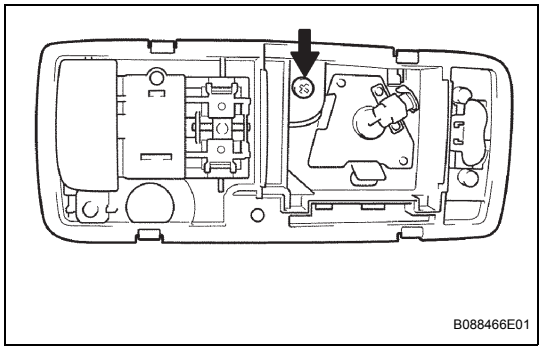
(a) Remove the 2 screws and visor.

IR

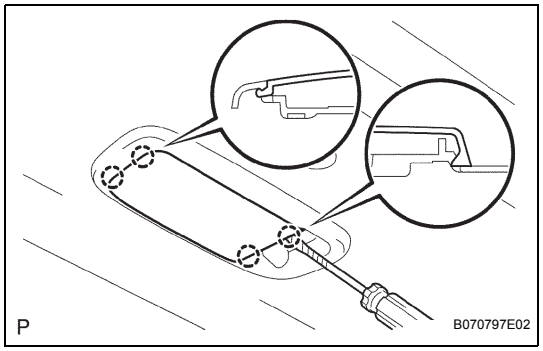


33. REMOVE MAP LIGHT ASSEMBLY

(a) Remove the screw and lens cover.

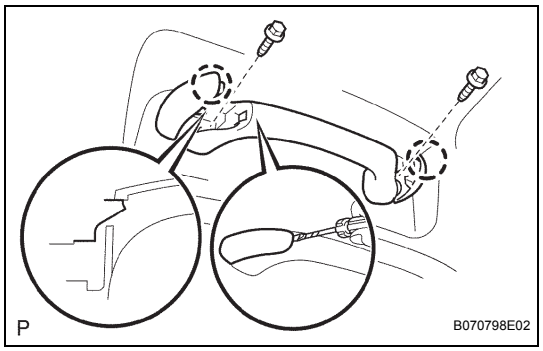


(b) Remove the screw and light.
(c) Disconnect the map light connector.



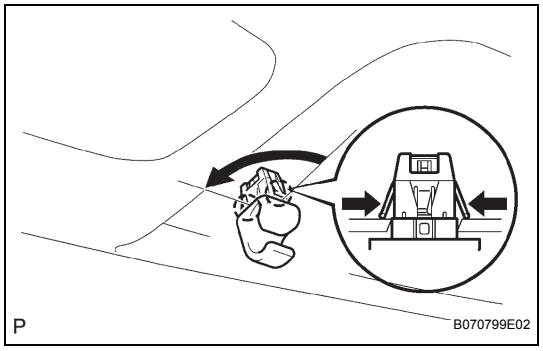
34. REMOVE NO. 1 ROOM LIGHT ASSEMBLY

(a) Using a screwdriver, detach the 4 claws and remove the lens cover.
HINT:
Tape the screwdriver tip before use.
(b) Remove the 2 screws.
(c) Disconnect the room light connector and remove the light.



35. REMOVE ASSIST GRIP ASSEMBLY

(a) Using a screwdriver, detach the 2 claws and remove the assist grip covers.
HINT:
Tape the screwdriver tip before use.
(b) Remove the 2 bolts and assist grip.

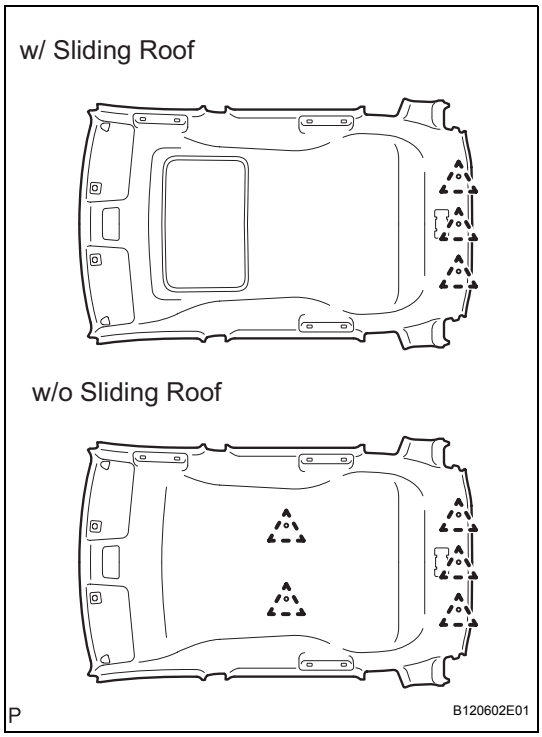


36. REMOVE VISOR HOLDER

(a) Remove the visor holder by turning it counterclockwise.

37. REMOVE SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof)

IR



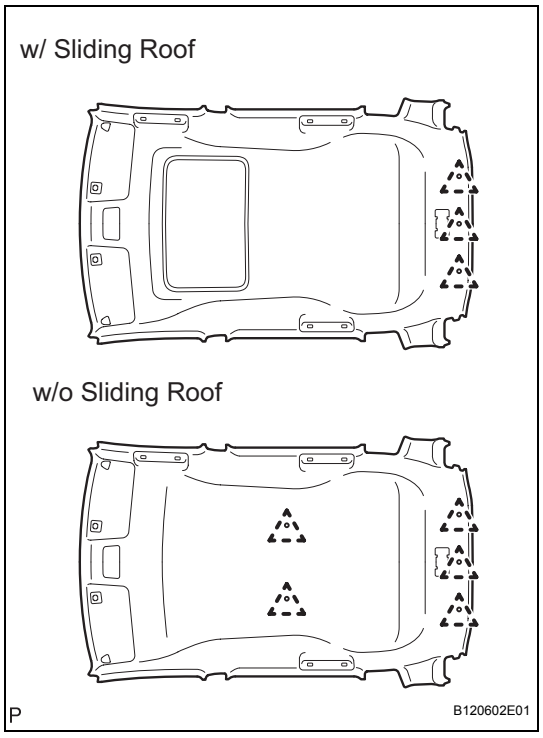
38. REMOVE ROOF HEADLINING ASSEMBLY

(a) w/ Sliding roof:
Using a clip remover, remove the 3 clips and headlining.

(b) w/o Sliding roof:
Using a clip remover, remove the 5 clips and headlining.

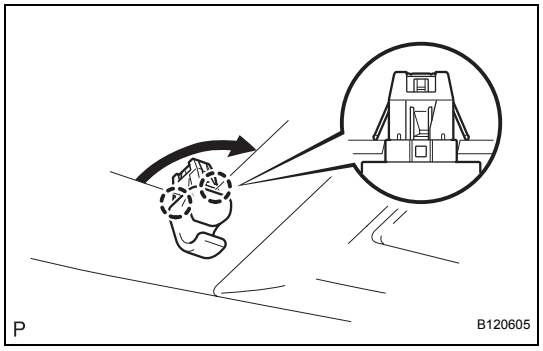
INSTALLATION

HINT:
A bolt without a torque specification is shown in the standard bolt chart (see page SS-2).

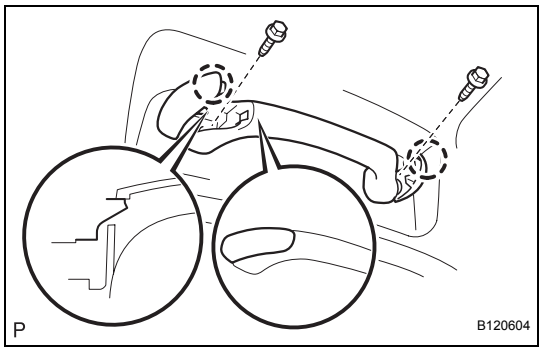


1. **INSTALL ROOF HEADLINING ASSEMBLY**
   (a) w/ Sliding roof:
   Install the headlining with the 3 clips.
   (b) w/o Sliding roof:
   Install the headlining with the 5 clips.

2. **INSTALL SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof)**

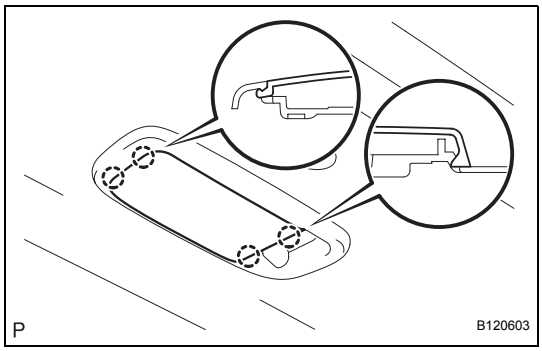


3. **INSTALL VISOR HOLDER**
   (a) Install the visor holder by turning it clockwise.



4. **INSTALL ASSIST GRIP ASSEMBLY**
   (a) Install the assist grip with the 2 bolts.
   (b) Attach the 2 claws to install the assist grip covers.

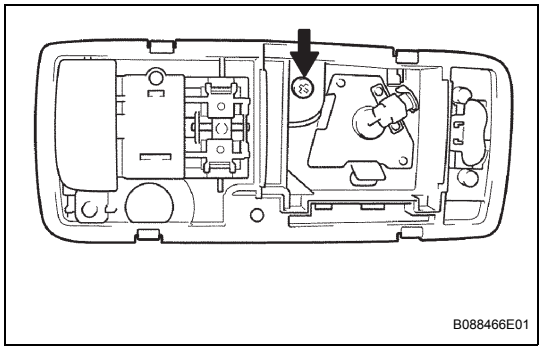
5. **INSTALL NO. 1 ROOM LIGHT ASSEMBLY**
   (a) Connect the room light connector.
   (b) Install the light with the 2 screws.



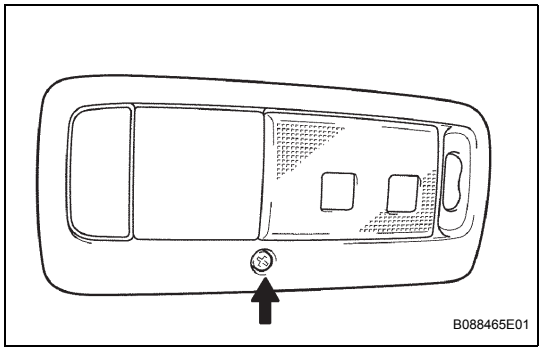
(c) Attach the 4 claws to install the lens cover.

6. INSTALL MAP LIGHT ASSEMBLY

(a) Connect the map light connector.



(b) Install the light with the screw.



(c) Install the lens cover with the screw.

7. INSTALL RH VISOR ASSEMBLY

(a) Install the visor with the 2 screws.

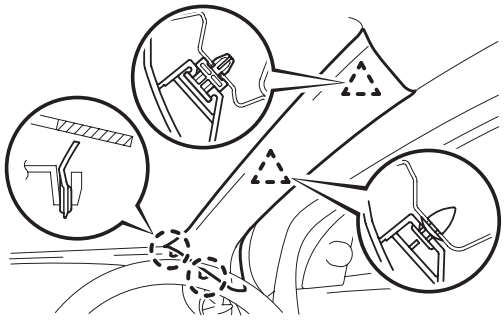
8. INSTALL LH VISOR ASSEMBLY

(a) Install the visor with the 2 screws.

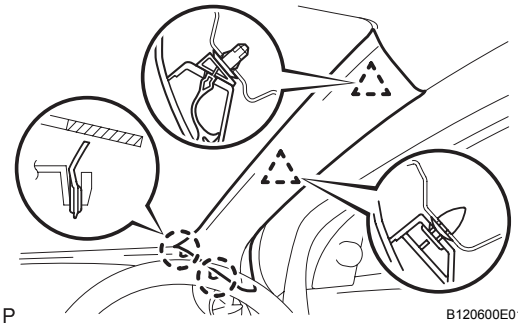
9. INSTALL FRONT PILLAR GARNISH RH

(a) w/ Curtain shield airbag:
Remove the protective cover.

w/o Curtain Shield Airbag



w/ Curtain Shield Airbag



P B120600E01

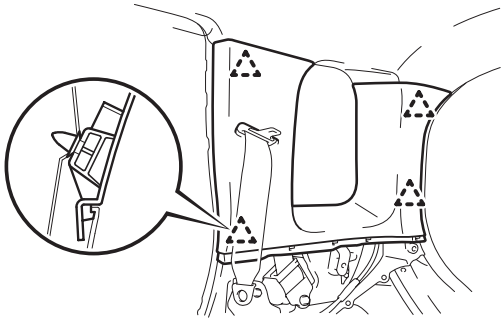
(b) Attach the 2 claws and 2 clips, and install the garnish.

10. INSTALL FRONT PILLAR GARNISH LH

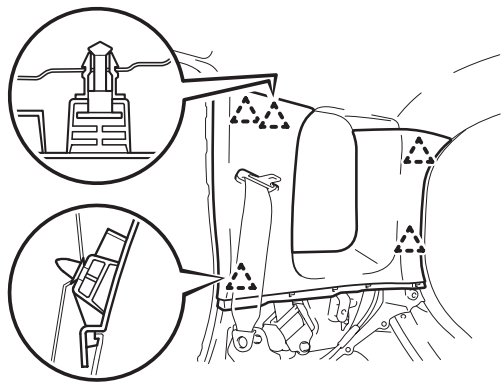
HINT:

Use the same procedures described for the RH side.

w/o Curtain Shield Airbag



w/ Curtain Shield Airbag



P B120599E01

11. INSTALL ROOF SIDE GARNISH INNER RH

(a) w/o Curtain shield airbag:
Attach the 4 clips to install the side garnish.

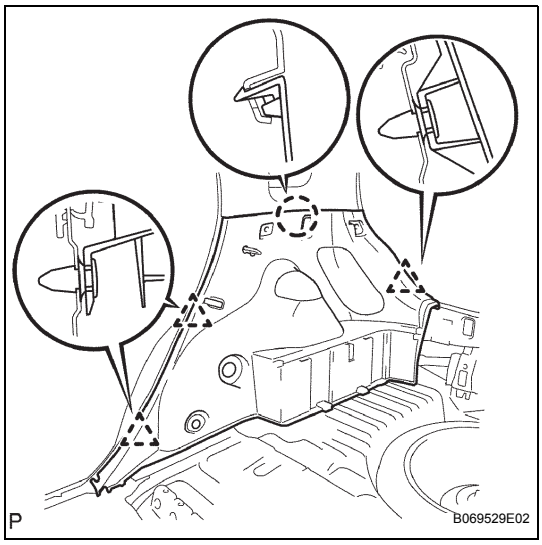
(b) w/ Curtain shield airbag:
Attach the 5 clips to install the side garnish.

12. INSTALL ROOF SIDE GARNISH INNER LH

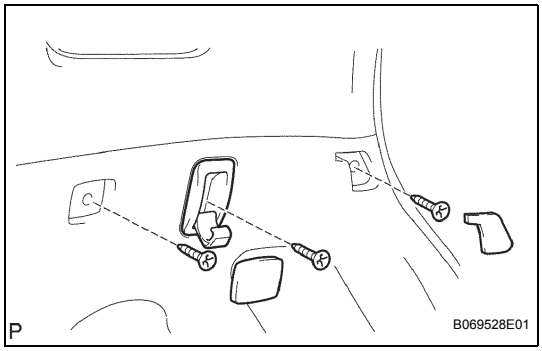
HINT:

Use the same procedures described for the RH side.

IR



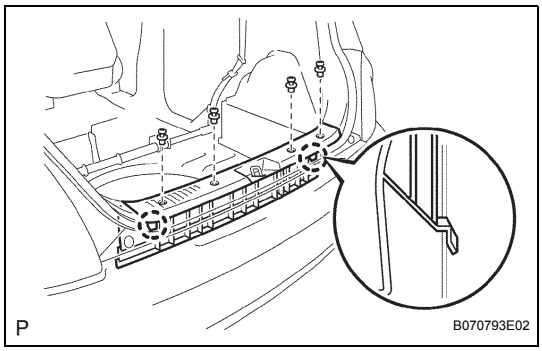
13. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH**
    (a) Attach the 3 clips and claw, and install the side panel.
    (b) Install the rear seat 3 point type belt floor anchor with the bolt.
    Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
    (c) Install the seatback hinge with the bolt.
    Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)



    (d) Install the compartment trim hook with the screw.
    (e) Install the 2 screws and 2 covers.

14. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH**
    HINT:
    Use the same procedures described for the RH side.

15. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY**
    (a) Install the anchor bracket with the 4 bolts.
    Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)



16. **INSTALL DECK TRIM COVER REAR**
    (a) Attach the 2 claws to install the trim cover.
    (b) Install the 4 clips.

17. **INSTALL SPARE WHEEL COVER ASSEMBLY**

18. **INSTALL DECK FLOOR BOX RH**
    (a) Install the floor box with the 2 bolts.

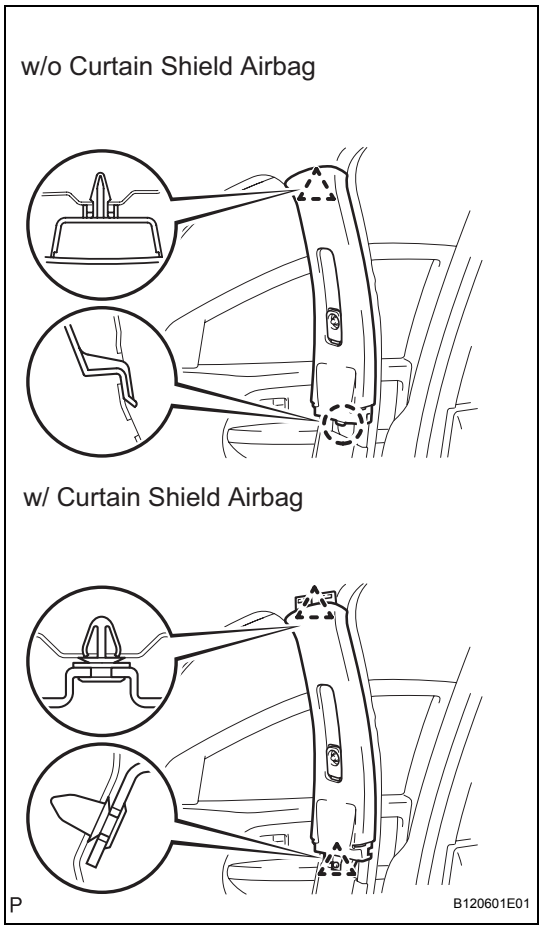
19. **INSTALL NO. 1 DECK BOARD**

20. **INSTALL TONNEAU COVER ASSEMBLY**

21. **INSTALL REAR SEATBACK ASSEMBLY RH (See page SE-17)**

22. **INSTALL REAR SEATBACK ASSEMBLY LH (See page SE-17)**

23. **INSTALL REAR SEAT CUSHION WITH COVER PAD SUB-ASSEMBLY (See page SE-17)**



24. INSTALL CENTER PILLAR GARNISH UPPER RH

(a) w/o Curtain shield airbag:
Attach the claw and clip to install the center pillar garnish.

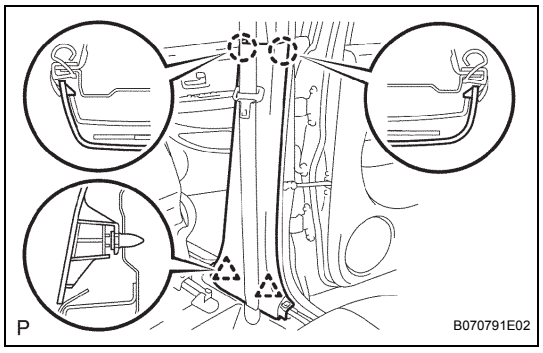
(b) w/ Curtain shield airbag:
Attach the 2 clips to install the center pillar garnish.

(c) Install the front seat outer belt shoulder anchor with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

(d) Install the shoulder anchor cover.

25. INSTALL CENTER PILLAR GARNISH UPPER LH

HINT:
Use the same procedures described for the RH side.



26. INSTALL CENTER PILLAR GARNISH LOWER RH

(a) Attach the 2 clips and 2 claws to install the center pillar garnish.

(b) Install the front seat outer belt floor anchor with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

(c) Install the floor anchor cover.

27. INSTALL CENTER PILLAR GARNISH LOWER LH

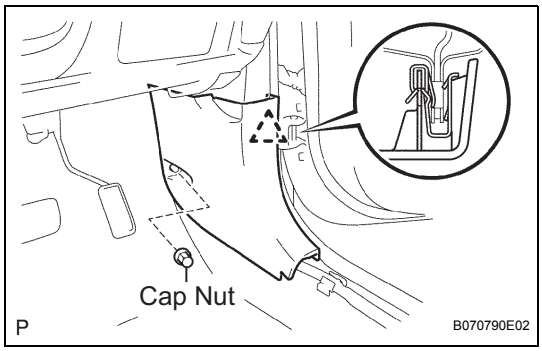
HINT:
Use the same procedures described for the RH side.

28. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH

29. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH

30. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH

31. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH



32. INSTALL COWL SIDE TRIM BOARD RH

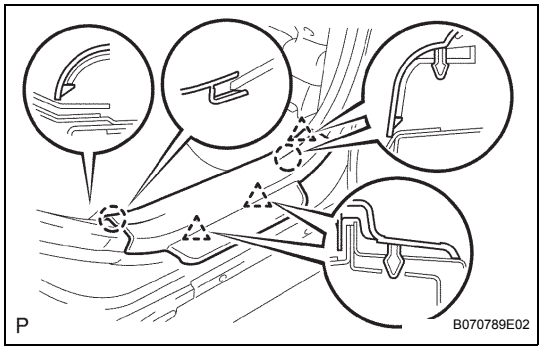
(a) Attach the clip to install the trim board.

(b) Install the cap nut.

33. INSTALL COWL SIDE TRIM BOARD LH

HINT:

Use the same procedures described for the RH side.



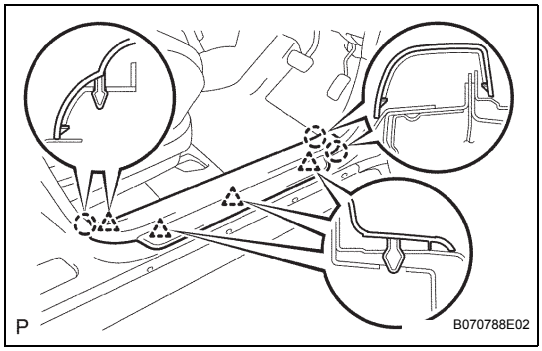
34. INSTALL REAR DOOR SCUFF PLATE RH

(a) Attach the 2 claws and 3 clips to install the scuff plate.

35. INSTALL REAR DOOR SCUFF PLATE LH

HINT:

Use the same procedures described for the RH side.



36. INSTALL FRONT DOOR SCUFF PLATE RH

(a) Attach the 3 claws and 4 clips to install the scuff plate.

37. INSTALL FRONT DOOR SCUFF PLATE LH

HINT:

Use the same procedures described for the RH side.

38. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

39. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).

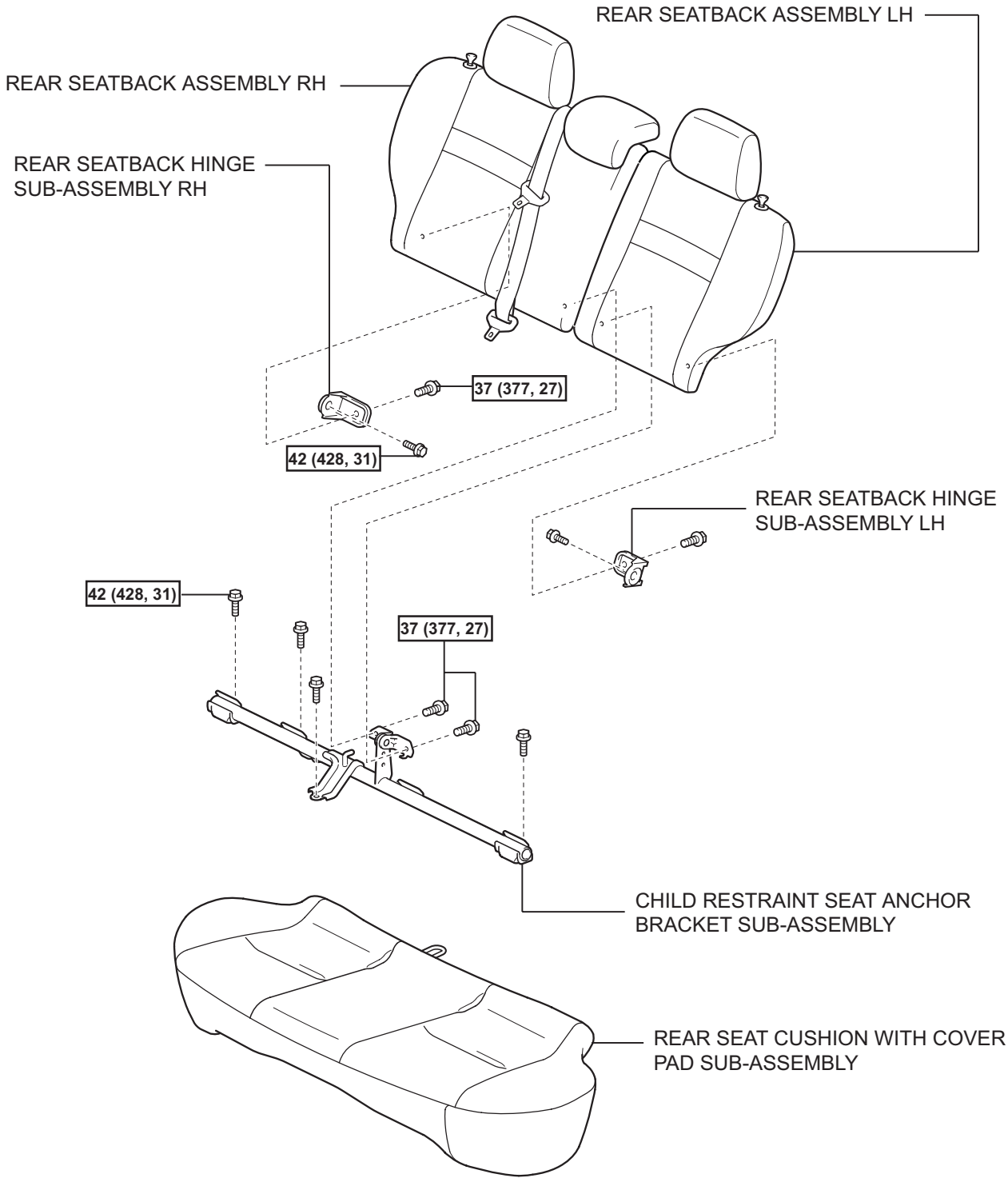
NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

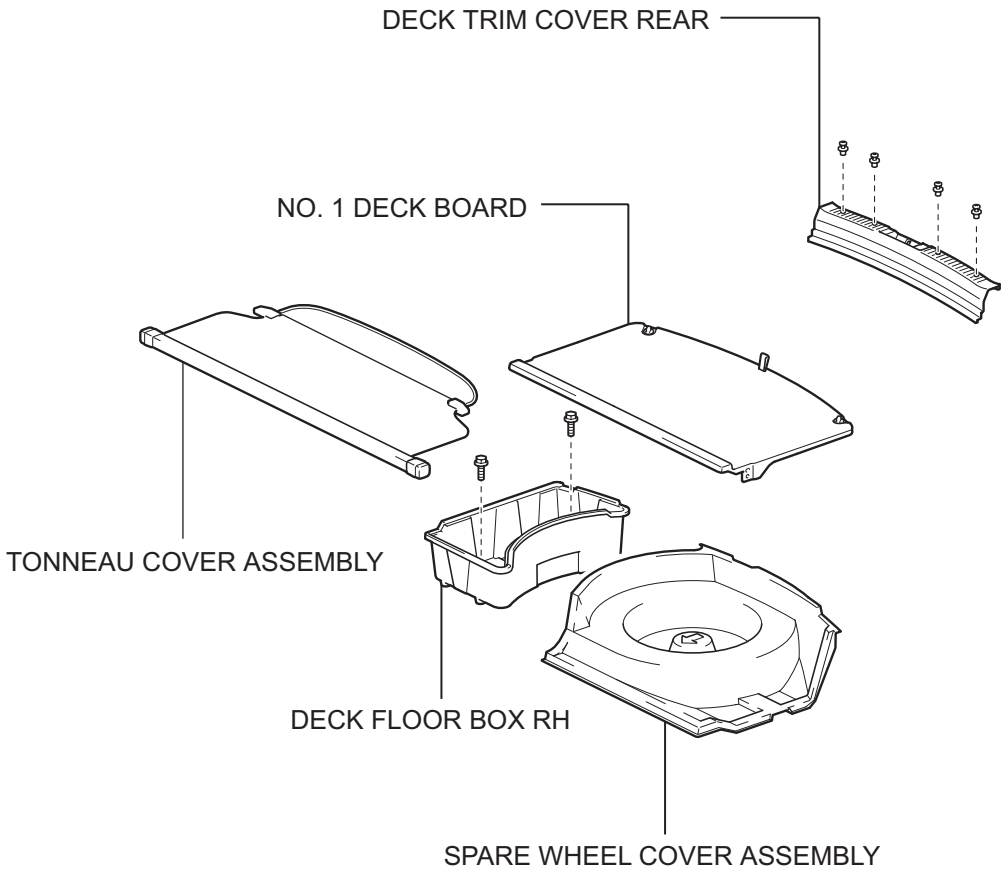
IR

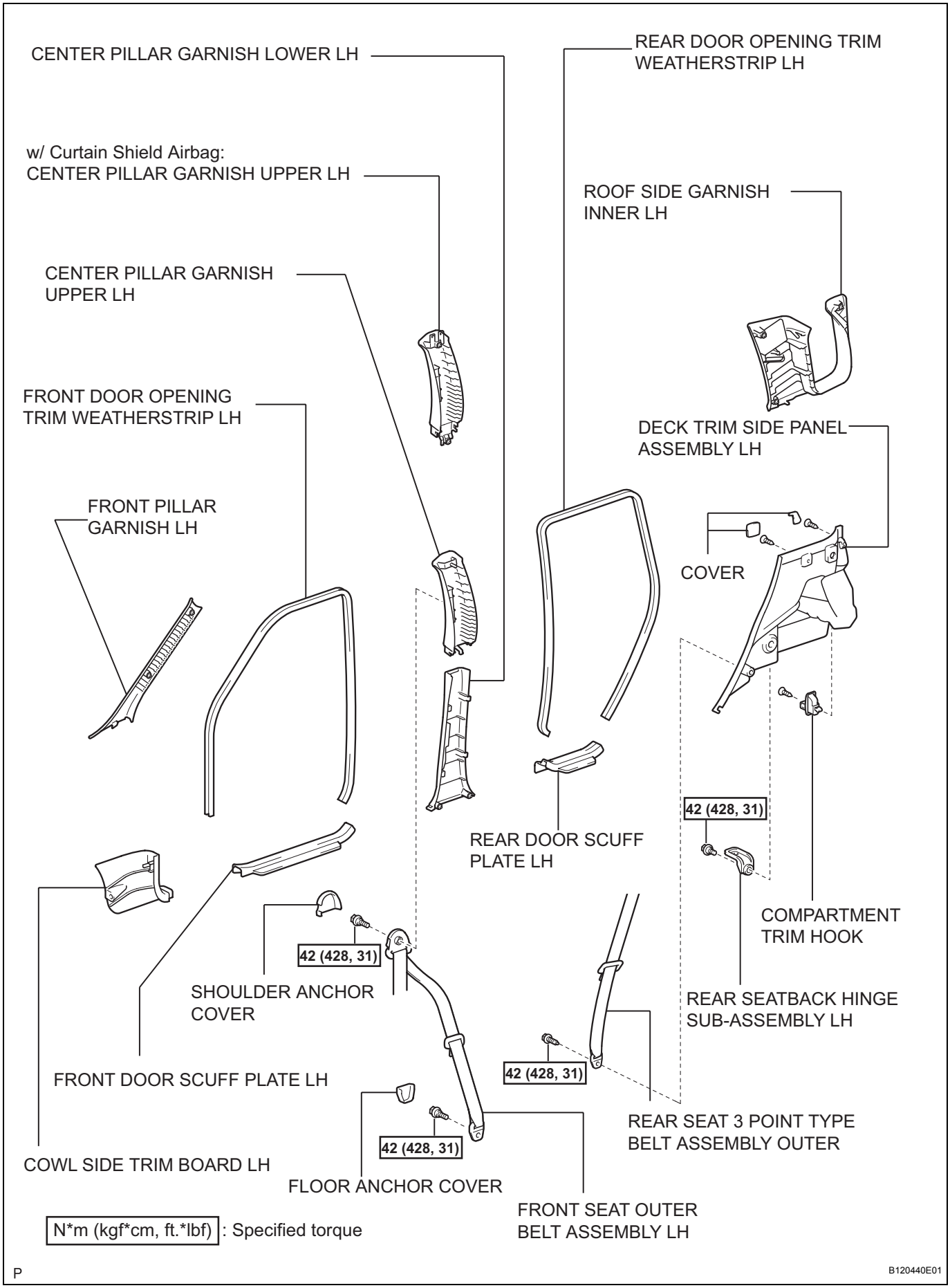
ROOF HEADLINING

COMPONENTS

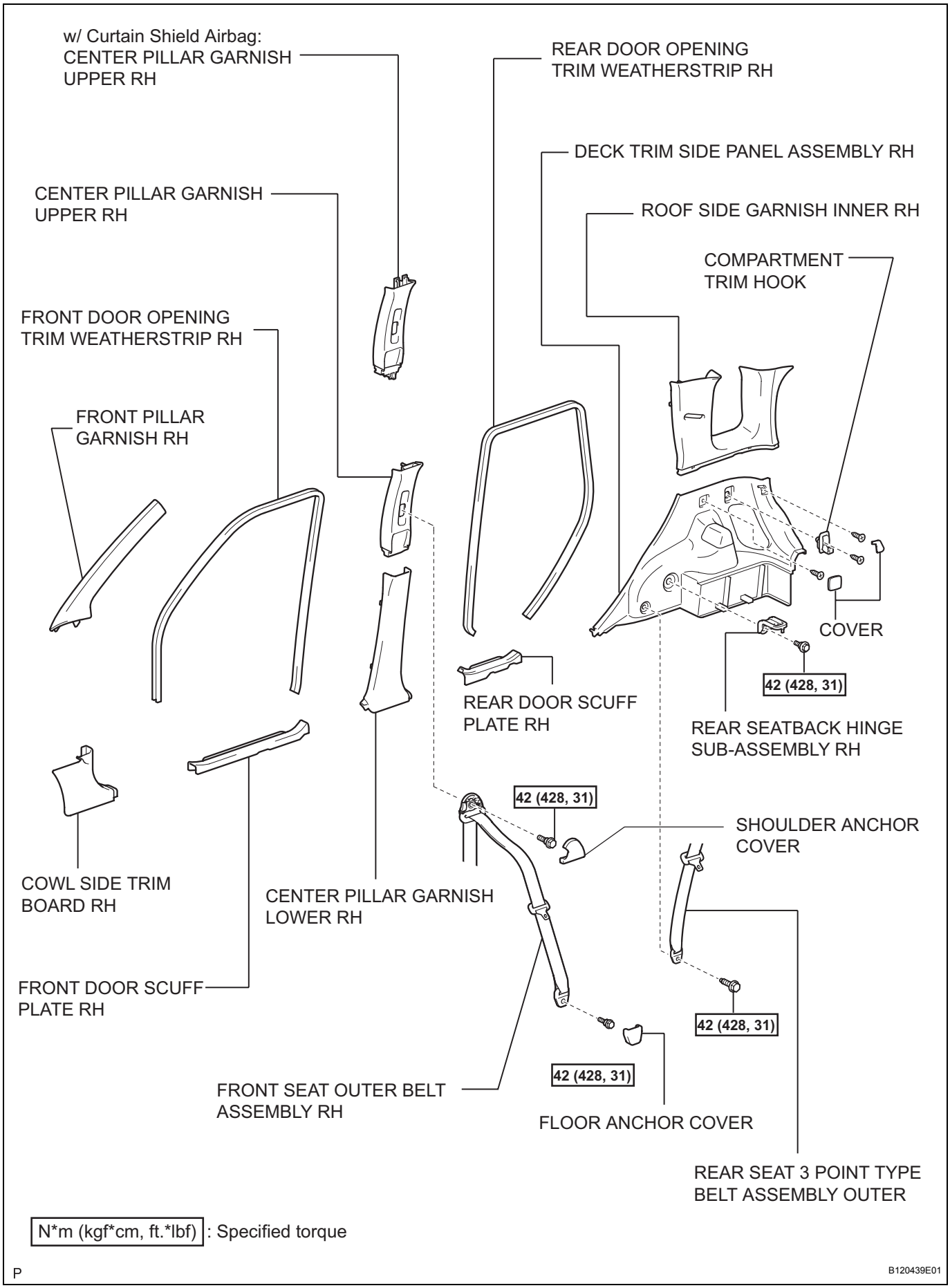


IR


DECK TRIM COVER REAR
NO. 1 DECK BOARD
TONNEAU COVER ASSEMBLY
DECK FLOOR BOX RH
SPARE WHEEL COVER ASSEMBLY
P
B121308E01

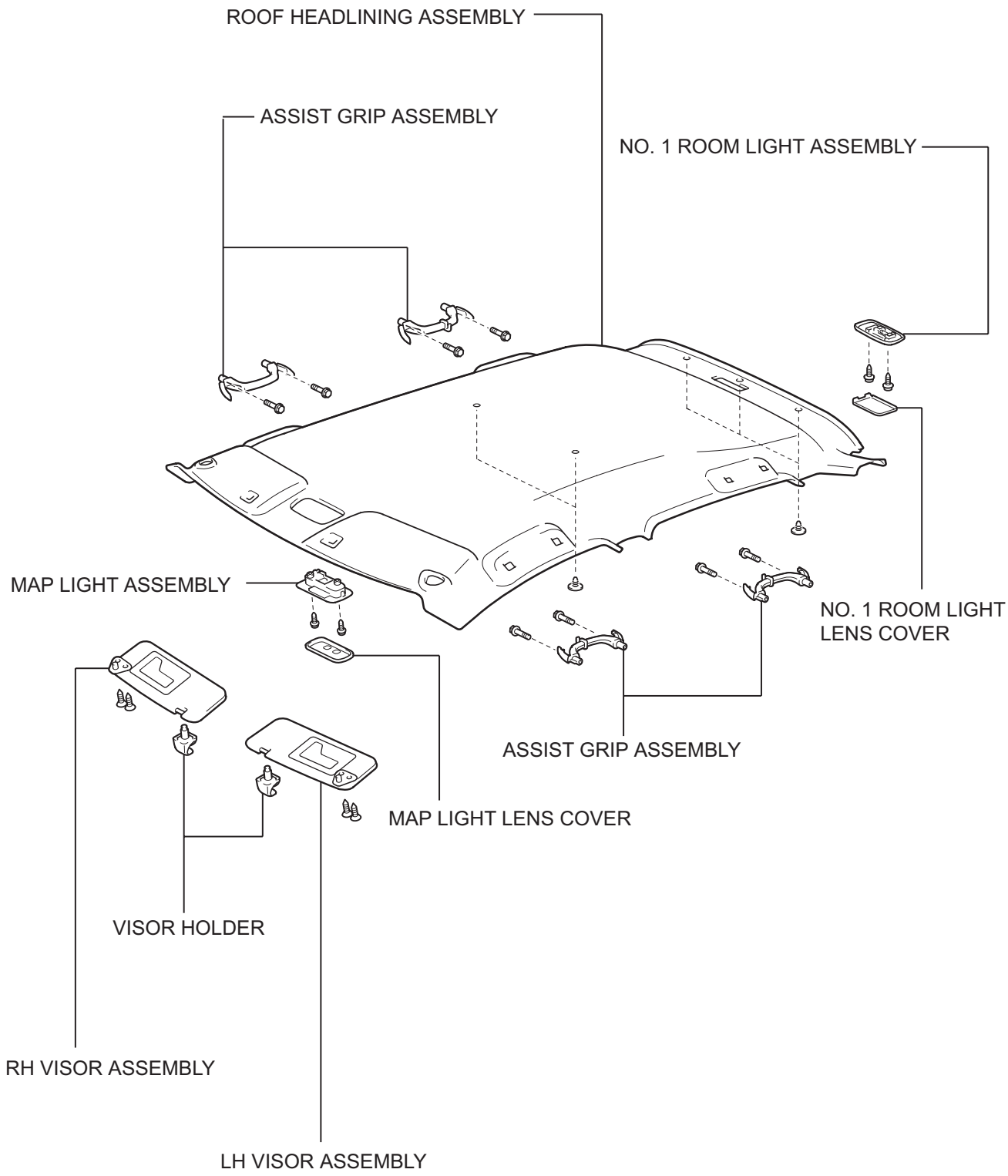

CENTER PILLAR GARNISH LOWER LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
w/ Curtain Shield Airbag:
CENTER PILLAR GARNISH UPPER LH
ROOF SIDE GARNISH INNER LH
CENTER PILLAR GARNISH UPPER LH
FRONT DOOR OPENING TRIM WEATHERSTRIP LH
DECK TRIM SIDE PANEL ASSEMBLY LH
FRONT PILLAR GARNISH LH
COVER
REAR DOOR SCUFF PLATE LH
42 (428, 31)
COMPARTMENT TRIM HOOK
SHOULDER ANCHOR COVER
42 (428, 31)
REAR SEATBACK HINGE SUB-ASSEMBLY LH
FRONT DOOR SCUFF PLATE LH
42 (428, 31)
REAR SEAT 3 POINT TYPE BELT ASSEMBLY OUTER
COWL SIDE TRIM BOARD LH
42 (428, 31)
FLOOR ANCHOR COVER
FRONT SEAT OUTER BELT ASSEMBLY LH
N*m (kgf*cm, ft.*lbf) : Specified torque
P
B120440E01

IR


w/ Curtain Shield Airbag:
CENTER PILLAR GARNISH
UPPER RH
REAR DOOR OPENING
TRIM WEATHERSTRIP RH
DECK TRIM SIDE PANEL ASSEMBLY RH
CENTER PILLAR GARNISH
UPPER RH
ROOF SIDE GARNISH INNER RH
COMPARTMENT
TRIM HOOK
FRONT DOOR OPENING
TRIM WEATHERSTRIP RH
FRONT PILLAR
GARNISH RH
COVER
42 (428, 31)
REAR DOOR SCUFF
PLATE RH
REAR SEATBACK HINGE
SUB-ASSEMBLY RH
42 (428, 31)
SHOULDER ANCHOR
COVER
COWL SIDE TRIM
BOARD RH
CENTER PILLAR GARNISH
LOWER RH
FRONT DOOR SCUFF
PLATE RH
42 (428, 31)
42 (428, 31)
FRONT SEAT OUTER BELT
ASSEMBLY RH
FLOOR ANCHOR COVER
REAR SEAT 3 POINT TYPE
BELT ASSEMBLY OUTER
N*m (kgf*cm, ft.*lbf) : Specified torque
P
B120439E01

IR

w/o Sliding Roof

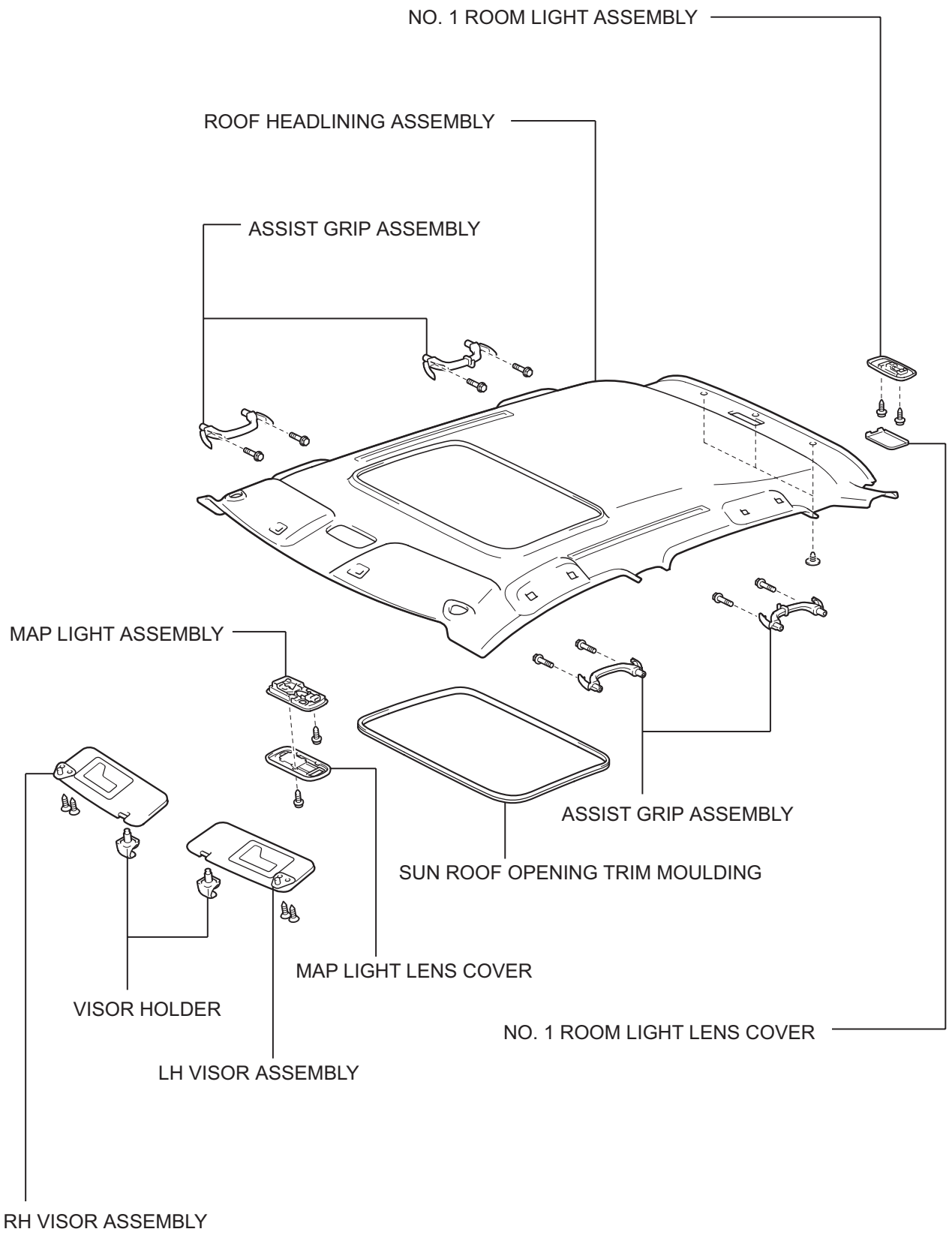


P

B120598E01

IR

w/ Sliding Roof

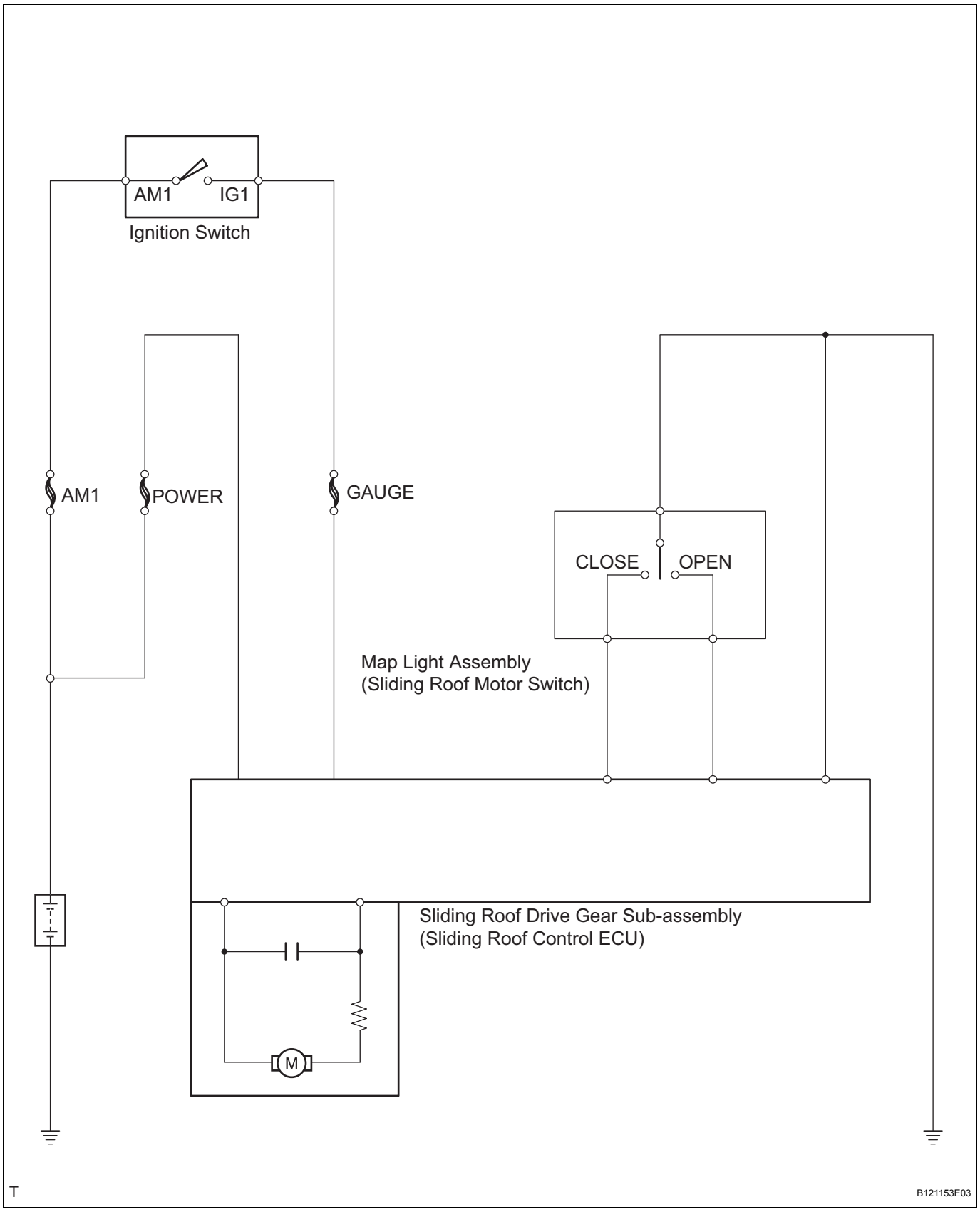


IR

P

B120597E01

SYSTEM DIAGRAM



RF

INITIALIZATION

1. **RESET SLIDING ROOF DRIVE GEAR (MOTOR)**
   NOTICE:
   The sliding roof drive gear (motor) must be reset (pulse sensor's location must be set) when one of the following occurs: 1) the battery cable has been disconnected, 2) the drive gear connector is connected/disconnected, or 3) the sliding roof is replaced or installed/removed. If the drive gear is not reset, the AUTO function will not operate.
   (a) The sliding roof AUTO operation and the jam protection function may not operate normally if the battery cable is disconnected/reconnected, or the battery is replaced or recharged. Initialize the sliding roof system using the method below.
      (1) Turn the ignition switch ON.
      (2) Fully open the sliding roof.
      (3) Press and hold the sliding roof motor switch on the SLIDE/OPEN side for 2 seconds or more. The sliding roof control ECU built into the drive gear will memorize the position of the sliding roof. Initialization is now complete.
      HINT:
      If the battery cable is disconnected, the sliding roof control ECU may not detect the position of the roof glass. If the sliding roof AUTO operation is still disabled even after the drive gear has been initialized, the Hall IC may be malfunctioning. The Hall IC is built into the drive gear and detects the roof glass position. If the result is not as specified, replace the drive gear assembly (sliding roof control ECU).
2. **INSPECT SLIDING ROOF FUNCTION (See page RF-5)**
   HINT:
   - If the jam protection function is not operating, reset the drive gear.
   - If the AUTO operation function and jam protection function do not operate after the drive gear has been reset, replace the drive gear assembly (sliding roof control ECU).

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Sliding roof system

Symptom	Suspected area	See page
Sliding roof does not operate	1. GAUGE fuse	RF-1
	2. POWER H-fuse	RF-1
	3. AM1 H-fuse	RF-1
	4. Map light assembly	RF-12
	5. Sliding roof drive gear sub-assembly	RF-5
	6. Wire harness	-
	7. Faulty sliding of sliding roof	-
Sliding roof operation is abnormal	1. Map light assembly	RF-12
	2. Sliding roof drive gear sub-assembly	RF-5
	3. Wire harness	-
Sliding roof system stops operation halfway even when no foreign object is in motor	1. Map light assembly	RF-12
	2. Sliding roof drive gear sub-assembly	RF-5
	3. Wire harness	-
	4. Sliding roof drive gear sub-assembly (must be reset)	RF-4
AUTO function is inoperative	1. Sliding roof drive gear sub-assembly (must be reset)	RF-4
	2. Sliding roof drive gear sub-assembly (sliding roof control ECU)	RF-10
Jam protection function is inoperative	1. Sliding roof drive gear sub-assembly (must be reset)	RF-4
	2. Sliding roof drive gear sub-assembly (sliding roof control ECU)	RF-10

ON-VEHICLE INSPECTION

NOTICE:
The drive gear (motor) must be reset (pulse sensor's location must be set) when one of the following occurs: 1) the battery cable has been disconnected from the negative (-) battery terminal, 2) the drive gear connector is connected/disconnected, or 3) the sliding roof is replaced or installed/removed. If the drive gear is not reset, the AUTO function will not operate.

1. CHECK AUTO SLIDE-OPEN/CLOSE FUNCTION

(a) Check the AUTO slide OPEN operation function.
  (1) Turn the ignition switch ON.
  (2) If the roof glass is not fully closed, slide or tilt it so that it is fully closed.
  (3) With the roof glass fully closed, press the sliding roof motor OPEN switch for 0.3 seconds or more. The roof glass will begin opening through the AUTO operation and stop 35 mm (1.38 in.) from the fully open position. If the switch is pressed again, the roof glass will fully slide open.

(b) Check the AUTO slide CLOSE operation function.
  (1) Turn the ignition switch ON.
  (2) Press the sliding roof motor CLOSE switch for 0.3 seconds or more. The roof glass will automatically close.
  (3) If the CLOSE or OPEN switch is pressed while the roof glass is in motion, the roof will stop moving.

2. CHECK JAM PROTECTION FUNCTION

HINT:
When the sliding roof AUTO operation is being used, the jam protection prevents objects from being caught between the vehicle body and the roof glass.
Operates during:
AUTO CLOSE operation
CAUTION:
- **Do not use a part of your body, for example your hand, to check the jam protection.**
- **Do not allow anything to become caught in the sliding roof in this procedure.**
- **The jam protection function may not operate with an object that is less than 5 mm (0.20 in.) in width.**

(a) When the sliding roof CLOSE operation is being performed and an object is caught between the vehicle body and the roof glass, the roof glass should open a distance of 200 mm (7.87 in.) from the point of contact with the object, or open fully if 200 mm (7.87 in.) of opening distance is not available.

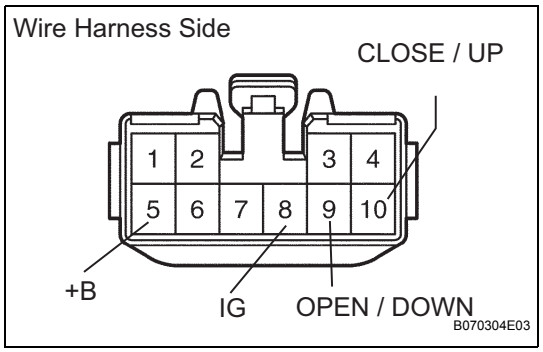
3. **CHECK FAIL-SAFE FUNCTION**

(a) If the sliding roof does not close because the jam protection function operates improperly, press the sliding roof motor switch on the SLIDE/OPEN side and hold it until the sliding roof is in the fully slided open position. Then, you can manually close the sliding roof.

4. **CHECK SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY**

(a) Disconnect the drive gear connector.

(b) Measure the voltage and resistance of the wire harness side connector.



Standard voltage

Tester Connection	Condition	Specified Condition
5 (+B) - Body ground	Always	10 to 14 V
8 (IG) - Body ground	Ignition switch OFF	Below 1 V
8 (IG) - Body ground	Ignition switch ON	10 to 14 V

Standard resistance

Tester Connection	Condition	Specified Condition
9 (OPEN/DOWN) - Body ground	Sliding roof motor switch ON	Below 1 Ω
10 (CLOSE/UP) - Body ground	Sliding roof motor switch ON	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the drive gear connector.

(d) Initialize the sliding roof gear (see page RF-4).

(e) Measure the voltage of the connector.

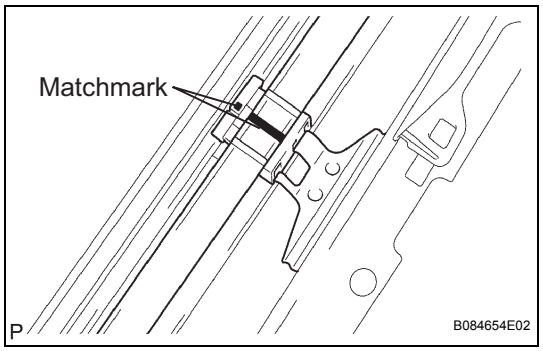
Standard voltage

Tester Connection	Condition	Specified Condition
9 (OPEN) - Body ground	Ignition switch ON and OPEN switch ON	0 V
9 (OPEN) - Body ground	Ignition switch ON and OPEN switch OFF	10 to 14 V
10 (CLOSE) - Body ground	Ignition switch ON and CLOSE switch ON	0 V
10 (CLOSE) - Body ground	Ignition switch ON and CLOSE switch OFF	10 to 14 V

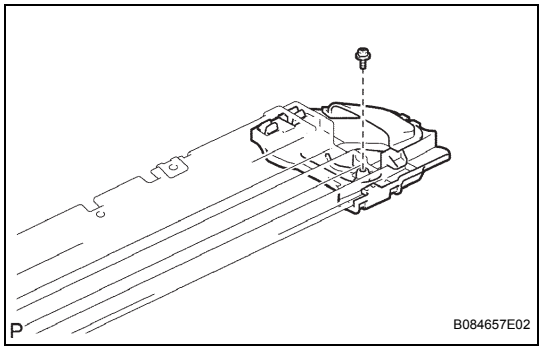
If the result is not as specified, the drive gear sub-assembly (sliding roof control ECU) may have a malfunction.

REASSEMBLY

1. **INSTALL SLIDING ROOF DRIVE CABLE LH**
2. **INSTALL SLIDING ROOF DRIVE CABLE RH**
3. **ADJUST FULLY CLOSED POSITION**
   (a) Using a screwdriver, slide the sliding roof drive cable LH and RH to align the matchmarks.
   HINT:
   Tape the screwdriver tip before use.



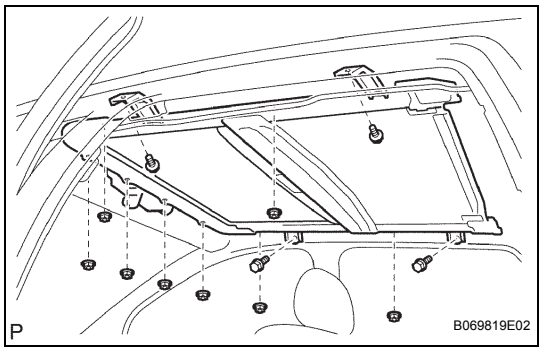
4. **INSTALL SUNSHADE TRIM SUB-ASSEMBLY**
5. **INSTALL SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY**
   (a) Install the driver gear with the 2 bolts.



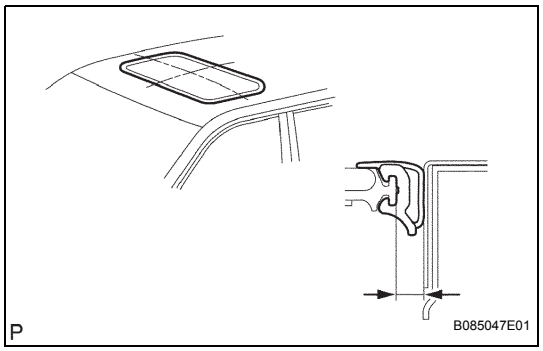
6. **INSTALL SLIDING ROOF DRAIN HOSE JOINT LH**
   (a) Install the joint with the screw.
7. **INSTALL SLIDING ROOF DRAIN HOSE JOINT RH**
   HINT:
   Use the same procedures described for the LH side.

INSTALLATION

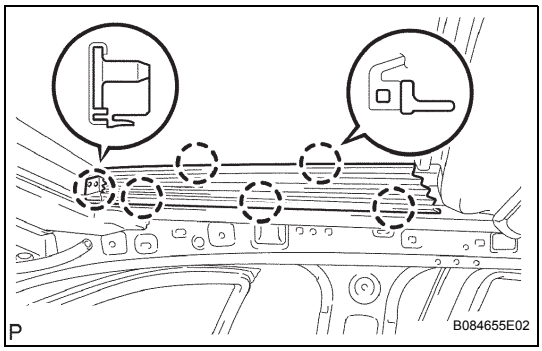
1. **INSTALL SLIDING ROOF HOUSING ASSEMBLY**
   (a) Install the housing with the 4 bolts and 8 nuts.
   Torque: 5.5 N*m (55 kgf*cm, 49 in.*lbf) for bolt
   4.0 N*m (41 kgf*cm, 35 in.*lbf) for nut



2. **CONNECT SLIDING ROOF DRAIN HOSE**
   (a) Connect the 4 drain hoses.
3. **INSTALL SLIDING ROOF WEATHERSTRIP**
4. **INSTALL SLIDING ROOF GLASS SUB-ASSEMBLY**
   (a) Install the glass.
   (b) Using a T25 "torx" driver, install the 4 screws.
5. **ADJUST SLIDING ROOF GLASS SUB-ASSEMBLY**
   (a) Check the clearance between the roof glass and roof panel. Using a T25 "torx" driver, loosen the 4 screws and adjust the sliding roof panel position.
   Standard clearance:
   0 +-5.1 mm (0 +-0.20 in.)
   NOTICE:
   The difference should be even all around.



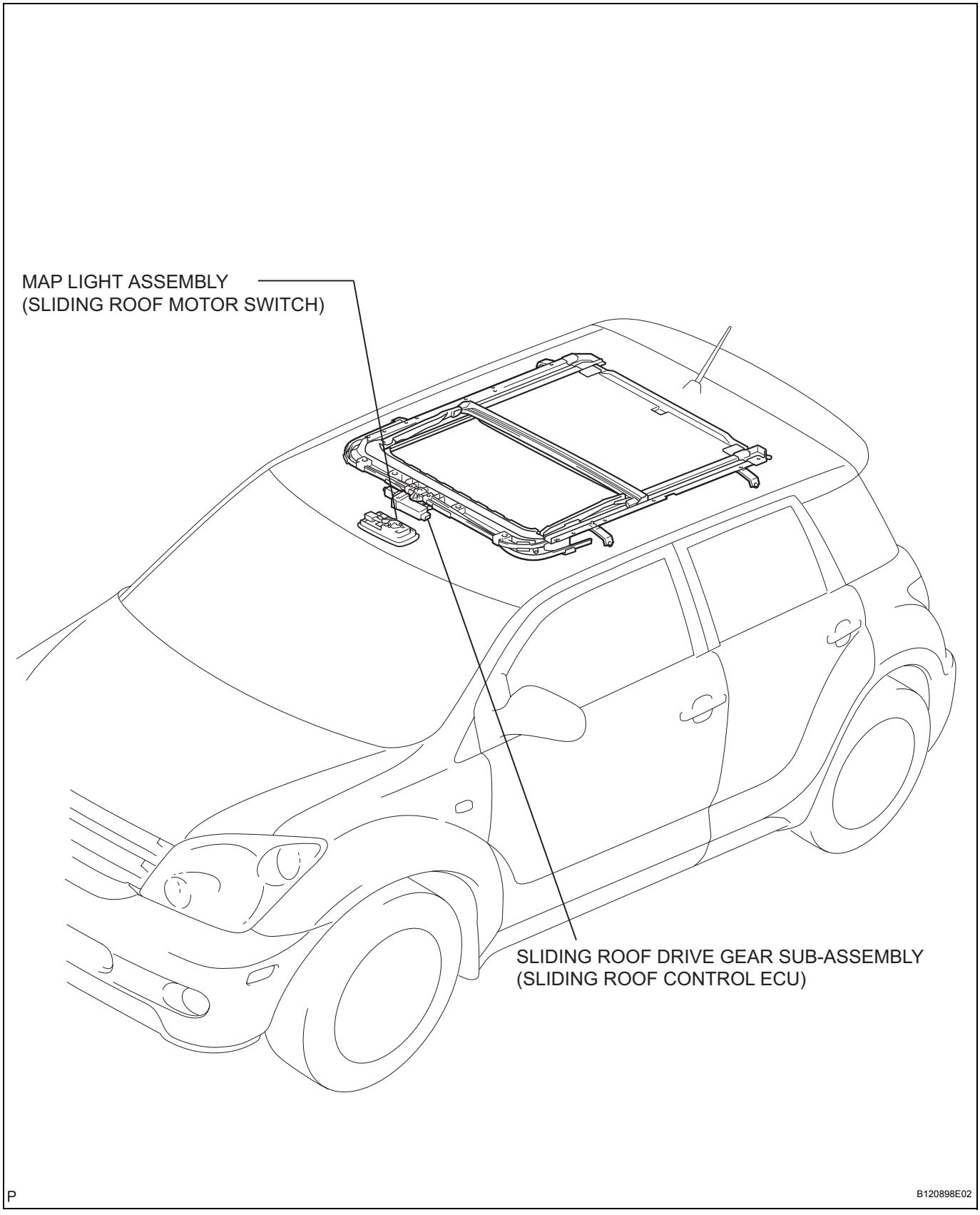
RF

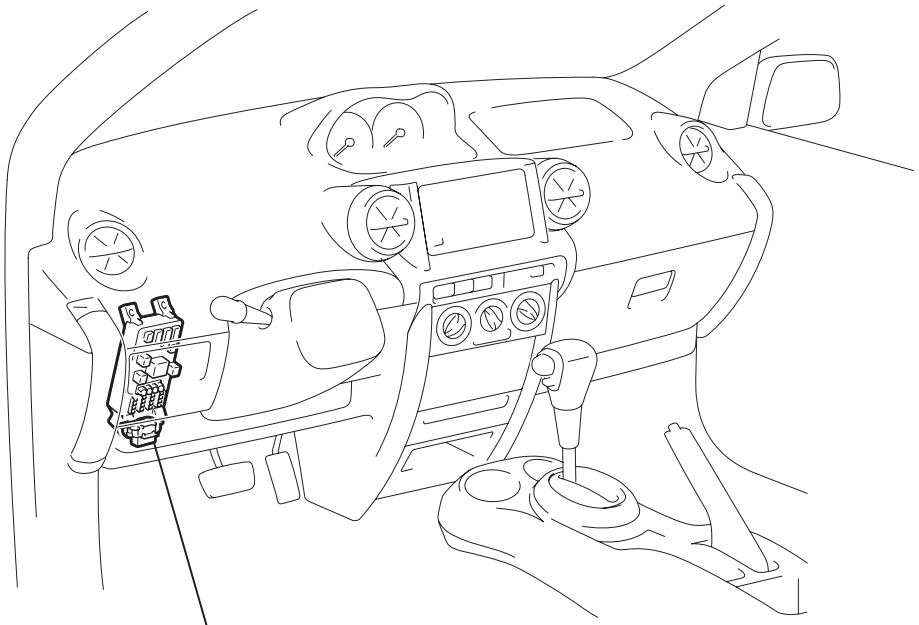


6. **INSTALL SLIDING ROOF SIDE GARNISH LH**
   (a) Attach the 6 claws to install the garnish.
7. **INSTALL SLIDING ROOF SIDE GARNISH RH**
   HINT:
   Use the same procedures described for the LH side.
8. **INSTALL ROOF HEADLINING ASSEMBLY**
   (a) Install the roof headlining (see page IR-12).
9. **CHECK FOR WATER LEAKS**
   (a) If a leak is found, readjust the sliding roof.
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-23).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
12. **CHECK SRS WARNING LIGHT**
    (a) Check the SRS warning light (see page RS-28).

SLIDING ROOF SYSTEM

PARTS LOCATION



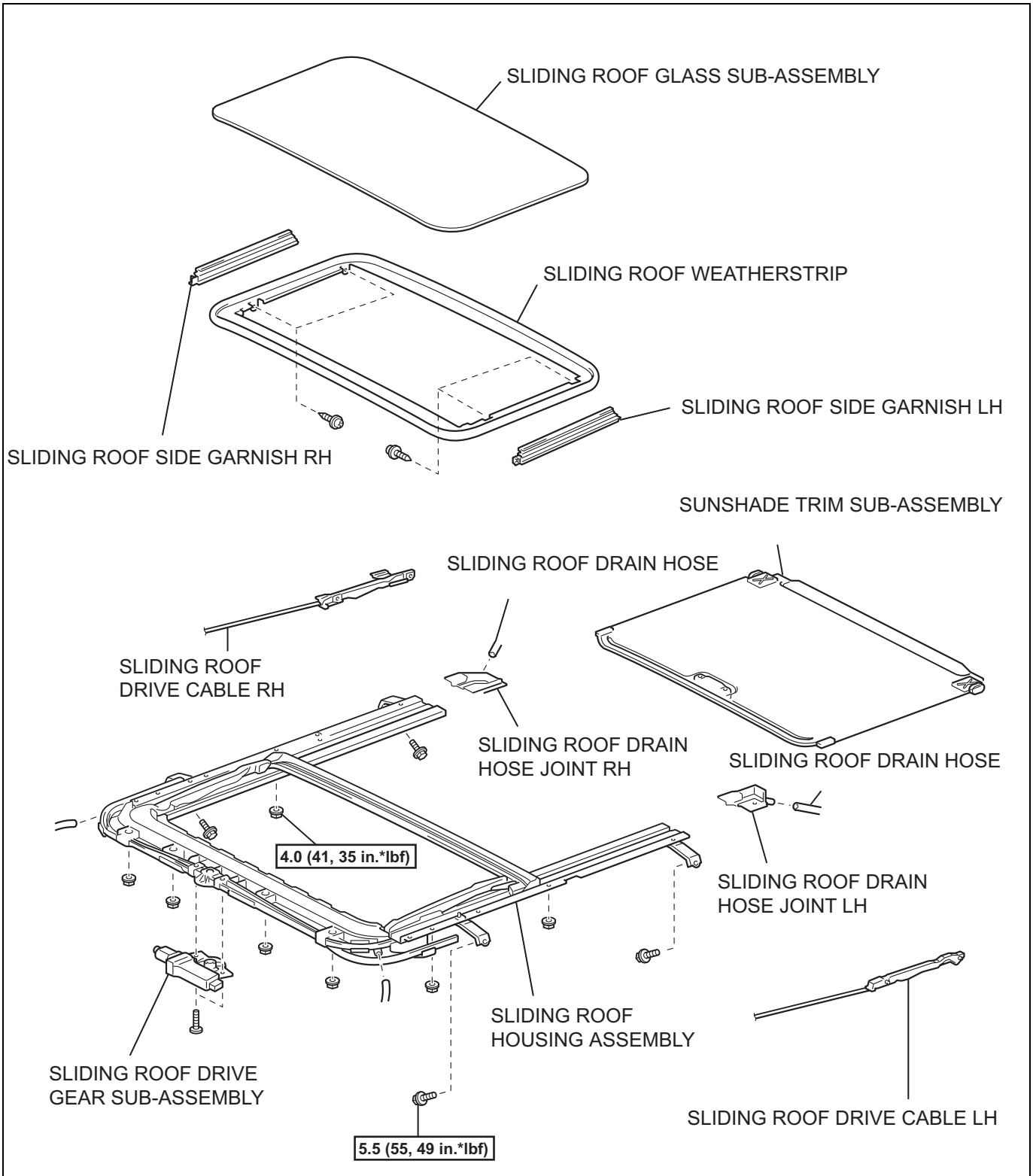


INSTRUMENT PANEL JUNCTION BLOCK
- GAUGE FUSE
- POWER H-FUSE
- AM1 H-FUSE

B121152E03

SLIDING ROOF HOUSING

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

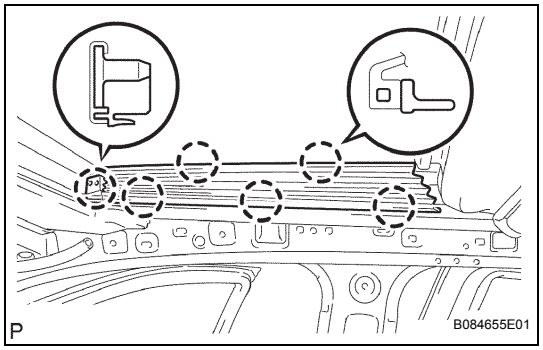
G

B121094E04

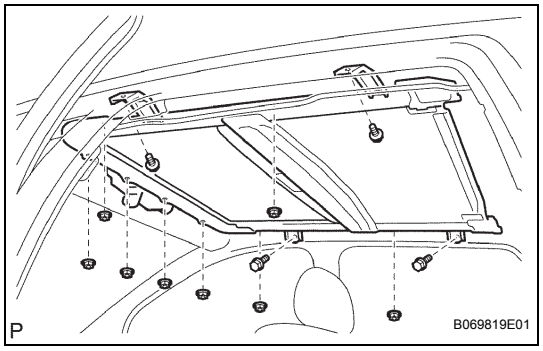
RF

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE ROOF HEADLINING ASSEMBLY**
   (a) Remove the roof headlining (see page IR-7).
3. **REMOVE SLIDING ROOF SIDE GARNISH LH**
   (a) Using a screwdriver, detach the 6 claws and remove the garnish.
   HINT:
   Tape the screwdriver tip before use.

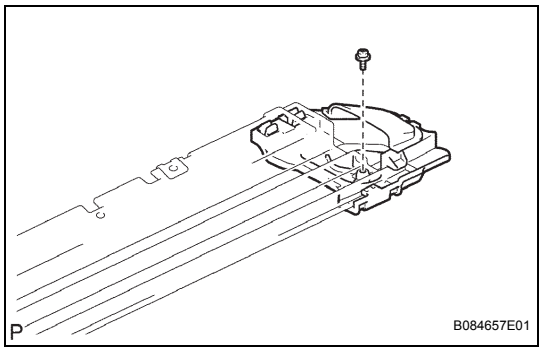


4. **REMOVE SLIDING ROOF SIDE GARNISH RH**
   HINT:
   Use the same procedures described for the LH side.
5. **REMOVE SLIDING ROOF GLASS SUB-ASSEMBLY**
   (a) Using a T25 "torx" driver, remove the 4 screws and glass.
6. **REMOVE SLIDING ROOF WEATHERSTRIP**
7. **DISCONNECT SLIDING ROOF DRAIN HOSE**
   (a) Disconnect the 4 drain hoses.
8. **REMOVE SLIDING ROOF HOUSING ASSEMBLY**
   (a) Remove the 4 bolts, 8 nuts and housing.

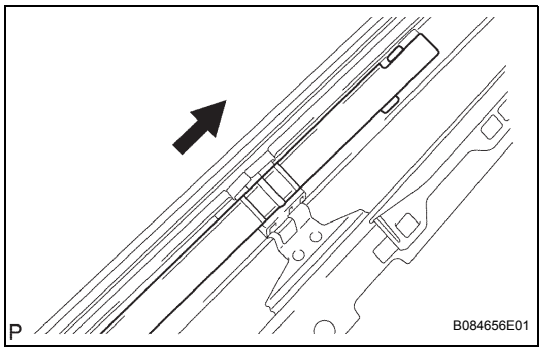


DISASSEMBLY

1. **REMOVE SLIDING ROOF DRAIN HOSE JOINT LH**
   (a) Remove the screw and joint.
2. **REMOVE SLIDING ROOF DRAIN HOSE JOINT RH**
   HINT:
   Use the same procedures described for the LH side.



RF



3. **REMOVE SLIDING ROOF DRIVE CABLE LH**
   (a) Using a screwdriver, slide the drive cable backward and remove it.
   HINT:
   Tape the screwdriver tip before use.

4. **REMOVE SLIDING ROOF DRIVE CABLE RH**
   HINT:
   Use the same procedures described for the LH side.

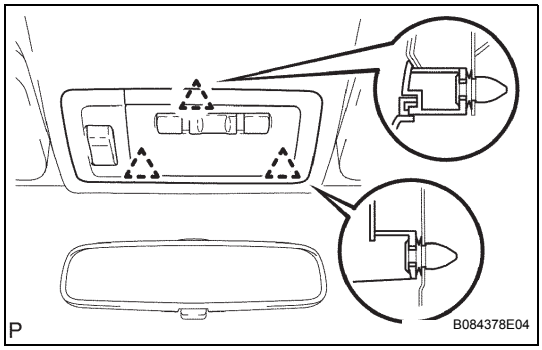
5. **REMOVE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY**
   (a) Remove the 2 bolts and driver gear.

6. **REMOVE SUNSHADE TRIM SUB-ASSEMBLY**

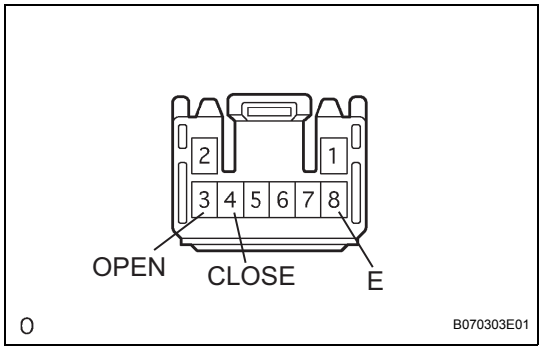
SLIDING ROOF SWITCH ASSEMBLY

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



2. **REMOVE MAP LIGHT ASSEMBLY**
   (a) Using a clip remover, detach the 3 clips and remove the light.
   HINT:
   Tape the clip remover tip before use.
   (b) Disconnect the map light connector.

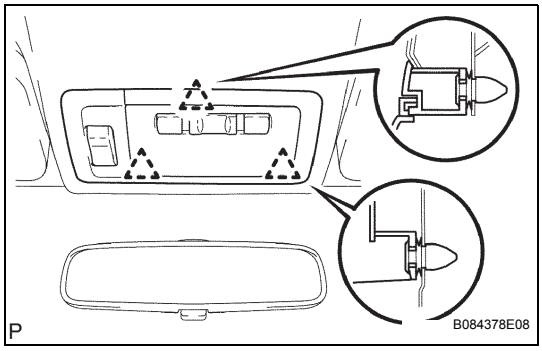


INSPECTION

1. **INSPECT MAP LIGHT ASSEMBLY**
   (a) Measure the resistance of the switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
3 (OPEN) - 8 (E)	OPEN	Below 1 Ω
4 (CLOSE) - 8 (E)	CLOSE	Below 1 Ω
3 (OPEN) - 8 (E)	OFF	10 kΩ or higher
4 (CLOSE) - 8 (E)	OFF	10 kΩ or higher

   If the result is not as specified, replace the map light assembly.



INSTALLATION

1. **INSTALL MAP LIGHT ASSEMBLY**
   (a) Connect the map light connector.
   (b) Attach the 3 clips to install the map light.

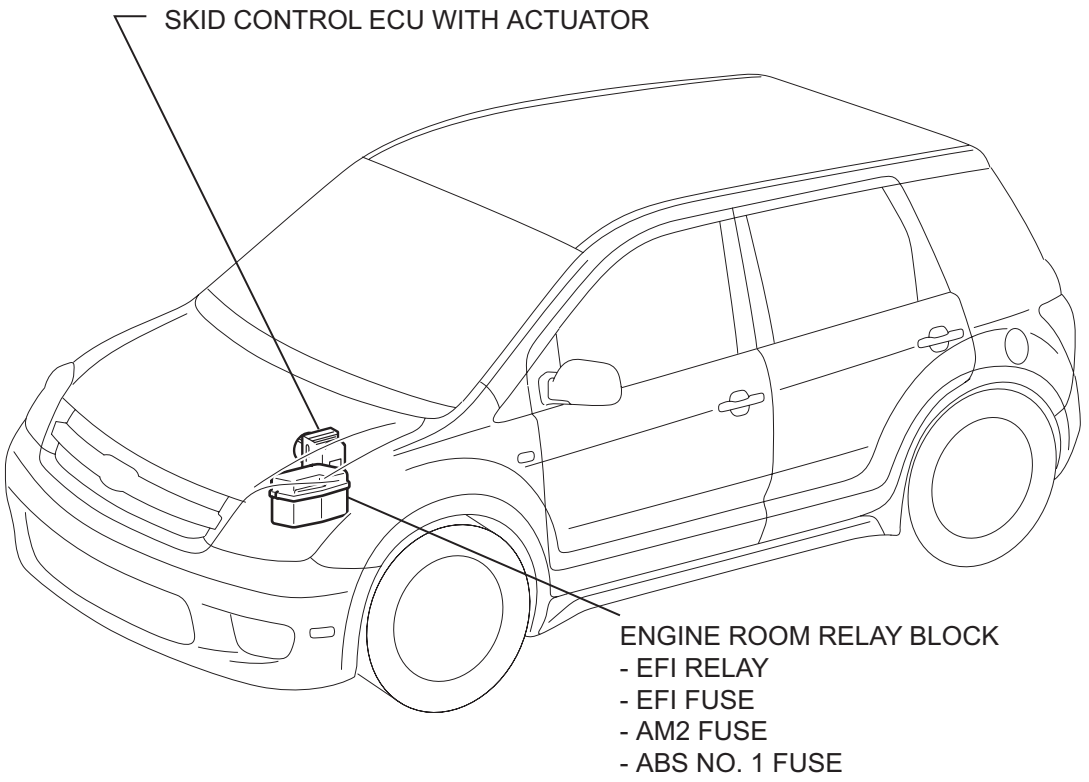
2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

4. **CHECK SRS WARNING LIGHT**
   (a) Check the SRS warning light (see page RS-28).

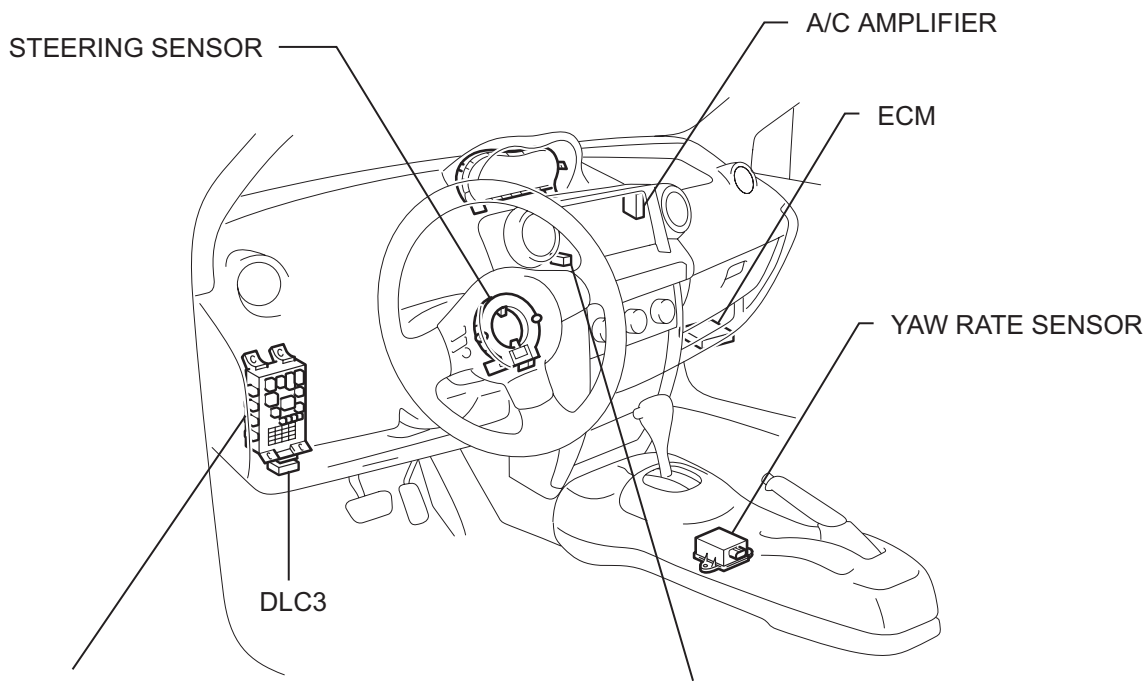
RF

PARTS LOCATION



T

F100887E02

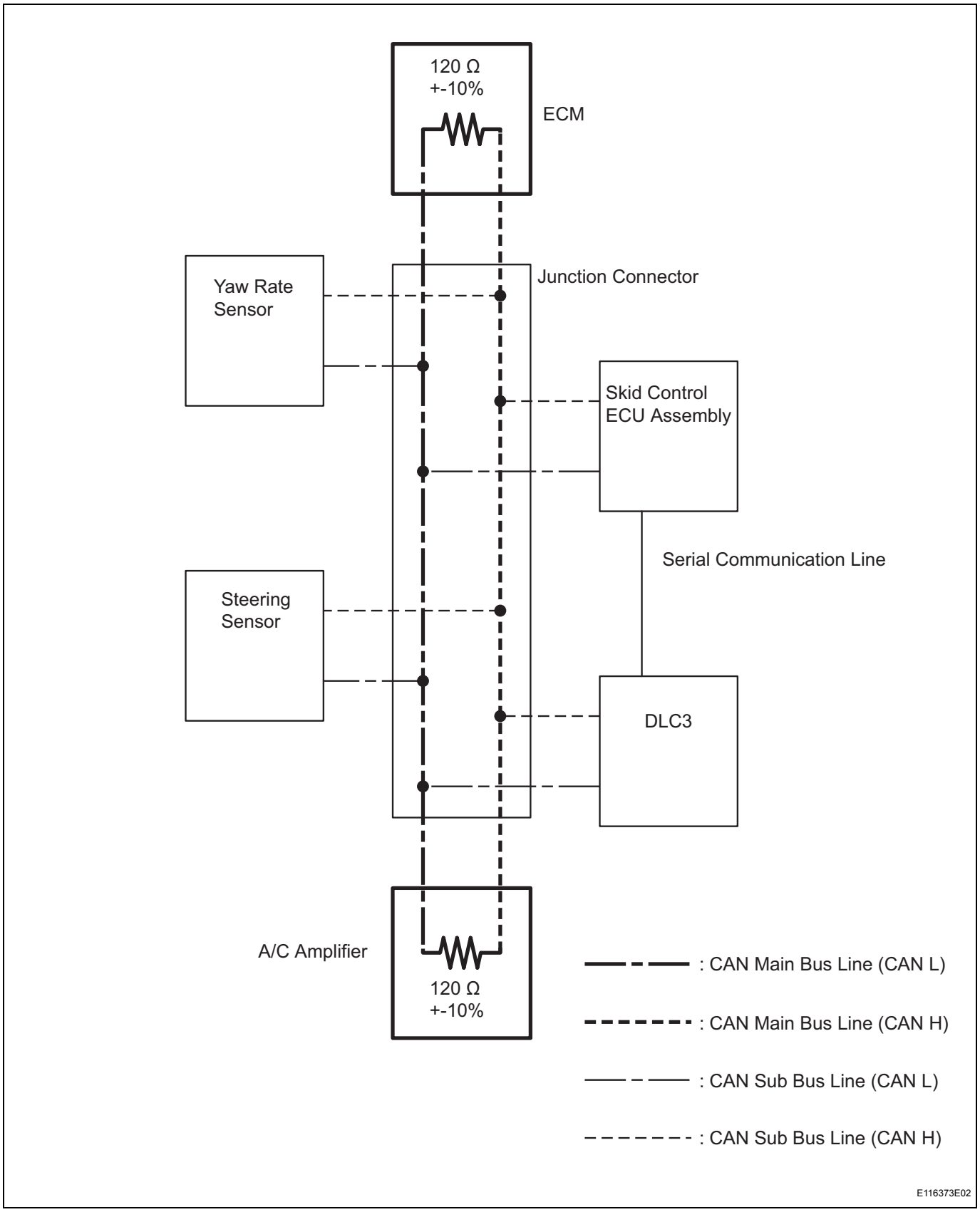


T

F100888E02

CA

SYSTEM DIAGRAM



CA

HINT:
The skid control ECU stores DTCs and performs DTC communication by receiving information from the steering sensor and yaw rate sensor. These sensors cannot store DTCs or perform DTC communication.

SYSTEM DESCRIPTION

1. BRIEF DESCRIPTION

(a) The Controller Area Network (CAN) is a serial data communication system for real time applications. It is a vehicle multiplex communication system which has a high communication speed (500 kbps) and the ability to detect malfunctions.

(b) By pairing the CANH and CANL bus lines, the CAN performs the communication based on the differential voltage.

(c) Many ECUs (sensors) installed on the vehicle operate by sharing information and communicating with each other.

(d) The CAN has 2 resistors of 120 Ω which are necessary to communicate with the main bus line.

2. DEFINITION OF TERMS

(a) Main bus line

(1) The main bus line is a wire harness between the two terminus circuits on the bus (communication line). This is the main bus in the CAN communication system.

(b) Sub bus line

(1) The sub bus line is a wire harness which diverges from the main bus line to an ECU or sensor.

(c) Terminus circuit

(1) The terminus circuit is a circuit which is placed to convert communication current of the CAN communication into bus voltage. It consists of a resistor and condenser. Two terminus circuits are necessary on a bus.

3. ECUS OR SENSORS WHICH COMMUNICATE THROUGH CAN COMMUNICATION SYSTEM

(a) Skid Control ECU

(b) Yaw Rate Sensor

(c) Steering Sensor

(d) ECM

(e) A/C Amplifier

4. DIAGNOSTIC CODES FOR CAN COMMUNICATION SYSTEM

(a) DTCs for the CAN communication system are as follows: U0073/94 (C1223/43), U0100/65, U0123/62, U0124/95 (C1223/43), U0126/63, B1499.

5. REMARKS FOR TROUBLESHOOTING

(a) Trouble in the CAN bus (communication line) can be checked from the DLC3 (except when there is a wire break other than in the sub bus line of the DLC3).

(b) DTCs of the CAN communication system can be checked using the intelligent tester via the CAN VIM.

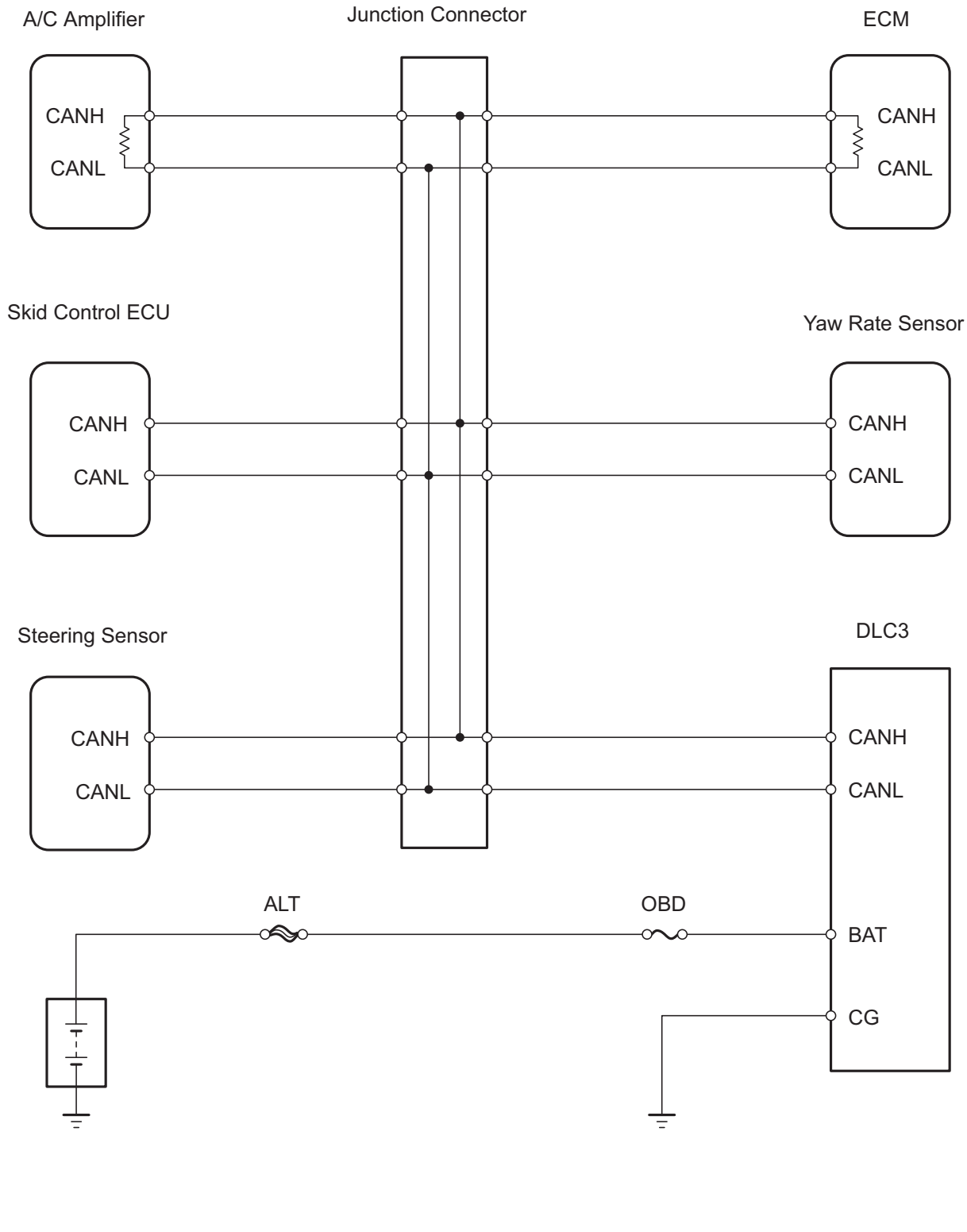
(c) The CAN communication system cannot detect trouble in the sub bus line of the DLC3 even though the DLC3 is also connected to the CAN communication system.

CAN Bus Line

DESCRIPTION

When a CAN communication DTC is output, first measure the resistance between the terminals of the DLC3 to determine the trouble area.

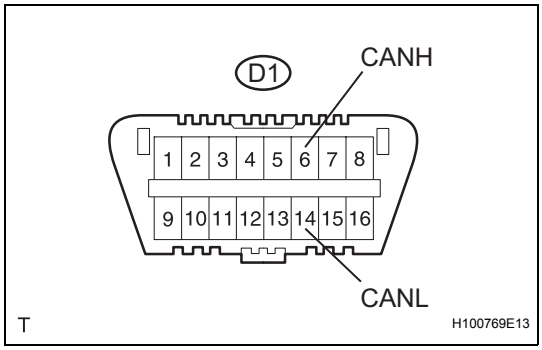
WIRING DIAGRAM



CA

INSPECTION PROCEDURE

1 CHECK CAN BUS LINE (MAIN BUS LINE FOR DISCONNECTION, BUS LINES FOR SHORT CIRCUIT)



(a) Measure the resistance of the DLC3.
Standard resistance

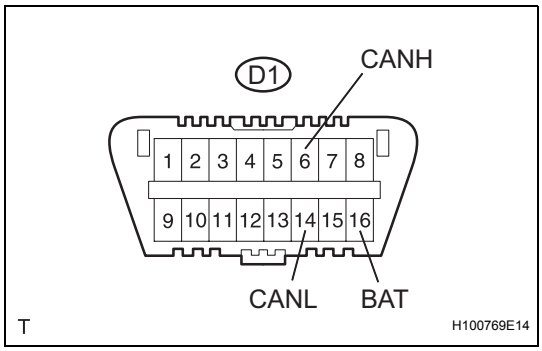
Tester Connection	Condition	Specified Condition	Proceed to
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	54 to 69 Ω	OK
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	69 Ω or higher	NG-A
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	Below 54 Ω	NG-B

NG-A → **CHECK CAN MAIN BUS LINE (FOR DISCONNECTION)**

NG-B → **CHECK CAN BUS LINE (FOR SHORT CIRCUIT)**

OK

2 CHECK CAN BUS LINE (FOR SHORT TO B+)



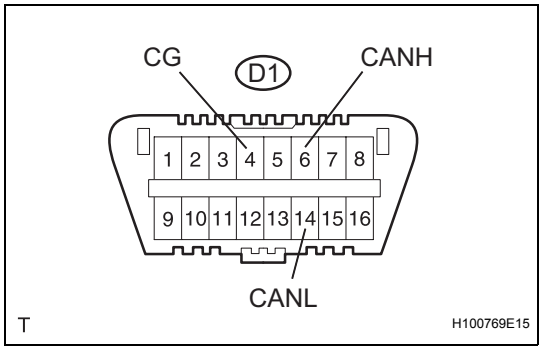
(a) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩ or higher
D1-14 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩ or higher

NG → **CHECK CAN BUS LINE (FOR SHORT TO B+)**

OK

3 CHECK CAN BUS LINE (FOR SHORT TO GND)



(a) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-4 (CG) - D1-6 (CANH)	Ignition switch OFF	3 kΩ or higher
D1-4 (CG) - D1-14 (CANL)	Ignition switch OFF	3 kΩ or higher

NG → **CHECK CAN BUS LINE (FOR SHORT TO GND)**

CA

OK

HOW TO PROCEED WITH TROUBLESHOOTING

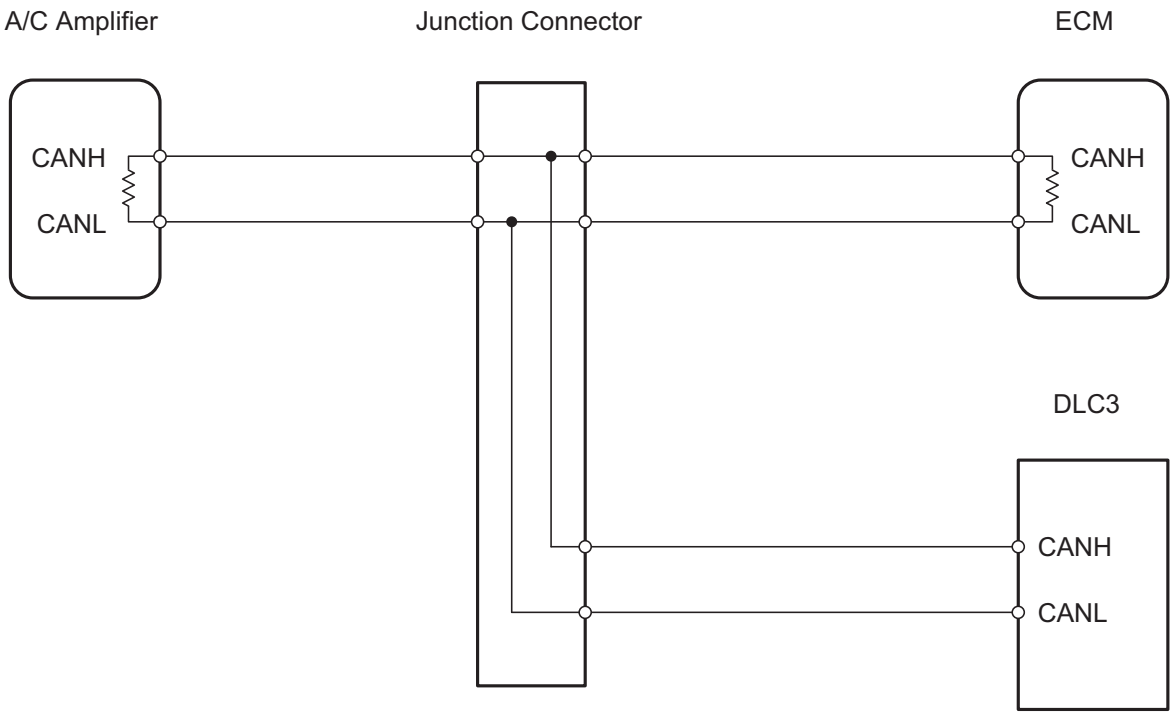
Open in CAN Main Bus Line

DESCRIPTION

The CAN main bus line and DLC3 sub bus line may be disconnected when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 69 Ωor higher.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of DLC3 is more than 69 Ω	• CAN main bus line or connector • ECM • A/C amplifier • DLC3 sub bus line and connector • Junction connector

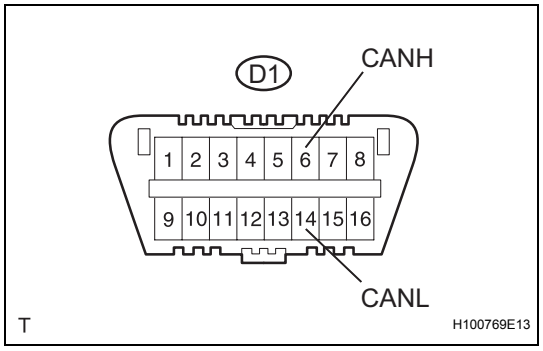
WIRING DIAGRAM



CA

INSPECTION PROCEDURE

1	CHECK DLC3



(a) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition	Proceed to
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	108 to 132 Ω	A
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	132 Ω or higher	B

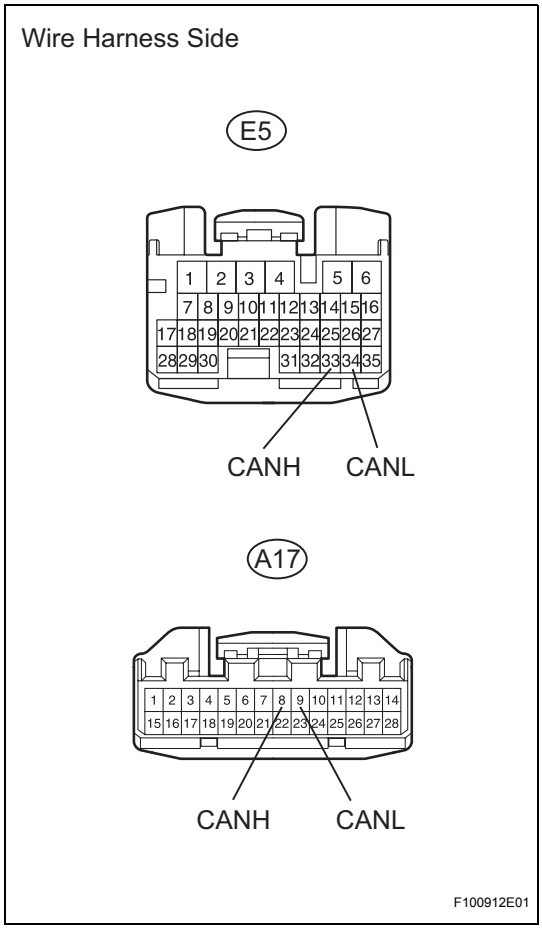
NOTICE:
When the measured value is 132 Ω or more and a CAN communication system DTC is output, there may be a fault other than the disconnection of the DLC3 sub bus line. After repairing the trouble area, perform the "How to Proceed with Troubleshooting" procedures (see page CA-5).

B → **REPAIR OR REPLACE DLC3 SUB BUS LINE AND CONNECTOR (CANH, CANL)**

A

CA

2 CHECK CAN MAIN BUS LINE FOR DISCONNECTION (ECM - A/C AMPLIFIER)



(a) Disconnect the E5 ECM and A17 amplifier connectors.
(b) Measure the resistance of the wire harness side connector.

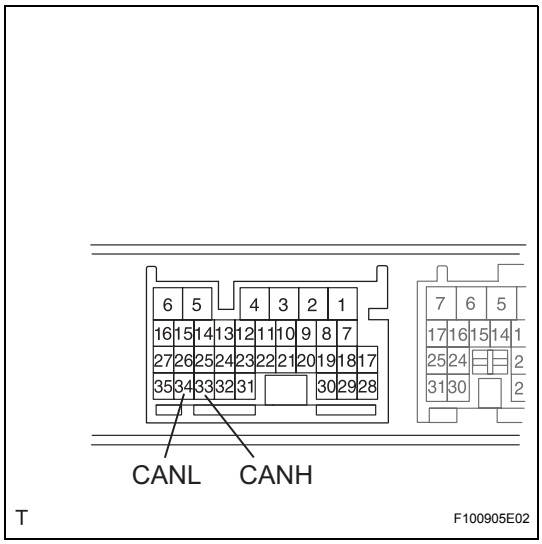
Standard resistance

Tester Connection	Condition	Specified Condition
E5-33 (CANH) - A17-8 (CANH)	Ignition switch OFF	Below 1 Ω
E5-34 (CANL) - A17-9 (CANL)	Ignition switch OFF	Below 1 Ω

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE AND CONNECTOR (ECM - A/C AMPLIFIER) OR JUNCTION CONNECTOR**

OK

3 INSPECT ECM



(a) Measure the resistance of the ECM.

Tester Connection	Condition	Specified Condition
33 (CANH) - 34 (CANL)	Ignition switch OFF	108 to 132 Ω

NG → **REPLACE ECM**

CA

OK

REPLACE A/C AMPLIFIER

CAN COMMUNICATION SYSTEM

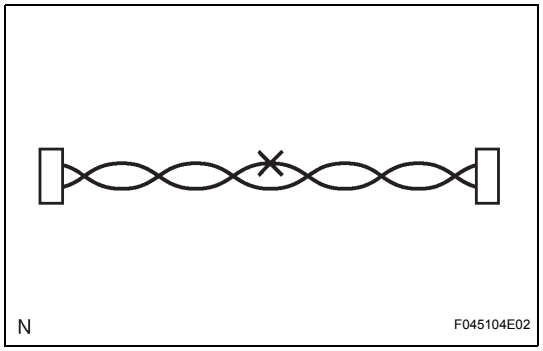
PRECAUTION

1. HANDLING PRECAUTIONS FOR STEERING SYSTEM

(a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in hazardous driving.

2. HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

(a) This vehicle is equipped with a Supplemental Restraint System (SRS), which includes a driver airbag and front passenger airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal, installation, inspection or replacement of parts), be sure to read the SRS section's PRECAUTION (see page RS-1).

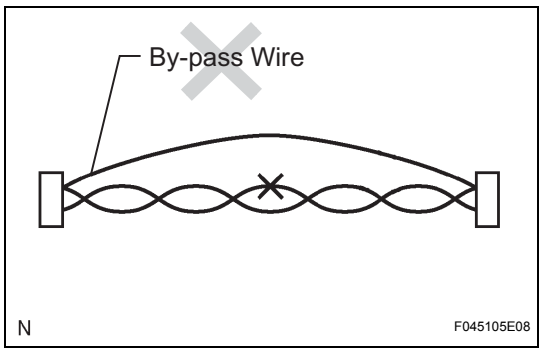


3. WIRE HARNESS REPAIR

(a) After repairing the wire bus line with solder, wrap the repaired area with vinyl tape.

NOTICE:

- **The CANL bus line and CANH bus line must always be installed. When installing the lines, make sure to twist them.**
- **The difference in length of the CANL bus line and CANH bus line should be less than 100 mm (3.93 in.).**
- **Make sure the length between each twist of the wire connecting the connectors is 80 mm (3.15 in.) or less.**

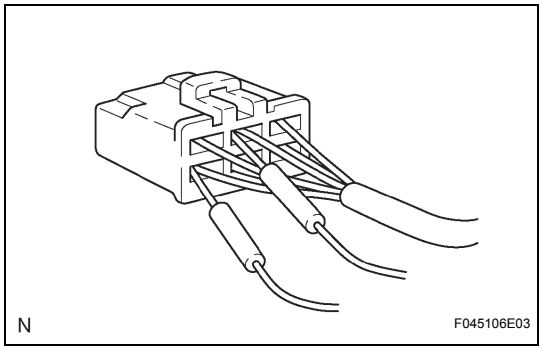


(b) Do not use by-pass wiring between the connectors.

NOTICE:

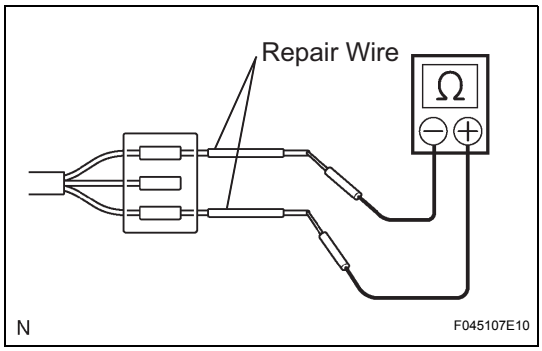
If you perform by-pass wiring, the characteristic of the twisted wire harness will be lost.

CA



4. CONNECTOR HANDLING

(a) When checking the resistance of a connector, insert tester probes into the backside of the connector.



(b) If the tester probes cannot be inserted, use repair wires to check the resistance as shown in the illustration.

5. PRECAUTION FOR DISCONNECTING BATTERY CABLE

NOTICE:

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

System Name	See procedure
Sliding Roof System	IN-23

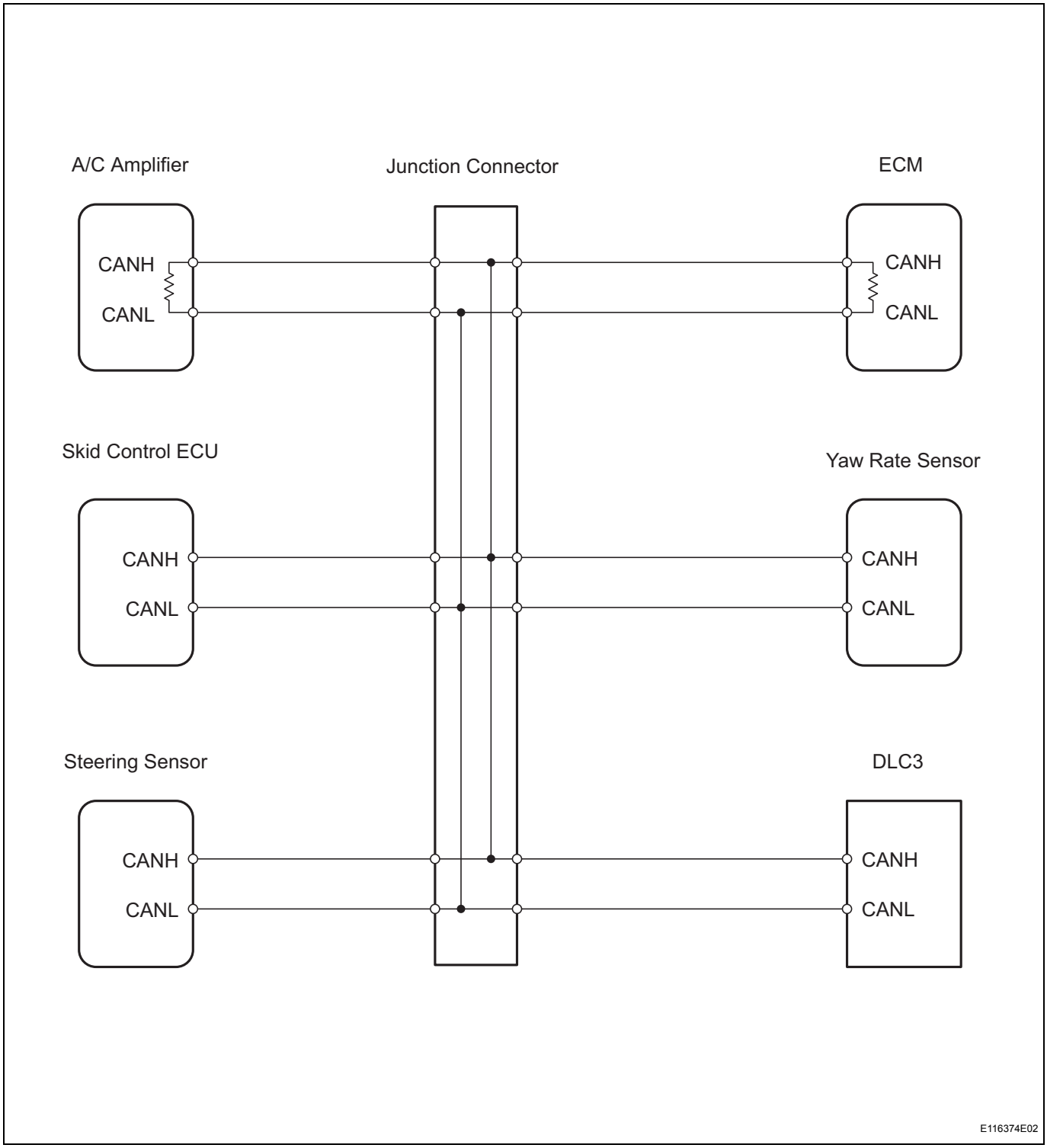
Short in CAN Bus Lines

DESCRIPTION

The CAN bus lines are considered to be shorted when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

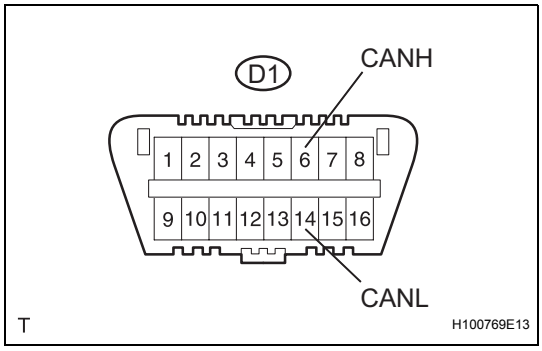
Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of DLC3 is below 54 Ω	• Short in CAN bus lines • Skid control ECU • Steering sensor • Yaw rate sensor • ECM • A/C amplifier • Junction connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR SHORT (DLC3 SUB BUS LINE)



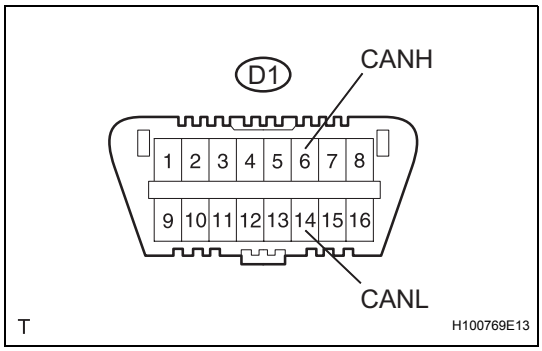
(a) Disconnect the J10 junction connector.
(b) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	1 MΩ or higher

NG → **REPAIR OR REPLACE DLC3 SUB BUS LINE AND CONNECTOR (CANH, CANL)**

OK

2 CHECK CAN BUS LINE FOR SHORT (ECM)



(a) Reconnect the J10 junction connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the DLC3.
Standard resistance

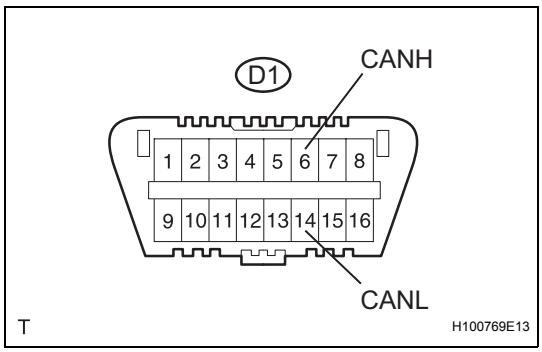
Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	1 MΩ or higher

OK → **REPLACE ECM**

NG

3 CHECK CAN BUS LINE FOR SHORT (A/C AMPLIFIER)

CA



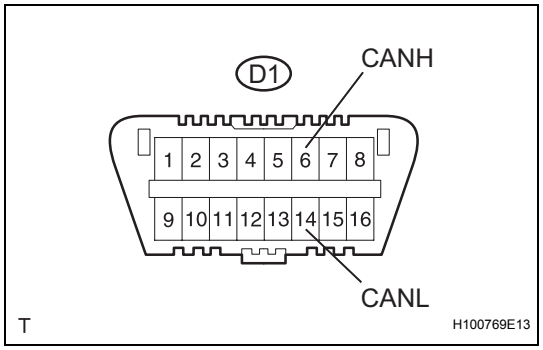
(a) Reconnect the E5 ECM connector.
(b) Disconnect the A17 amplifier connector.
(c) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	1 MΩ or higher

OK → **REPLACE A/C AMPLIFIER**

NG

4 CHECK CAN BUS LINE FOR SHORT (SKID CONTROL ECU)



(a) Reconnect the A17 amplifier connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the DLC3.

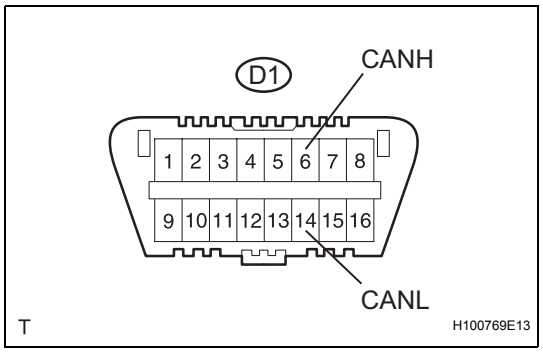
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	1 MΩ or higher

OK → REPLACE SKID CONTROL ECU

NG

5 CHECK CAN BUS LINE FOR SHORT (STEERING SENSOR)



(a) Reconnect the S1 ECU connector.
(b) Disconnect the S15 sensor connector.
(c) Measure the resistance of the DLC3.

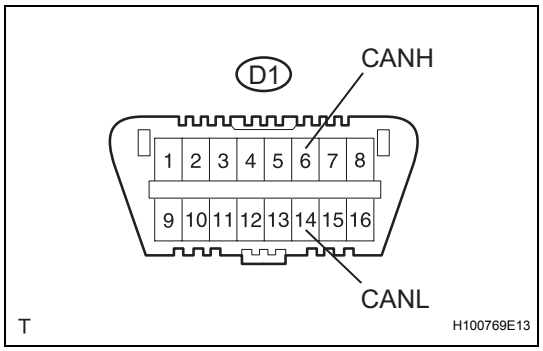
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	1 MΩ or higher

OK → REPLACE STEERING SENSOR

NG

6 CHECK CAN BUS LINE FOR SHORT (YAW RATE SENSOR)



(a) Reconnect the S15 sensor connector.
(b) Disconnect the Y1 sensor connector.
(c) Measure the resistance of the DLC3.

Standard resistance

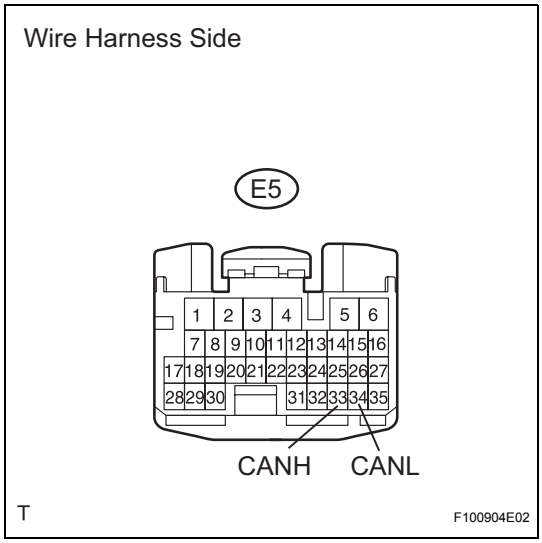
Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-14 (CANL)	Ignition switch OFF	1 MΩ or higher

OK → REPLACE YAW RATE SENSOR

NG

CA

7 CHECK CAN BUS LINE FOR SHORT (ECM - JUNCTION CONNECTOR)



(a) Reconnect the Y1 sensor connector.
(b) Disconnect the J10 connector from the junction block.
(c) Disconnect the E5 ECM connector.
(d) Measure the resistance of the wire harness side connector.

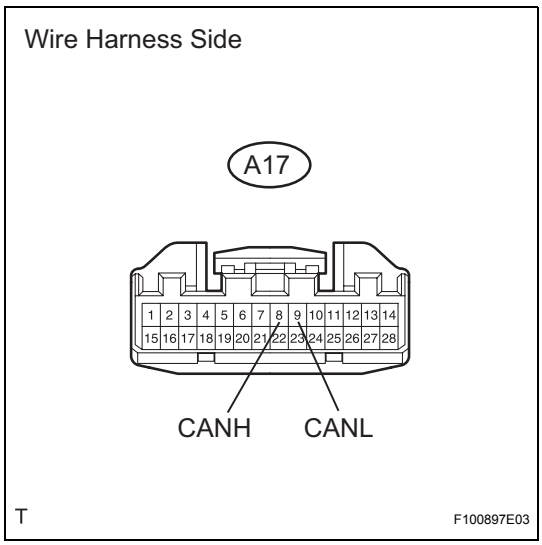
Standard resistance

Tester Connection	Condition	Specified Condition
E5-33 (CANH) - E5-34 (CANL)	Ignition switch OFF	1 MΩ or higher

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE AND CONNECTOR (ECM - JUNCTION CONNECTOR)**

OK

8 CHECK CAN BUS LINE FOR SHORT (A/C AMPLIFIER - JUNCTION CONNECTOR)



(a) Disconnect the A17 amplifier connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
A17-8 (CANH) - A17-9 (CANL)	Ignition switch OFF	1 MΩ or higher

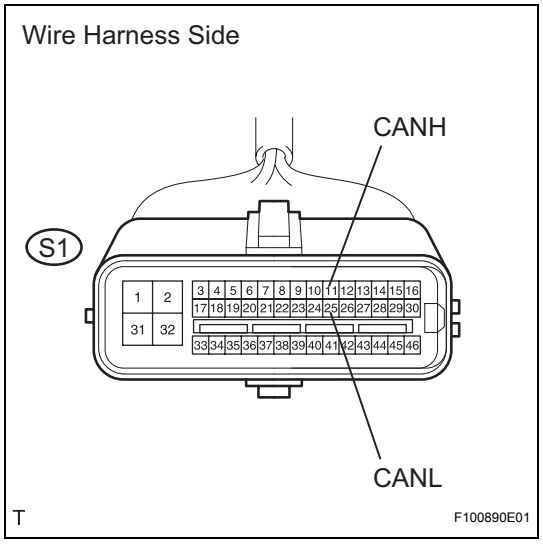
HINT:
Check the wire harness of the connector that was connected to the junction connector.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE AND CONNECTOR (A/C AMPLIFIER - JUNCTION CONNECTOR)**

OK

CA

9	CHECK CAN BUS LINE FOR SHORT (SKID CONTROL ECU - JUNCTION CONNECTOR)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

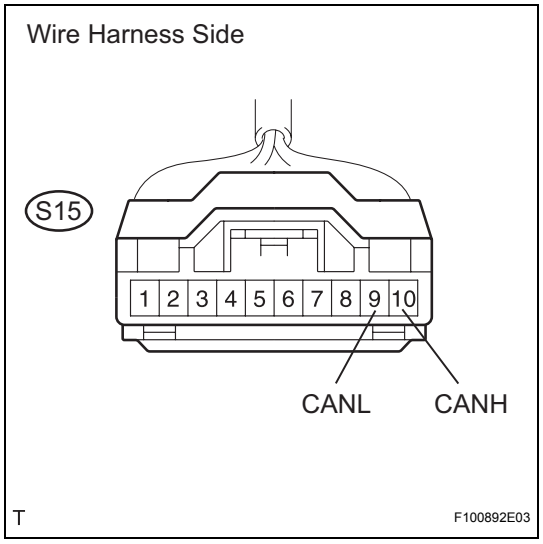
Tester Connection	Condition	Specified Condition
S1-11 (CANH) - S1-25 (CANL)	Ignition switch OFF	1 MΩ or higher

HINT:
Check the wire harness of the connector that was connected to the junction connector.

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR)**

OK

10	CHECK CAN BUS LINE FOR SHORT (STEERING SENSOR - JUNCTION CONNECTOR)



(a) Disconnect the S15 sensor connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
S15-10 (CANH) - S15-9 (CANL)	Ignition switch OFF	1 MΩ or higher

HINT:
Check the wire harness of the connector that was connected to the junction connector.

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR)**

OK

REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE AND CONNECTOR

CA

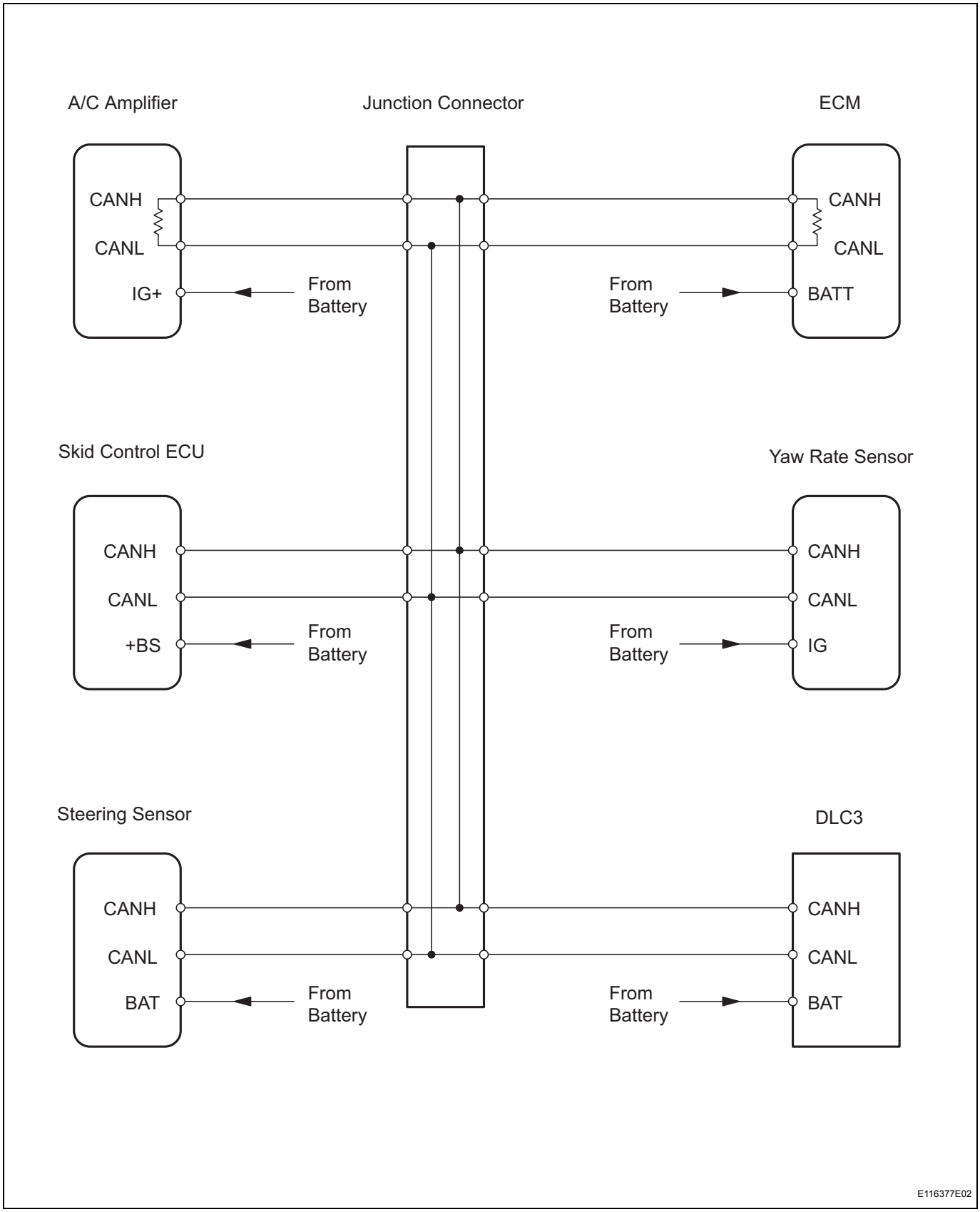
Short to B+ in CAN Bus Line

DESCRIPTION

A short to B+ may be occurring in the CAN bus line when there is a short between terminals 16 (BAT) and 6 (CANH) or terminals 16 (BAT) and 14 (CANL) of the DLC3.

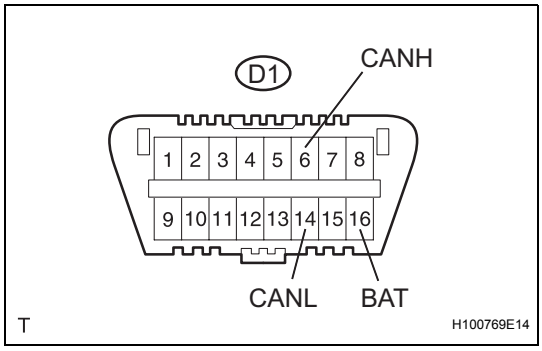
Symptom	Trouble Area
Short between terminals 16 (BAT) and 6 (CANH) or 16 (BAT) and 14 (CANL) of DLC3	• Short to B+ • Skid control ECU • Steering sensor • Yaw rate sensor • ECM • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR SHORT TO B+ (DLC3 SUB BUS LINE)



(a) Disconnect the J10 junction connector.
(b) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher
D1-14 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher

NG → REPAIR OR REPLACE DLC3 SUB BUS LINE AND CONNECTOR

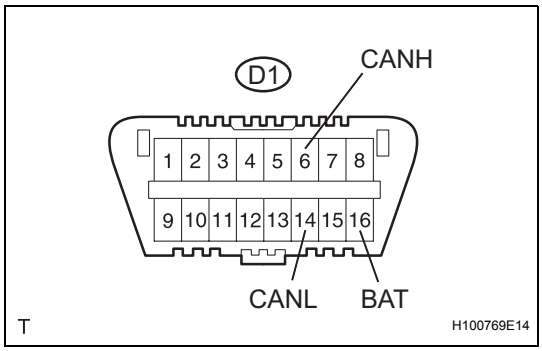
OK

2 CONNECT CONNECTOR

(a) Reconnect the J10 connector to the junction connector.

NEXT

3 CHECK CAN BUS LINE FOR SHORT TO B+ (ECM)



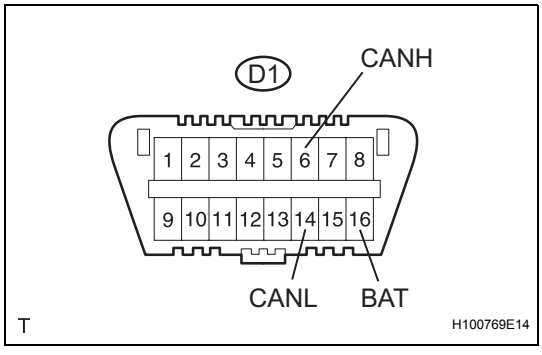
(a) Disconnect the E5 ECM connector.
(b) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher
D1-14 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher

OK → REPLACE ECM

NG

4 CHECK CAN BUS LINE FOR SHORT TO B+ (A/C AMPLIFIER)



(a) Reconnect the E5 ECM connector.
(b) Disconnect the A17 amplifier connector.
(c) Measure the resistance of the DLC3.
Standard resistance

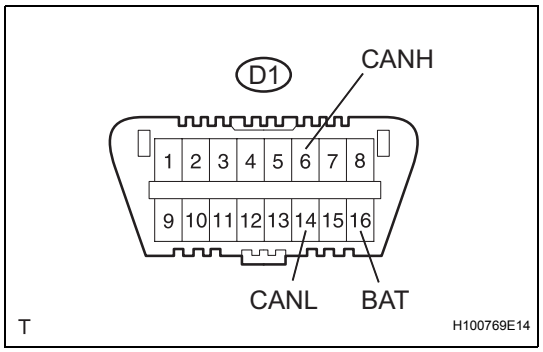
Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher
D1-14 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher

CA

OK → **REPLACE A/C AMPLIFIER**

NG

5 CHECK CAN BUS LINE FOR SHORT TO B+ (SKID CONTROL ECU)



(a) Reconnect the A17 amplifier connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the DLC3.

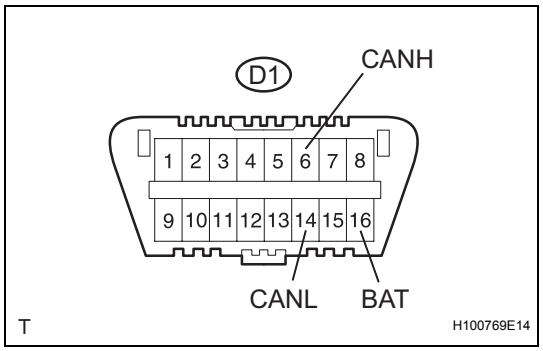
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher
D1-14 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher

OK → **REPLACE SKID CONTROL ECU**

NG

6 CHECK CAN BUS LINE FOR SHORT TO B+ (STEERING SENSOR)



(a) Reconnect the S1 ECU connector.
(b) Disconnect the S15 sensor connector.
(c) Measure the resistance of the DLC3.

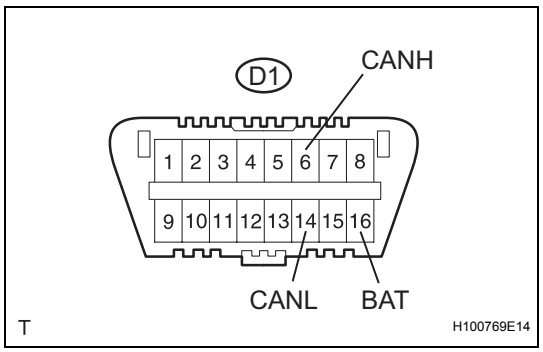
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher
D1-14 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher

OK → **REPLACE STEERING SENSOR**

NG

7 CHECK CAN BUS LINE FOR SHORT TO B+ (YAW RATE SENSOR)



(a) Reconnect the S15 sensor connector.
(b) Disconnect the Y1 sensor connector.
(c) Measure the resistance of the DLC3.

Standard resistance

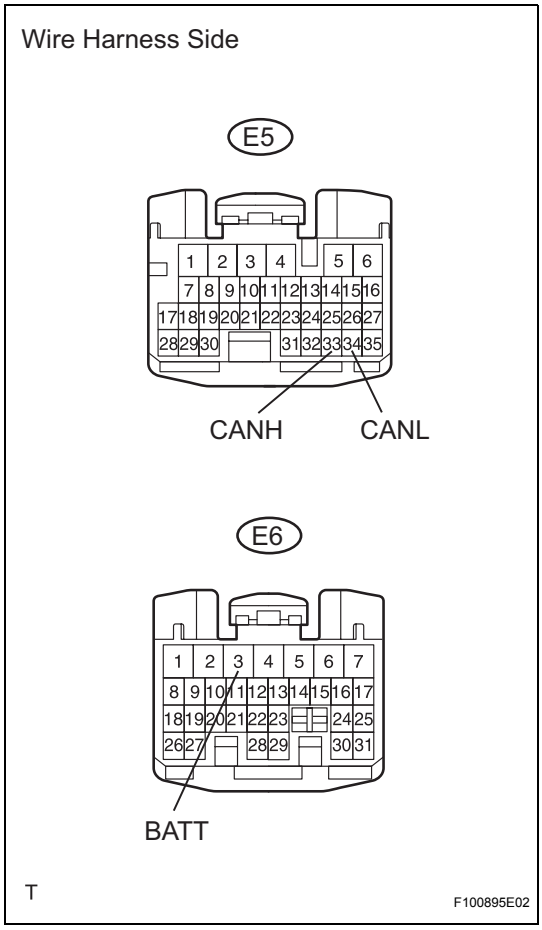
Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher
D1-14 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher

OK → **REPLACE YAW RATE SENSOR**

NG

CA

8 CHECK CAN BUS LINE FOR SHORT TO B+ (ECM - JUNCTION CONNECTOR)



(a) Reconnect the Y1 sensor connector.
(b) Disconnect the J10 junction connector.
(c) Disconnect the E5 and E6 ECM connectors.
(d) Measure the resistance of the wire harness side connector.

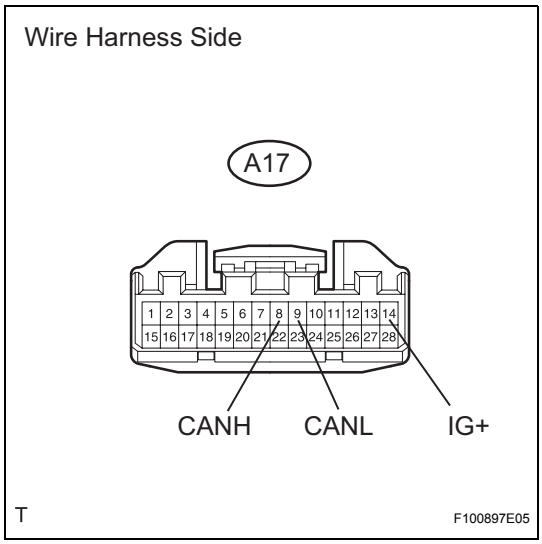
Standard resistance

Tester Connection	Condition	Specified Condition
E5-33 (CANH) - E6-3 (BATT)	Ignition switch OFF	1 MΩor higher
E5-34 (CANL) - E6-3 (BATT)	Ignition switch OFF	1 MΩor higher

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE AND CONNECTOR (ECM - JUNCTION CONNECTOR)**

OK

9 CHECK CAN BUS LINE FOR SHORT TO B+ (A/C AMPLIFIER - JUNCTION CONNECTOR)



(a) Disconnect the A17 amplifier connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
A17-8 (CANH) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher
A17-9 (CANL) - D1-16 (BAT)	Ignition switch OFF	1 MΩor higher

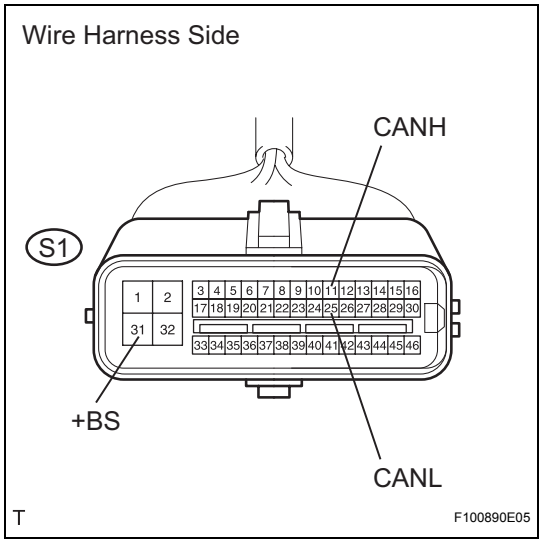
HINT:
Check the wire harness of the connector that was connected to the junction connector.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE AND CONNECTOR (A/C AMPLIFIER - JUNCTION CONNECTOR)**

CA

OK

10	**CHECK CAN BUS LINE FOR SHORT TO B+ (SKID CONTROL ECU - JUNCTION CONNECTOR)**



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

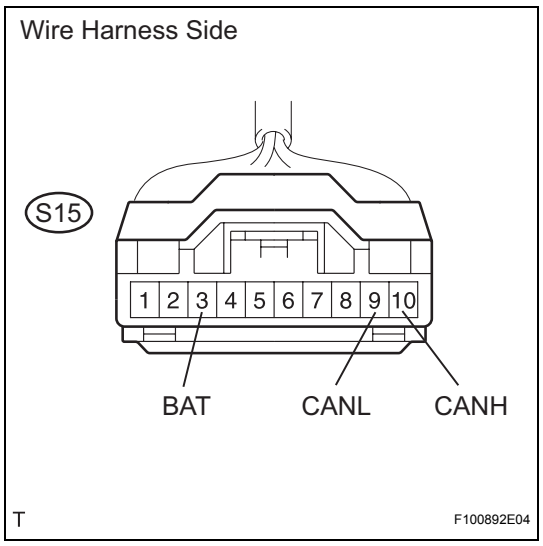
Standard resistance

Tester Connection	Condition	Specified Condition
S1-11 (CANH) - S1-31 (+BS)	Ignition switch OFF	1 MΩor higher
S1-25 (CANL) - S1-31 (+BS)	Ignition switch OFF	1 MΩor higher

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR)**

OK

11	**CHECK CAN BUS LINE FOR SHORT TO B+ (STEERING SENSOR - JUNCTION CONNECTOR)**



(a) Disconnect the S15 sensor connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
S15-10 (CANH) - S15-3 (BAT)	Ignition switch OFF	1 MΩor higher
S15-9 (CANL) - S15-2 (ESS)	Ignition switch OFF	1 MΩor higher

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR)**

OK

REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE AND CONNECTOR

CA

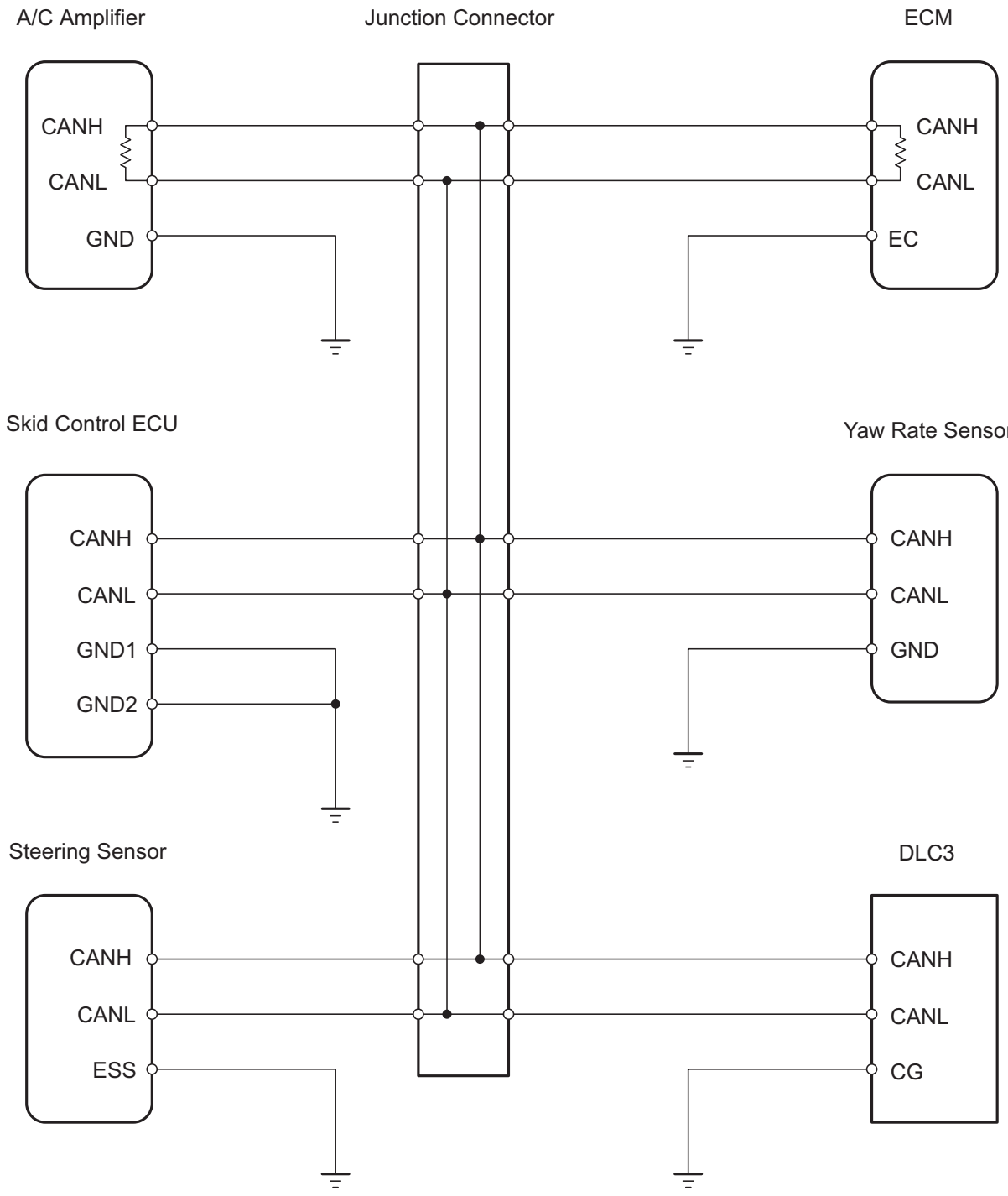
Short to GND in CAN Bus Line

DESCRIPTION

A short to GND may be occurring in the CAN bus line when there is a short between terminals 4 (CG) and 6 (CANH) or terminals 4 (CG) and 14 (CANL) of the DLC3.

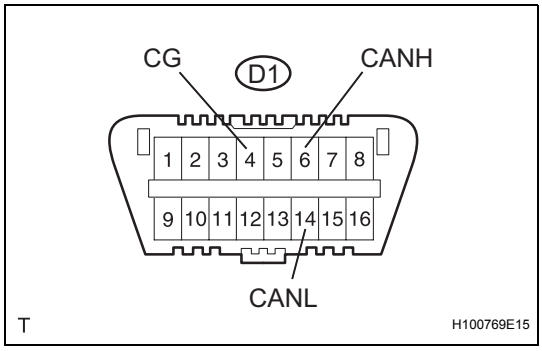
Symptom	Trouble Area
Short between terminals 4 (CG) and 6 (CANH) or 4 (CG) and 14 (CANL) of DLC3	• Short to GND • Skid control ECU • Steering sensor • Yaw rate sensor • ECM • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR SHORT TO GND (DLC3 SUB BUS LINE)



(a) Disconnect the J10 junction connector.
(b) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-4 (CG)	Ignition switch OFF	1 MΩor higher
D1-14 (CANL) - D1-4 (CG)	Ignition switch OFF	1 MΩor higher

NG → **REPAIR OR REPLACE DLC3 SUB BUS LINE AND CONNECTOR**

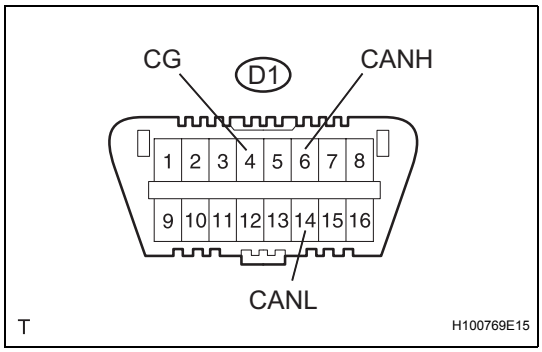
OK

2 CONNECT CONNECTOR

(a) Reconnect the J10 connector to the junction connector.

NEXT

3 CHECK CAN BUS LINE FOR SHORT TO GND (ECM)



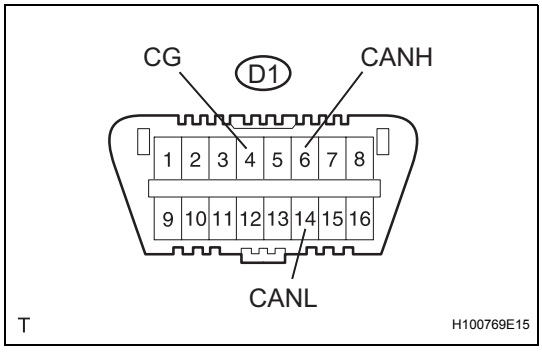
(a) Disconnect the E5 ECM connector.
(b) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher
D1-14 (CANL) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher

OK → **REPLACE ECM**

NG

4 CHECK CAN BUS LINE FOR SHORT TO GND (A/C AMPLIFIER)



(a) Reconnect the E5 ECM connector.
(b) Disconnect the A17 amplifier connector.
(c) Measure the resistance of the DLC3.
Standard resistance

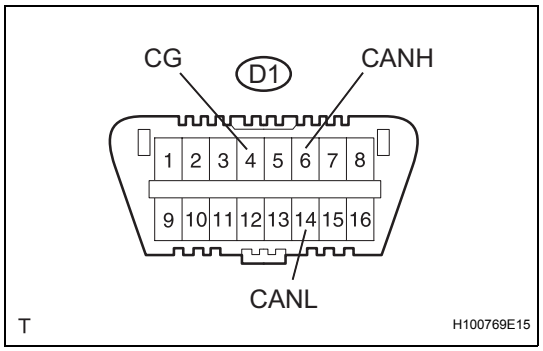
Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher
D1-14 (CANL) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher

OK → **REPLACE A/C AMPLIFIER**

CA

NG

5 CHECK CAN BUS LINE FOR SHORT TO GND (SKID CONTROL ECU)



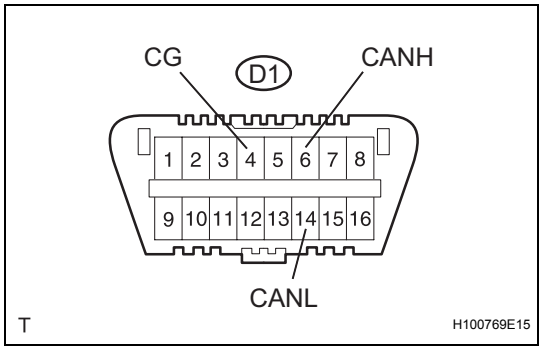
(a) Reconnect the A17 amplifier connector.
(b) Disconnect the S1 ECU connector.
(c) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher
D1-14 (CANL) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher

OK → **REPLACE SKID CONTROL ECU**

NG

6 CHECK CAN BUS LINE FOR SHORT TO GND (STEERING SENSOR)



(a) Reconnect the S1 ECU connector.
(b) Disconnect the S15 sensor connector.
(c) Measure the resistance of the DLC3.
Standard resistance

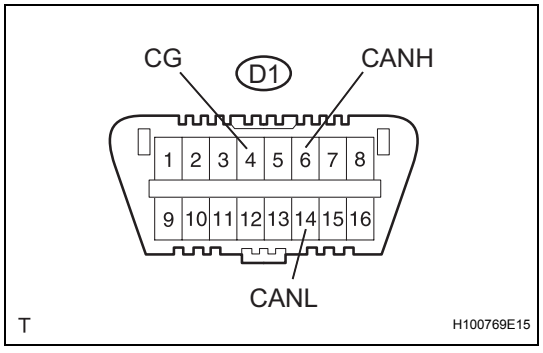
Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher
D1-14 (CANL) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher

OK → **REPLACE STEERING SENSOR**

NG

7 CHECK CAN BUS LINE FOR SHORT TO GND (YAW RATE SENSOR)

CA



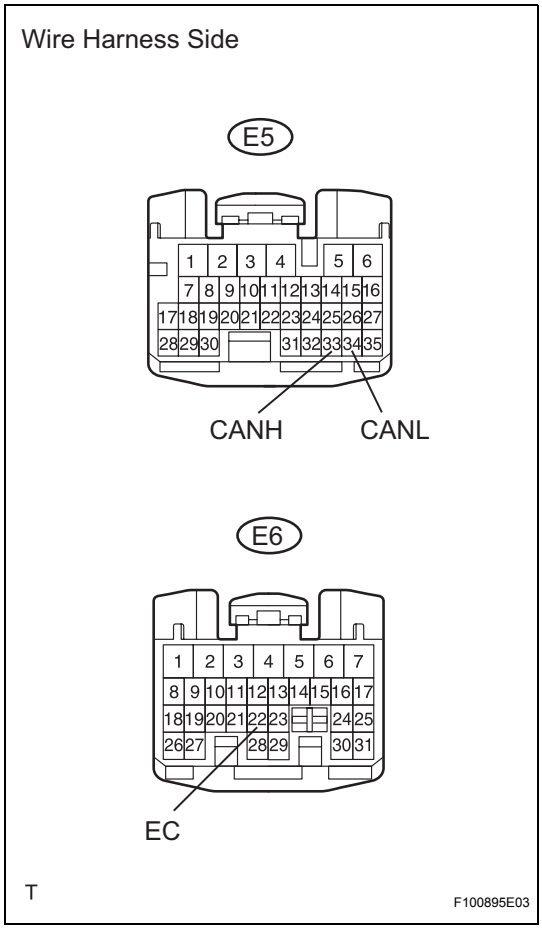
(a) Reconnect the S15 sensor connector.
(b) Disconnect the Y1 sensor connector.
(c) Measure the resistance of the DLC3.
Standard resistance

Tester Connection	Condition	Specified Condition
D1-6 (CANH) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher
D1-14 (CANL) - D1-4 (CG)	Ignition switch OFF	3 kΩor higher

OK → **REPLACE YAW RATE SENSOR**

NG

8 CHECK CAN BUS LINE FOR SHORT TO GND (ECM - JUNCTION CONNECTOR)



(a) Reconnect the Y1 sensor connector.
(b) Disconnect the J10 junction connector.
(c) Disconnect the E5 and E6 ECM connectors.
(d) Measure the resistance of the wire harness side connector.

Standard resistance

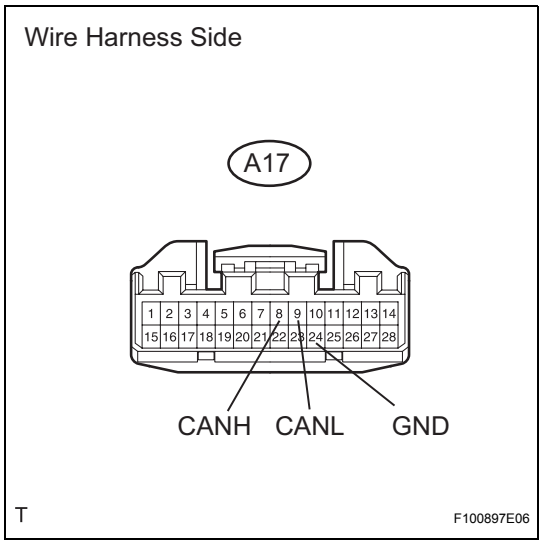
Tester Connection	Condition	Specified Condition
E5-33 (CANH) - E6-22 (EC)	Ignition switch OFF	3 kΩor higher
E5-34 (CANL) - E6-22 (EC)	Ignition switch OFF	3 kΩor higher

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE AND CONNECTOR (ECM - JUNCTION CONNECTOR)**

OK

9 CHECK CAN BUS LINE FOR SHORT TO GND (A/C AMPLIFIER - JUNCTION CONNECTOR)

CA



(a) Disconnect the A17 amplifier connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

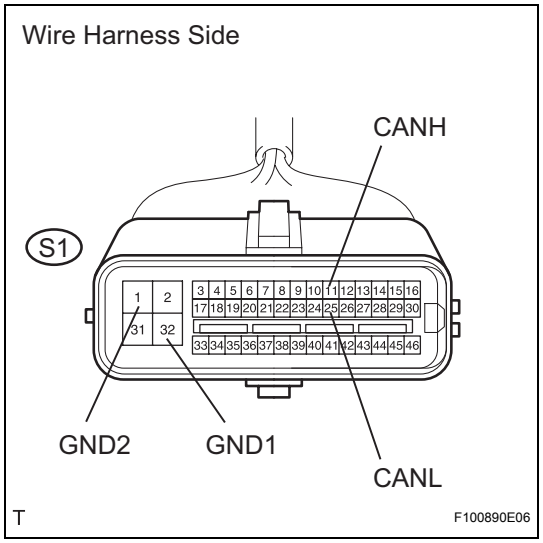
Tester Connection	Condition	Specified Condition
A17-8 (CANH) - A17-24 (GND)	Ignition switch OFF	3 kΩor higher
A17-9 (CANL) - A17-24 (GND)	Ignition switch OFF	3 kΩor higher

HINT:
Check the wire harness of the connector that was connected to the junction connector.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE AND CONNECTOR (A/C AMPLIFIER - JUNCTION CONNECTOR)**

OK

10	**CHECK CAN BUS LINE FOR SHORT TO GND (SKID CONTROL ECU - JUNCTION CONNECTOR)**



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

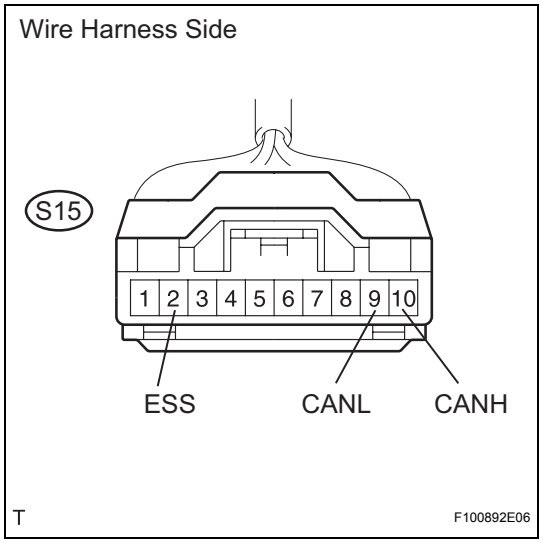
Standard resistance

Tester Connection	Condition	Specified Condition
S1-11 (CANH) - S1-32 (GND1)	Ignition switch OFF	3 kΩor higher
S1-11 (CANH) - S1-1 (GND2)	Ignition switch OFF	3 kΩor higher
S1-25 (CANL) - S1-32 (GND1)	Ignition switch OFF	3 kΩor higher
S1-25 (CANL) - S1-1 (GND2)	Ignition switch OFF	3 kΩor higher

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR)**

OK

11	**CHECK CAN BUS LINE FOR SHORT TO GND (STEERING SENSOR - JUNCTION CONNECTOR)**



(a) Disconnect the S15 sensor connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
S15-10 (CANH) - S15-2 (ESS)	Ignition switch OFF	3 kΩor higher
S15-9 (CANL) - S15-2 (ESS)	Ignition switch OFF	3 kΩor higher

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR)**

OK

REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE AND CONNECTOR

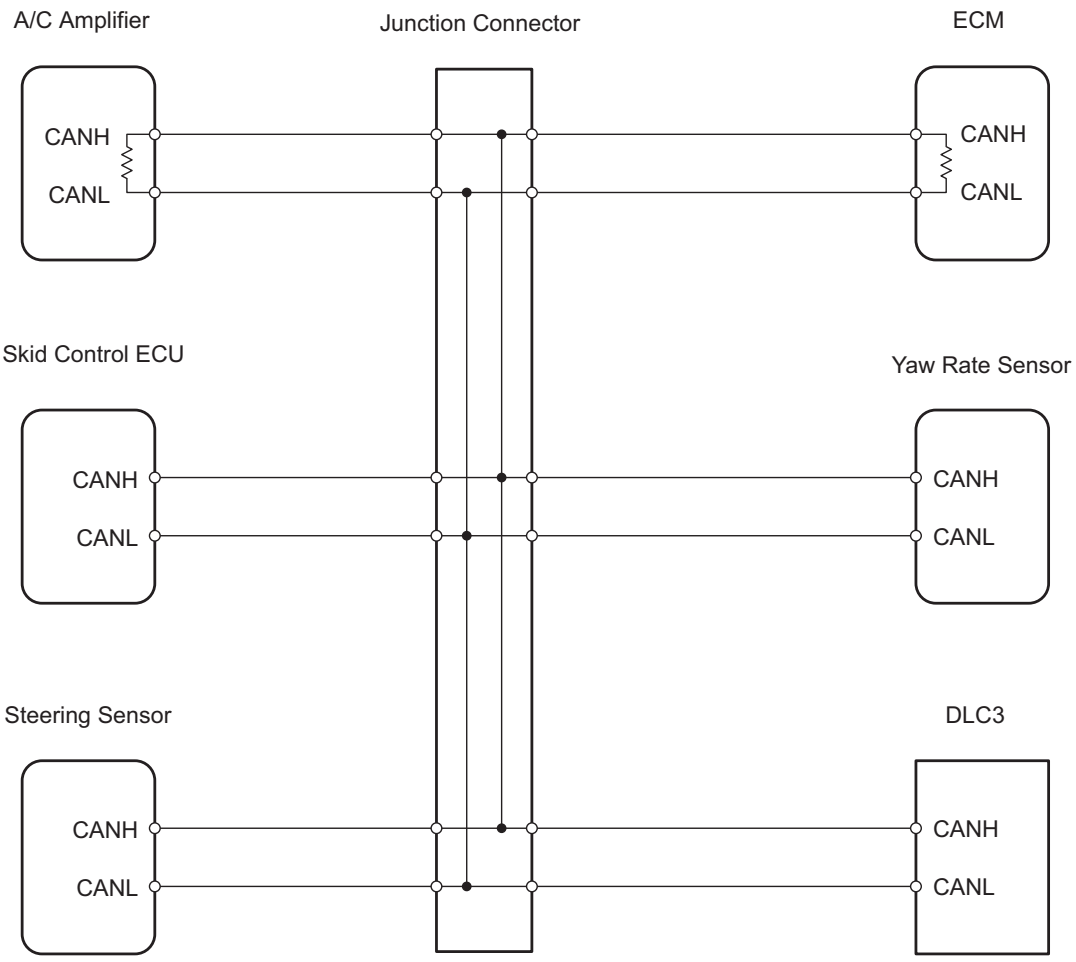
CA

Open in One Side of CAN Sub Bus Line

DESCRIPTION

If 2 or more ECUs and/or sensors do not appear on the intelligent tester's "BUS CHECK" screen via the CAN VIM, one side of the CAN sub bus line may be open (One side of the CANH [sub bus line] /CANL [sub bus line] of the ECU and/or sensor is open).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Perform the following inspection for the ECUs (sensors) which are not displayed on the intelligent tester. If a malfunction cannot be identified, perform the following inspections for the ECUs (sensors) connected to the CAN communication system.

- Do not remove the A/C amplifier and ECM, as they are the end parts of the circuit. If removed, CAN communication will not be possible.
- The open circuit confirmation of the A/C amplifier, ECM and main bus is performed in the CHECK CAN BUS LINE procedure of HOW TO PROCEED WITH TROUBLESHOOTING. This inspection only has procedures for checking for an open circuit on one side of the sub bus line.

1 CHECK FOR OPEN IN ONE SIDE OF CAN SUB BUS LINE (SKID CONTROL ECU)

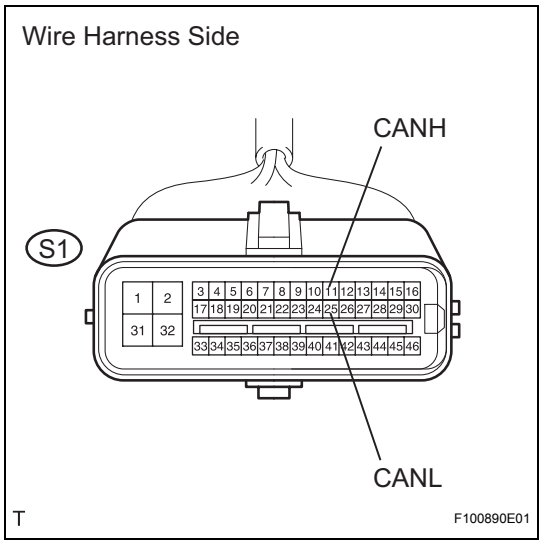
(a) Disconnect the S1 ECU connector.
(b) Select "BUS CHECK" on the intelligent tester display via the CAN VIM (see page CA-13).
Result

Result	Proceed to
ABS/VSC/TRAC are not displayed on intelligent tester.	A
Several ECUs and sensors other than ABS/VSC/TRAC are not displayed on intelligent tester.	B

B → **Go to step 3**

A

2 CHECK FOR OPEN IN ONE SIDE OF CAN SUB BUS LINE (SKID CONTROL ECU)



(a) Measure the resistance of the wire harness side connector.
Standard resistance:
54 to 69 Ω

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (SKID CONTROL ECU)**

OK

REPLACE SKID CONTROL ECU

3 CHECK FOR OPEN IN ONE SIDE OF CAN SUB BUS LINE (STEERING SENSOR)

(a) Disconnect the S15 sensor connector.
(b) Select "BUS CHECK" on the intelligent tester display via the CAN VIM (see page CA-13).

CA

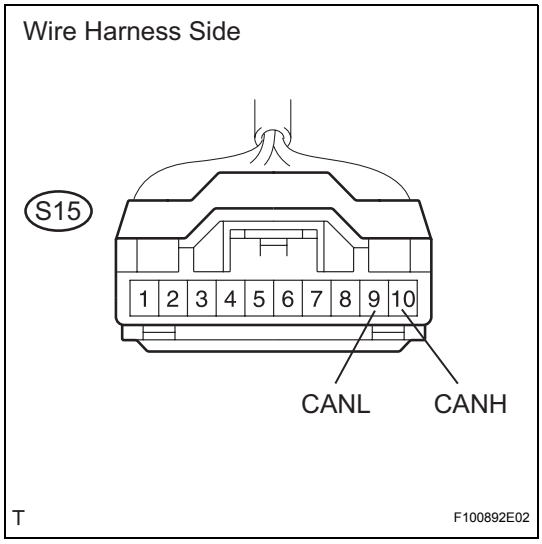
Result

Result	Proceed to
STEERING SENSOR is not displayed on intelligent tester.	A
Several ECUs and sensors other than STEERING SENSOR are not displayed on intelligent tester.	B

B → **Go to step 5**

A

4 CHECK FOR OPEN IN ONE SIDE OF CAN SUB BUS LINE (STEERING SENSOR)



(a) Measure the resistance of the wire harness side connector.
Standard resistance:
54 to 69 Ω

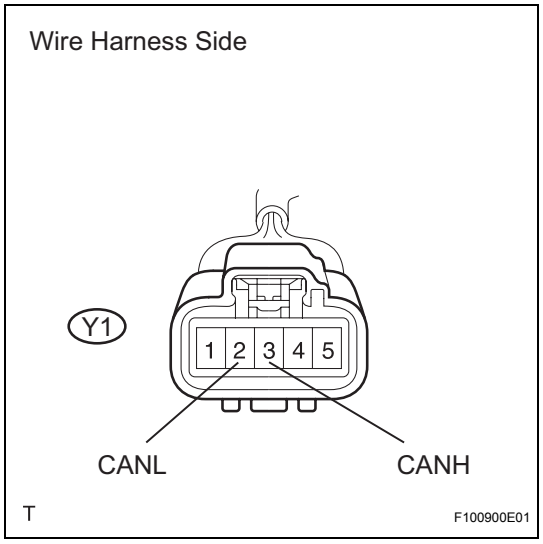
NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (STEERING SENSOR)**

OK

REPLACE STEERING SENSOR

CA

5	**CHECK FOR OPEN IN ONE SIDE OF CAN SUB BUS LINE (YAW RATE SENSOR)**



(a) Disconnect the Y1 sensor connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance:
54 to 69 Ω

NG → **REPAIR OR REPLACE CAN SUB BUS LINE AND CONNECTOR (YAW RATE SENSOR)**

OK

REPLACE YAW RATE SENSOR

CA

HOW TO PROCEED WITH TROUBLESHOOTING

NOTICE:
When DTCs other than U0073/94 (C1223/43), U0100/65, U0123/62, U0124/95 (1223/43), U0126/63, and B1499 are output, inspect and repair the trouble areas indicated by the DTCs from other systems first.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	CHECK AND CLEAR DTC

HINT:
When checking the DTCs for the skid control ECU (see page BC-74).

NEXT

4	CHECK CAN BUS LINE

(a) Check CAN bus line (see page CA-27).

NEXT

5	CHECK INTELLIGENT TESTER VIA CAN VIM

(a) Select "BUS CHECK" (see page CA-13).

Result

Result	Proceed to
All ECUs and sensors connected to the CAN communication system are displayed.	A
An ECU or sensor not connected to the CAN communication system is displayed.	B
A few ECUs or sensors not connected to the CAN communication system are displayed.	C

B → GO TO PROBLEM SYMPTOMS TABLE (COMMUNICATION STOP MODE TABLE)

CA

C → GO TO CHECK FOR AN OPEN IN ONE SIDE OF THE CAN SUB BUS LINE

A

6	CHECK DTC COMBINATION TABLE

(a) Confirm trouble according to the combination of output DTCs regarding the CAN communication system.
HINT:
Previous CAN communication system DTCs may be the cause if CAN communication system DTCs are output and all ECUs and sensors connected to the CAN communication system are displayed on the intelligent tester's "BUS CHECK" screen vie CAN VIM.

(b) Check DTC combination table (see page CA-13).

NEXT

7	CIRCUIT INSPECTION

NEXT

8	IDENTIFICATION OF PROBLEM

NEXT

9	REPAIR OR REPLACE

NEXT

CA

10	CONFIRMATION TEST

NEXT

END

PROBLEM SYMPTOMS TABLE

Result list of how to proceed with troubleshooting

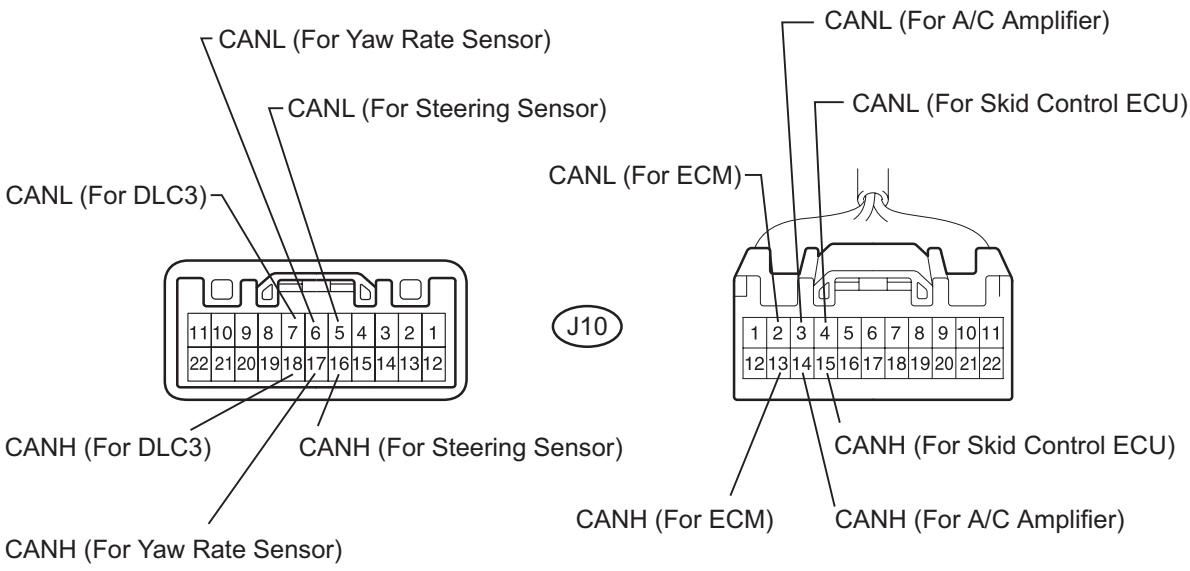
Symptom	Suspected area	See page
Open in CAN Main Bus Line	CHECK CAN MAIN BUS LINE FOR DISCONNECTION	CA-31
Short in CAN Bus Line	CHECK CAN BUS LINE FOR SHORT CIRCUIT	CA-35
Short to B+ in CAN Bus Line	CHECK CAN BUS LINE FOR SHORT TO B+	CA-41
Short to GND in CAN Bus Line	CHECK CAN BUS LINE FOR SHORT TO GND	CA-47
Open in One Side of CAN Sub Bus Line	CHECK FOR AN OPEN IN ONE SIDE OF THE CAN SUB BUS LINE	CA-53

Communication stop mode table

Symptom	Suspected area	See page
ENGINE is not displayed on the intelligent tester via CAN VIM	ECM COMMUNICATION STOP MODE	CA-24
SKID CONTROL ECU is not displayed on the intelligent tester via CAN VIM	SKID CONTROL ECU COMMUNICATION STOP MODE	CA-16
STEERING SENSOR is not displayed on the intelligent tester via CAN VIM	STEERING SENSOR COMMUNICATION STOP MODE	CA-20
YAW RATE SENSOR is not displayed on the intelligent tester via CAN VIM	YAW RATE SENSOR COMMUNICATION STOP MODE	CA-22
A/C AMPLIFIER is not displayed on the intelligent tester via CAN VIM	A/C CONDITIONING AMPLIFIER COMMUNICATION STOP MODE	CA-18

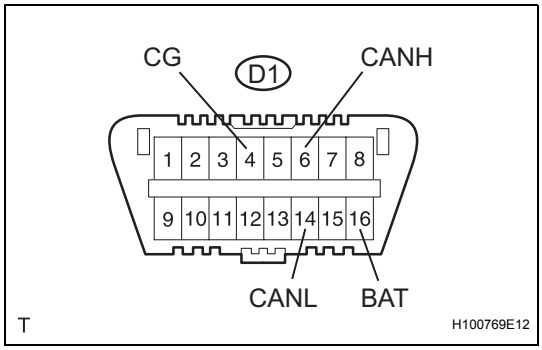
TERMINALS OF ECU

1. JUNCTION CONNECTOR



Junction Connector	Wiring Color	Connect to
CANH (J10-13)	B	ECM
CANL (J10-2)	W	ECM
CANH (J10-14)	B	A/C Amplifier
CANL (J10-3)	W	A/C Amplifier
CANH (J10-15)	B	Skid Control ECU
CANL (J10-4)	W	Skid Control ECU
CANH (J10-16)	B	Steering Sensor
CANL (J10-5)	W	Steering Sensor
CANH (J10-17)	B	Yaw Rate Sensor
CANL (J10-6)	W	Yaw Rate Sensor
CANH (J10-18)	B	DLC3
CANL (J10-7)	W	DLC3

CA



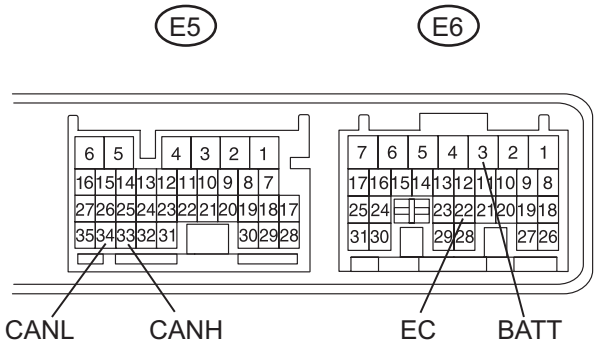
2. CHECK DLC3

(a) Measure the resistance of the connector.

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (D1-6) - CANL (D1-14)	B - W	Ignition switch OFF	54 to 69 Ω
CANH (D1-6) - CG (D1-4)	B - W-B	Ignition switch OFF	3 kΩ or higher
CANL (D1-14) - CG (D1-4)	W - W-B	Ignition switch OFF	3 kΩ or higher

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (D1-6) - BAT (D1-16)	B - B-O	Ignition switch OFF	1 MΩ or higher
CANL (D1-14) - BAT (D1-16)	W - B-O	Ignition switch OFF	1 MΩ or higher

3. CHECK ECM



T F100896E02

(a) Measure the resistance of the connector.

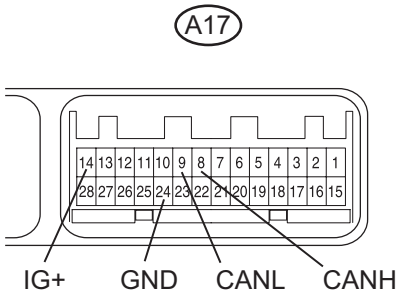
Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (E5-33) - CANL (E5-34)	B - W	Ignition switch OFF	54 to 69 Ω

(b) Disconnect the E5 and E6 ECM connectors.
(c) Measure the resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (E5-33) - CANL (E5-34)	B - W	Ignition switch OFF	108 to 132 Ω
CANH (E5-33) - EC (E6-22)	B - W-B	Ignition switch OFF	3 kΩ or higher
CANL (E5-34) - EC (E6-22)	W - W-B	Ignition switch OFF	3 kΩ or higher
CANH (E5-33) - BATT (E6-3)	B - B-Y	Ignition switch OFF	1 MΩ or higher
CANL (E5-34) - BATT (E6-3)	W - B-Y	Ignition switch OFF	1 MΩ or higher

4. CHECK A/C AMPLIFIER

CA



T F100906E02

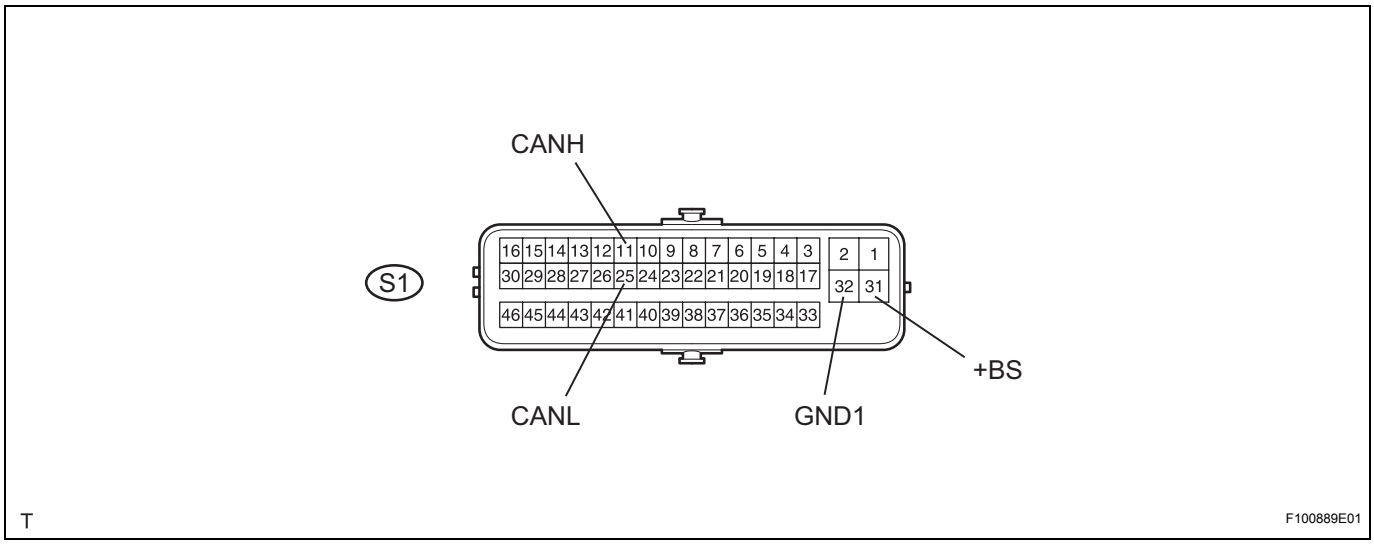
(a) Measure the resistance of the connector.

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (A17-8) - CANL (A17-9)	B - W	Ignition switch OFF	54 to 69 Ω

(b) Disconnect the A17 amplifier connector.
(c) Measure the resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (A17-8) - CANL (A17-9)	B - W	Ignition switch OFF	108 to 132 Ω
CANH (A17-8) - GND (A17-24)	B - W-B	Ignition switch OFF	3 kΩ or higher
CANL (A17-9) - GND (A17-24)	W - W-B	Ignition switch OFF	3 kΩ or higher
CANH (A17-8) - IG+ (A17-14)	B - L	Ignition switch OFF	1 MΩ or higher
CANL (A17-9) - IG+ (A17-14)	W - L	Ignition switch OFF	1 MΩ or higher

5. CHECK SKID CONTROL ECU

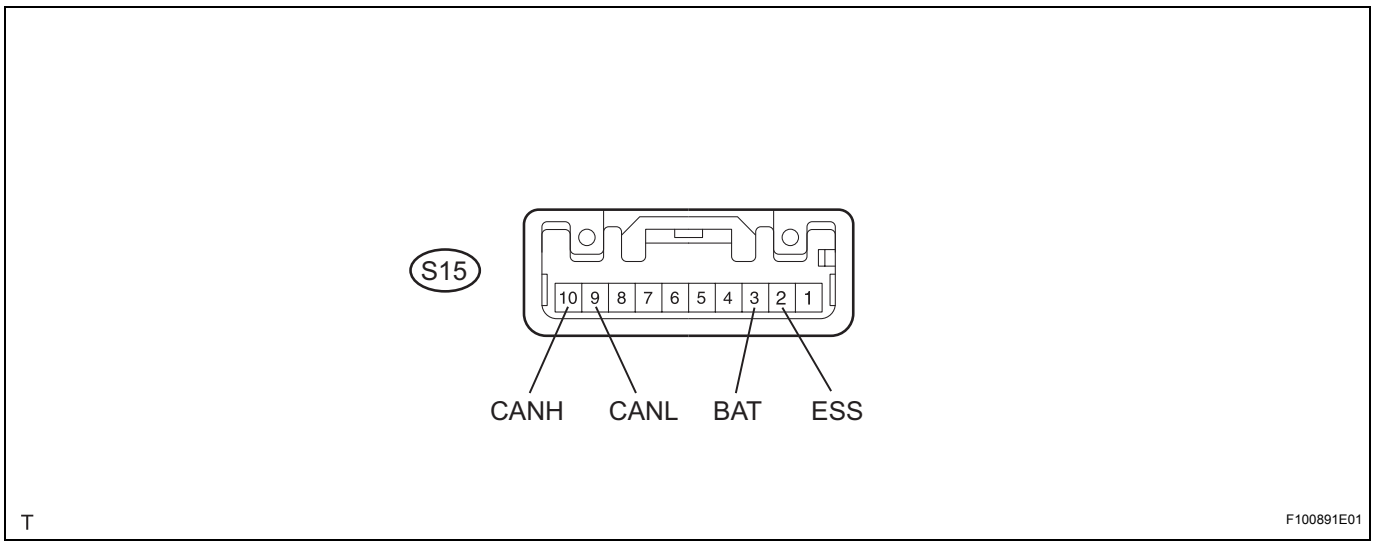


(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.

CA

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (S1-11) - CANL (S1-25)	B - W	Ignition switch OFF	54 to 69 Ω
CANH (S1-11) - GND1 (S1-32)	B - W-B	Ignition switch OFF	3 kΩ or higher
CANL (S1-25) - GND1 (S1-32)	W - W-B	Ignition switch OFF	3 kΩ or higher
CANH (S1-11) - +BS (S1-31)	B - B	Ignition switch OFF	1 MΩ or higher
CANL (S1-25) - +BS (S1-31)	W - B	Ignition switch OFF	1 MΩ or higher

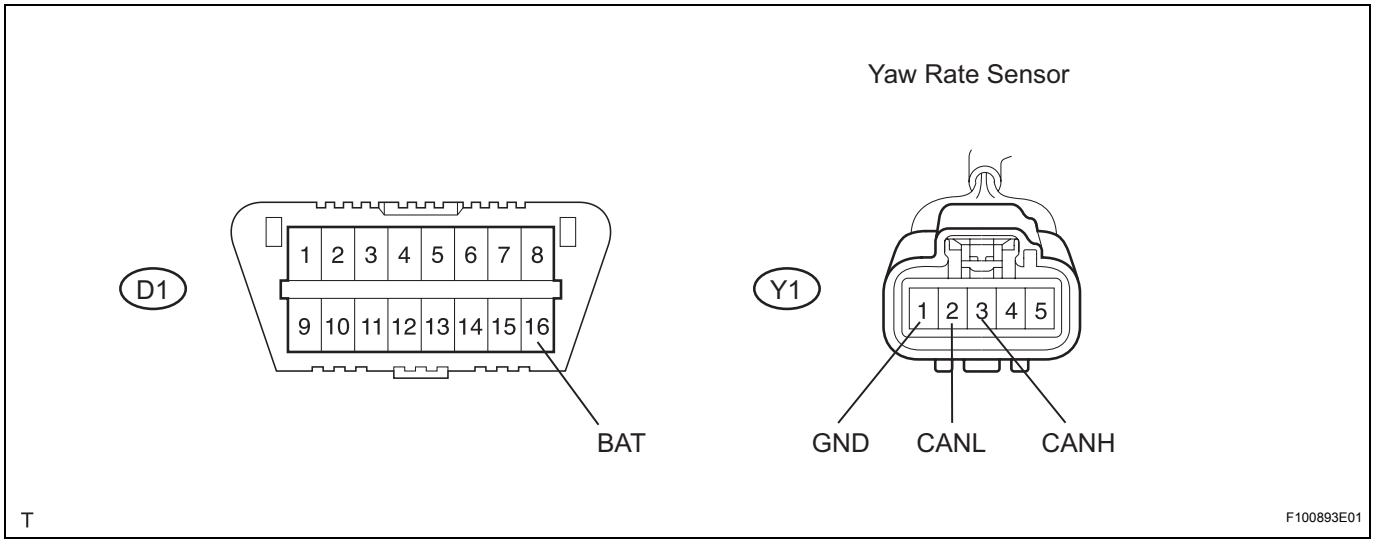
6. CHECK STEERING SENSOR



(a) Disconnect the S15 sensor connector.
(b) Measure the resistance of the wire harness side connector.

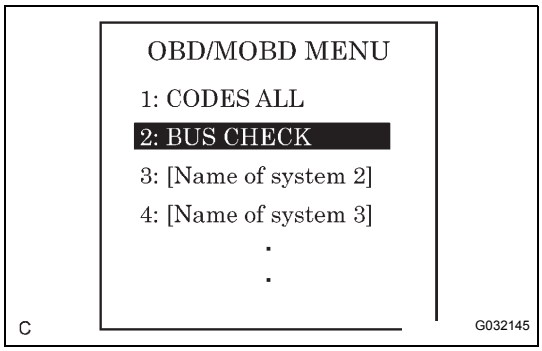
Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (S15-10) - CANL (S15-9)	B - W	Ignition switch OFF	54 to 69 Ω
CANH (S15-10) - ESS (S15-2)	B - W-B	Ignition switch OFF	3 kΩ or higher
CANL (S15-9) - ESS (S15-2)	W - W-B	Ignition switch OFF	3 kΩ or higher
CANH (S15-10) - BAT (S15-3)	B - W-R	Ignition switch OFF	1 MΩ or higher
CANL (S15-9) - BAT (S15-3)	W - W-R	Ignition switch OFF	1 MΩ or higher

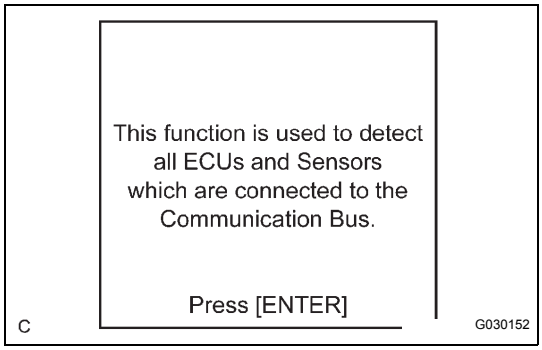
7. CHECK YAW RATE SENSOR

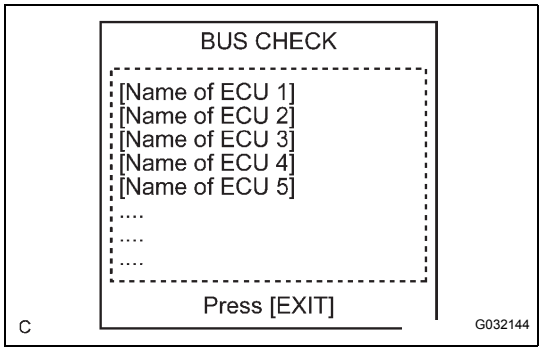


(a) Disconnect the Y1 sensor connector.
(b) Measure the resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
CANH (Y1-3) - CANL (Y1-2)	B - W	Ignition switch OFF	54 to 69 Ω
CANH (Y1-3) - GND (Y1-1)	B - W-B	Ignition switch OFF	3 kΩ or higher
CANL (Y1-3) - GND (Y1-1)	W - W-B	Ignition switch OFF	3 kΩ or higher
CANH (Y1-3) - BAT (D1-16)	B - B-O	Ignition switch OFF	1 MΩ or higher
CANL (Y1-2) - BAT (D1-16)	W - B-O	Ignition switch OFF	1 MΩ or higher







DIAGNOSIS SYSTEM

1. BUS CHECK

(a) Select "BUS CHECK" from the "OBD/MOBD MENU" screen.
HINT:
The ECUs and sensors that are properly connected to the CAN communication system can be displayed using the intelligent tester via the CAN VIM.

(b) Press "ENTER" on the intelligent tester.

(c) The screen displays the ECUs that are properly connected to the CAN communication system.
HINT:
There is a communication stop in the system of any properly connected ECUs that are not displayed.

2. DTC TABLE BY ECU

HINT:

- In the CAN communication system, CAN communication system DTCs can be displayed by the ECU using the intelligent tester.
- If CAN communication system DTCs are output, the trouble cannot be determined only by checking the DTCs.
  Perform troubleshooting according to "HOW TO PROCEED WITH TROUBLESHOOTING" (see page CA-5).

(a) ECM
HINT:
The ECM is connected to the CAN communication system, but CAN communication system DTCs are not output.

(b) SKID CONTROL ECU
HINT:
DTC communication uses the SIL Line.

DTC No.	Detection Item
U0073/94 (C1223/43)	Control Module Communication Bus OFF
U0100/65	LOST Communication with ECM/PCM
U0123/62	LOST Communication with Yaw Rate Sensor Module
U0124/95 (C1223/43)	LOST Communication with Lateral Acceleration Sensor Module
U0126/63	LOST Communication with Steering Angle Sensor Module

CA

(c) A/C AMPLIFIER
HINT:
The A/C amplifier is connected to the CAN communication system but CAN communication DTCs are not output.

DTC No.	Detection Item
B1499	LOST Communication with ECM Module

3. DTC, BUS CHECK COMBINATION TABLE

-	Output from	Output DTC	ECM COMMUNICATION STOP MODE	SKID CONTROL ECU COMMUNICATION STOP MODE	STEERING SENSOR COMMUNICATION STOP MODE	YAW RATE SENSOR COMMUNICATION STOP MODE	A/C AMPLIFIER COMMUNICATION STOP MODE
DTC	Skid Control ECU	U0073/94 (C1223/43)	X	O	X	X	X
		U0100/65	▲ During driving	▲ During driving	X	X	X
		U0123/62	X	O	X	O	X
		U0124/95 (C1223/43)	X	O	X	O	X
		U0126/63	X	O	O	X	X
	A/C Amplifier*	B1499	O	X	X	X	X
Bus Check	ECM	-	X	O	O	O	O
	Skid Control ECU	-	O	X	O	O	O
	Steering Sensor	-	O	O	X	O	O
	Yaw Rate Sensor	-	O	O	O	X	O
	A/C Amplifier	-	O	O	O	O	X

HINT:
- O: Output
  ▲: Outputs under specific condition
  X: Not output
- *: When the BUS CHECK is performed but A/C is not displayed, refer to A/C AMPLIFIER COMMUNICATION STOP MODE.

(a) Perform troubleshooting according to the combination of DTCs that are output.
HINT:
- ECM COMMUNICATION STOP MODE (see page CA-24).
- SKID CONTROL ECU COMMUNICATION STOP MODE (see page CA-16).
- STEERING SENSOR COMMUNICATION STOP MODE (see page CA-20).
- YAW RATE SENSOR COMMUNICATION STOP MODE (see page CA-22).
- A/C AMPLIFIER COMMUNICATION STOP MODE (see page CA-18).

CA

FAIL-SAFE CHART

1. FAIL-SAFE FUNCTION

(a) When communication fails in any of the CAN bus lines (communication lines) due to a short circuit or for another reason, the fail-safe function, which is specified for each system, operates to prevent the system from malfunctioning.

(b) The fail-safe function activates on each system when communication is impossible. (For further details, refer to the relevant systems of each part.)

ECM	Skid Control ECU	Steering Sensor	Yaw Rate Sensor	A/C Amplifier	Normal condition	Conditions when communication is impossible	DTC detection (Driver detectable)
B	A	B	B	-	VSC Control (Controls driving force while VSC is in operation)	VSC function stops	Detectable (Light comes on)
B	A	-	-	-	TRC control (Activation control and engine torque control usage during acceleration slip)	TRC function stops	Detectable (Light comes on)
B	-	-	-	A	A/C and PTC heater control	A/C control stops PTC heater control stops	Not Detectable (Detected when A/C is not effective)

HINT:

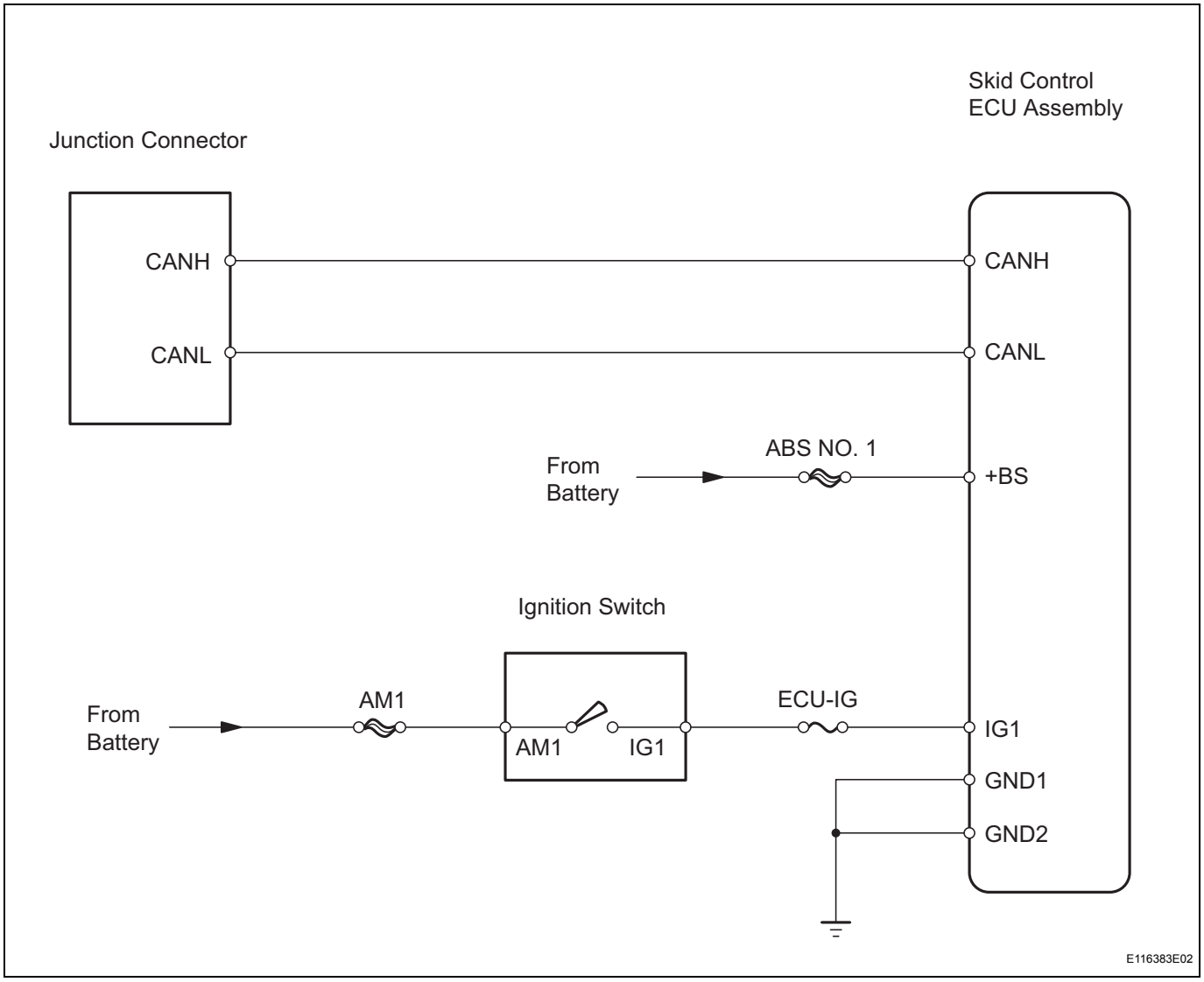
- Fail-safe function operation during an A-B communication error is shown in the above chart.
- A: Main control system
  B: Related system

Skid Control ECU Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
SKID CONTROL ECU COMMUNICATION STOP MODE	• ABS/VSC/TRAC is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "SKID CONTROL ECU COMMUNICATION STOP MODE" in the "DTC, BUS CHECK COMBINATION TABLE"	• Power source or inside the skid control ECU • Skid control ECU sub bus line and connector

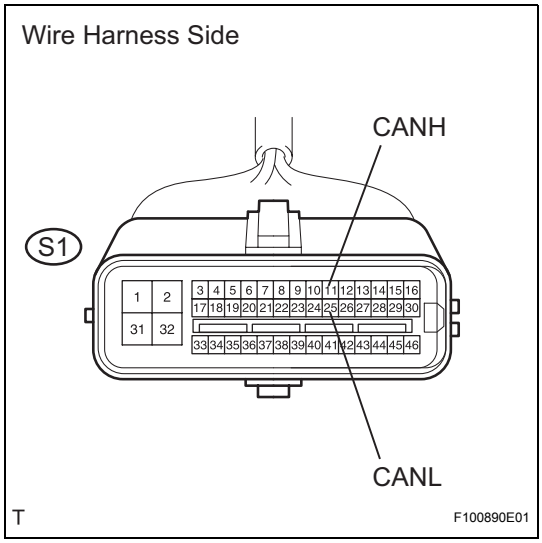
WIRING DIAGRAM



CA

INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR DISCONNECTION (SKID CONTROL ECU SUB BUS LINE)



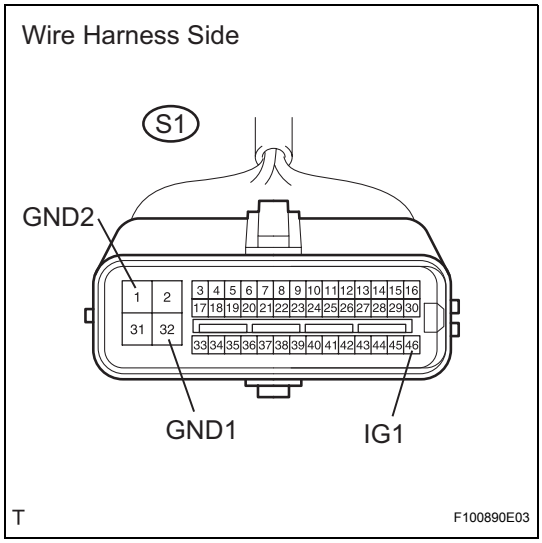
(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Condition	Specified Condition
S1-11 (CANH) - S1-25 (CANL)	Ignition switch OFF	54 to 69 Ω

NG → **REPAIR OR REPLACE SKID CONTROL ECU SUB BUS LINE AND CONNECTOR (CANH, CANL)**

OK

2 CHECK WIRE HARNESS (SKID CONTROL ECU - BATTERY AND BODY GROUND)



(a) Disconnect the S1 ECU connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω
S1-1 (GND2) - Body ground	Below 1 Ω

(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
S1-46 (IG1) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE SKID CONTROL ECU

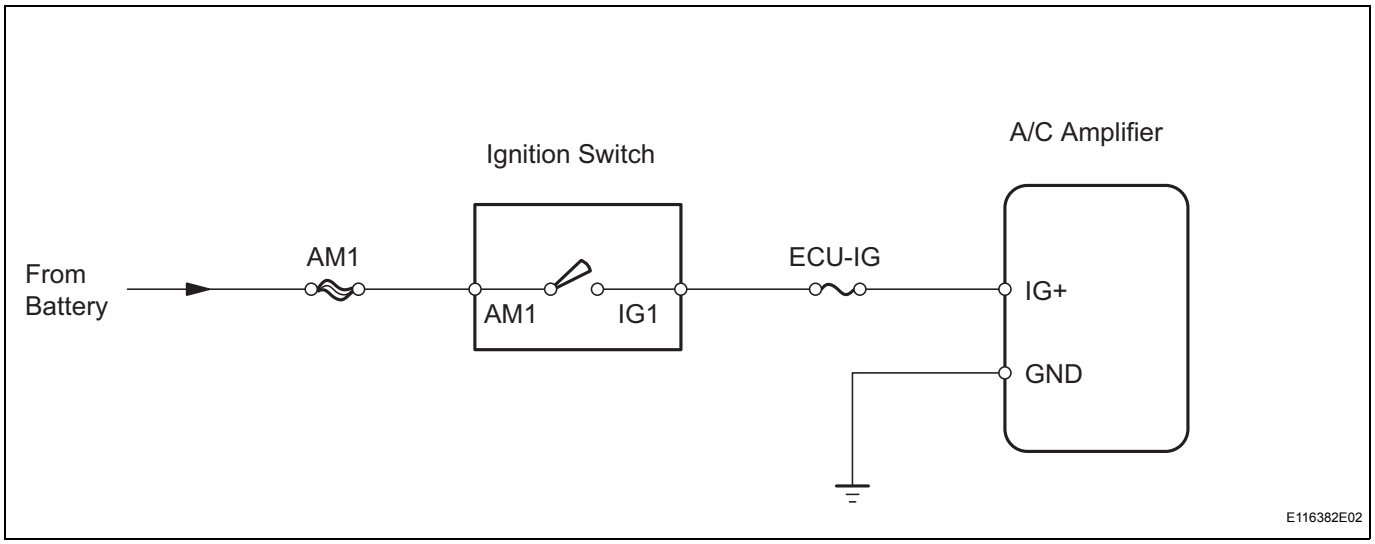
CA

Air Conditioning Amplifier Communication Stop Mode

DESCRIPTION

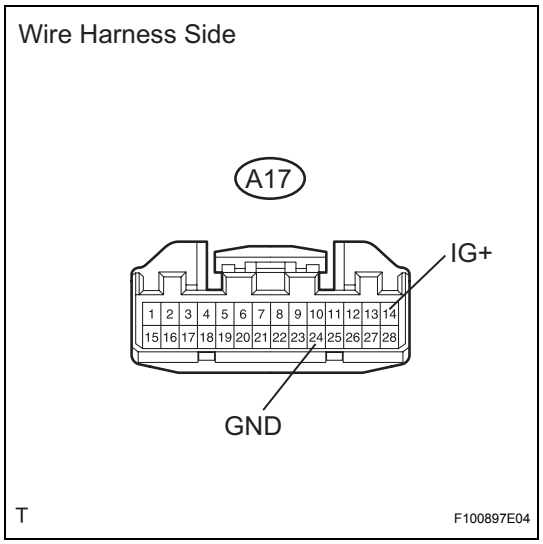
Detection Item	Symptom	Trouble Area
AIR CONDITIONING AMPLIFIER COMMUNICATION STOP MODE	• A/C is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "AIR CONDITIONING AMPLIFIER COMMUNICATION STOP MODE" in the "DTC, BUS CHECK COMBINATION TABLE" • A/C control stops • PTC heater control stops	• Power source or inside the A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (A/C AMPLIFIER - BATTERY AND BODY GROUND)



(a) Disconnect the A17 amplifier connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
A17-24 (GND) - Body ground	Below 1 Ω

(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A17-14 (IG+) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

CA

OK

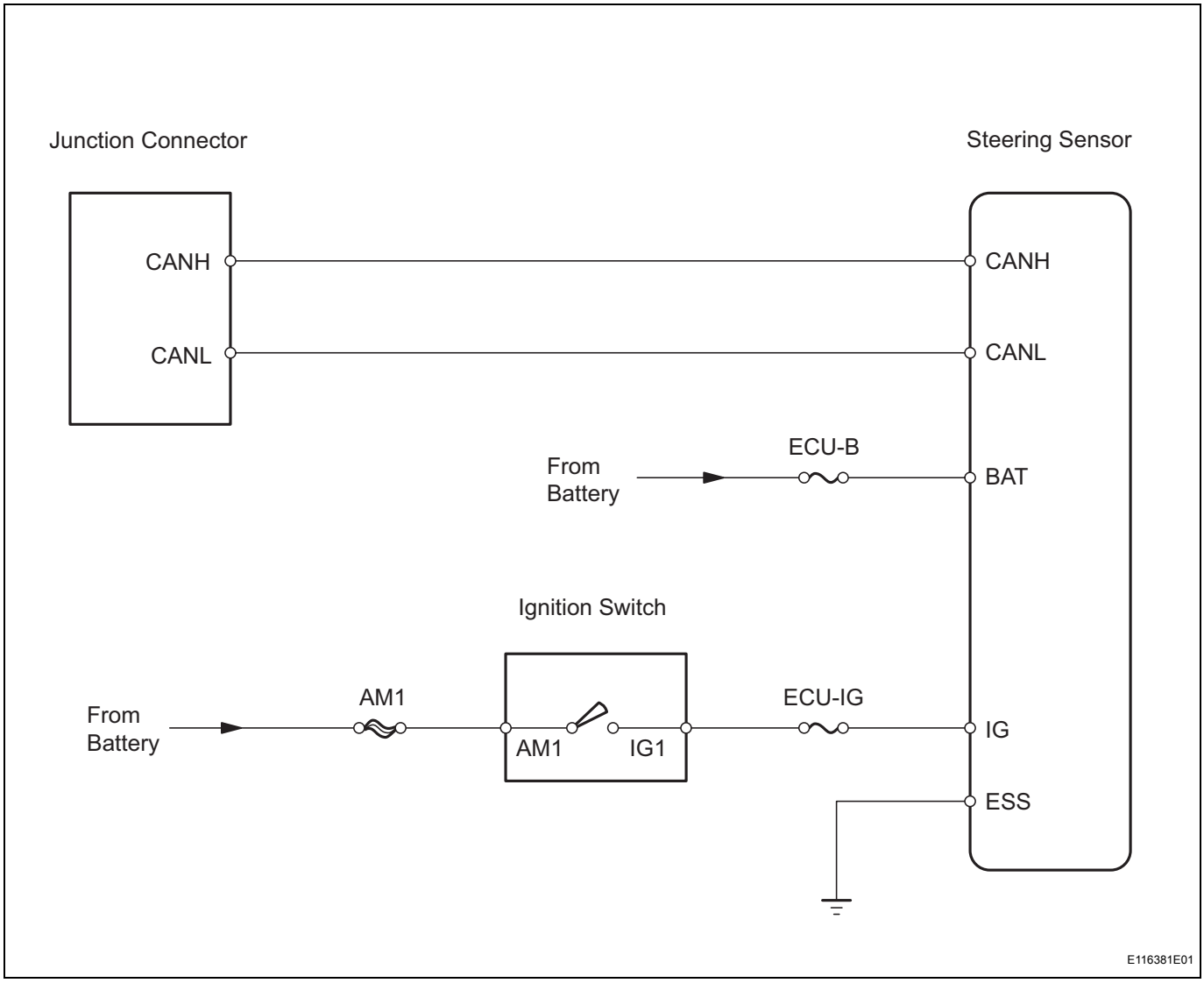
REPLACE A/C AMPLIFIER

Steering Angle Sensor Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
STEERING SENSOR COMMUNICATION STOP MODE	• STEERING SENSOR is not displayed on the "BUS CHECK" screen of the intelligent tester. • Applies to "STEERING SENSOR COMMUNICATION STOP MODE" in the "DTC, BUS CHECK COMBINATION TABLE"	• Power source or inside the steering sensor • Steering sensor sub bus line and connector

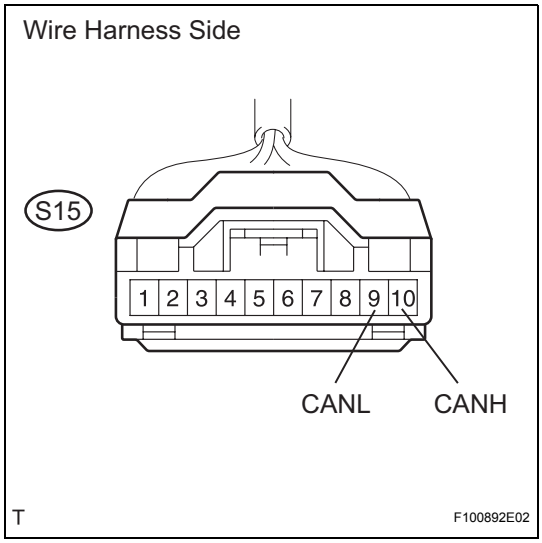
WIRING DIAGRAM



CA

INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR DISCONNECTION (STEERING SENSOR SUB BUS LINE)



(a) Disconnect the S15 sensor connector.
(b) Measure the resistance of the wire harness side connector.

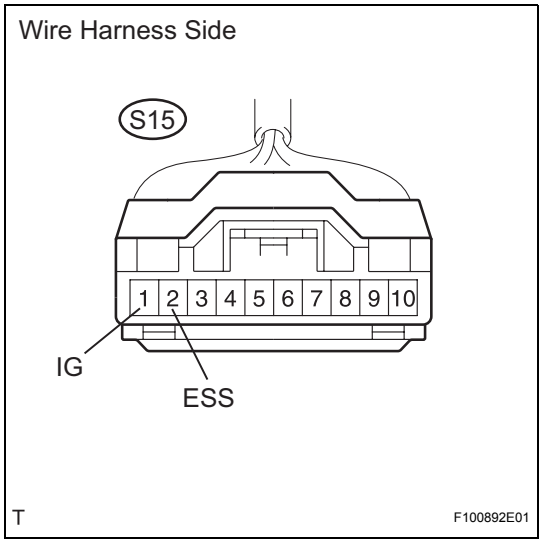
Standard resistance

Tester Connection	Condition	Specified Condition
S15-10 (CANH) - S15-9 (CANL)	Ignition switch OFF	54 to 69 Ω

NG → **REPAIR OR REPLACE STEERING SENSOR SUB BUS LINE AND CONNECTOR (CANH, CANL)**

OK

2 CHECK WIRE HARNESS (STEERING SENSOR - BATTERY AND BODY GROUND)



(a) Disconnect the S15 sensor connector.
(b) Measure the resistance of the wire harness side connector.

Standard resistance

Tester Connection	Specified Condition
S15-2 (ESS) - Body ground	Below 1 Ω

(c) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Condition	Specified Condition
S15-1 (IG) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE STEERING SENSOR

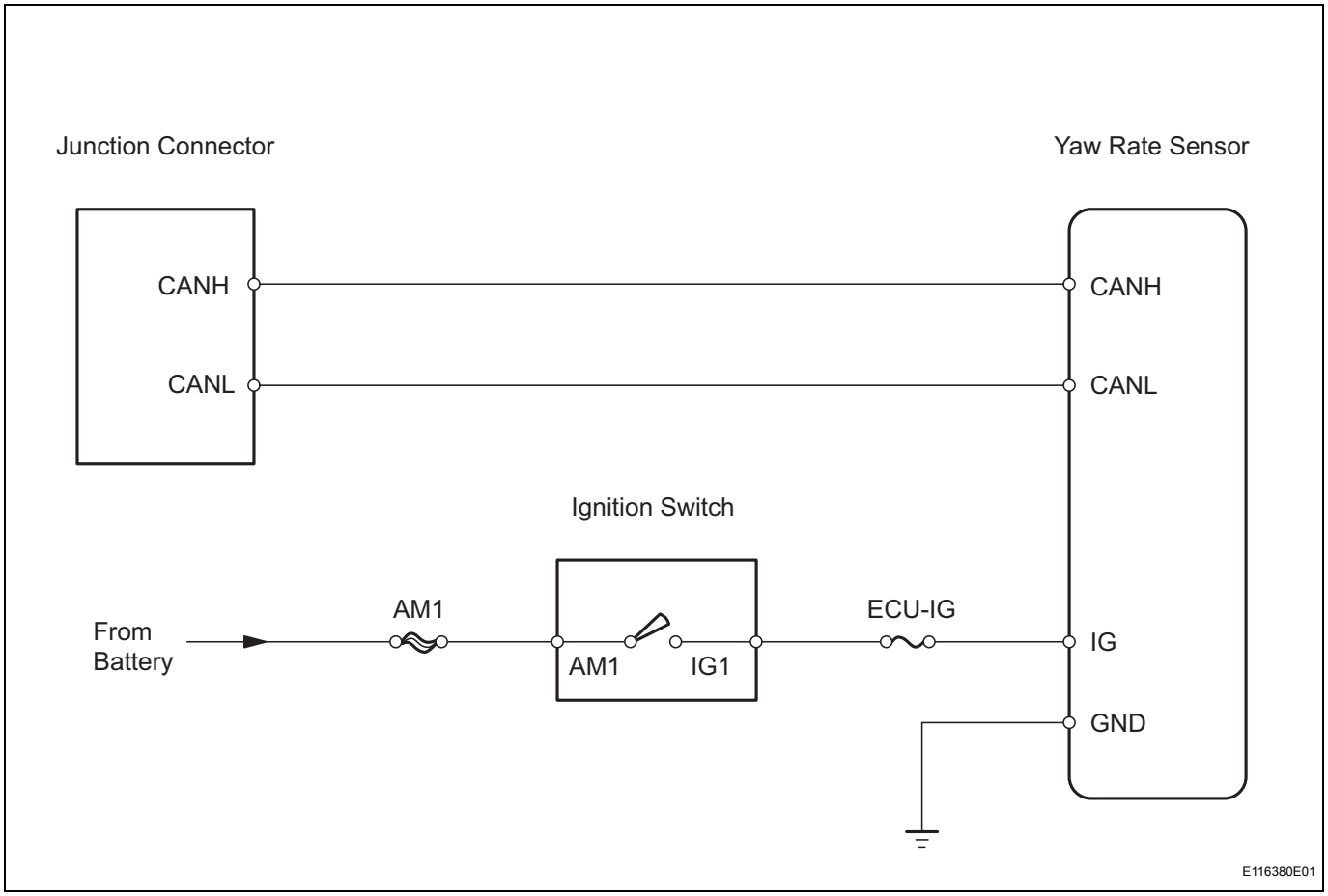
CA

Yaw Rate Sensor Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
YAW RATE SENSOR COMMUNICATION STOP MODE	• YAW / DECELERAT is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "YAW RATE SENSOR COMMUNICATION STOP MODE" in the "DTC, BUS CHECK COMBINATION TABLE"	• Power source or inside the yaw rate sensor • Yaw rate sensor sub line and connector

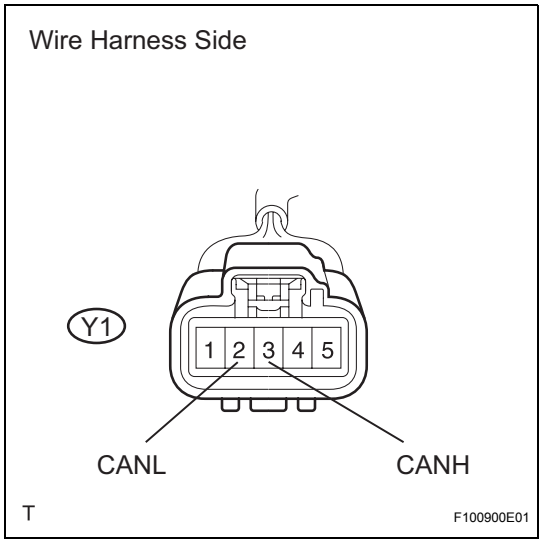
WIRING DIAGRAM



CA

INSPECTION PROCEDURE

1 CHECK CAN BUS LINE FOR DISCONNECTION (YAW RATE SENSOR SUB BUS LINE)



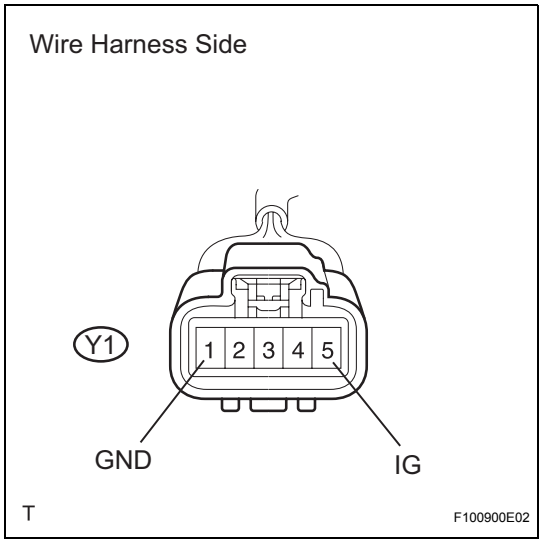
(a) Disconnect the Y1 sensor connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Condition	Specified Condition
Y1-2 (CANL) - Y1-3 (CANH)	Ignition switch OFF	54 to 69 Ω

NG → **REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE AND CONNECTOR (CANH, CANL)**

OK

2 CHECK WIRE HARNESS (YAW RATE SENSOR - BATTERY AND BODY GROUND)



(a) Disconnect the Y1 sensor connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
Y1-1 (GND) - Body ground	Below 1 Ω

(c) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
Y1-5 (IG) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE YAW RATE SENSOR

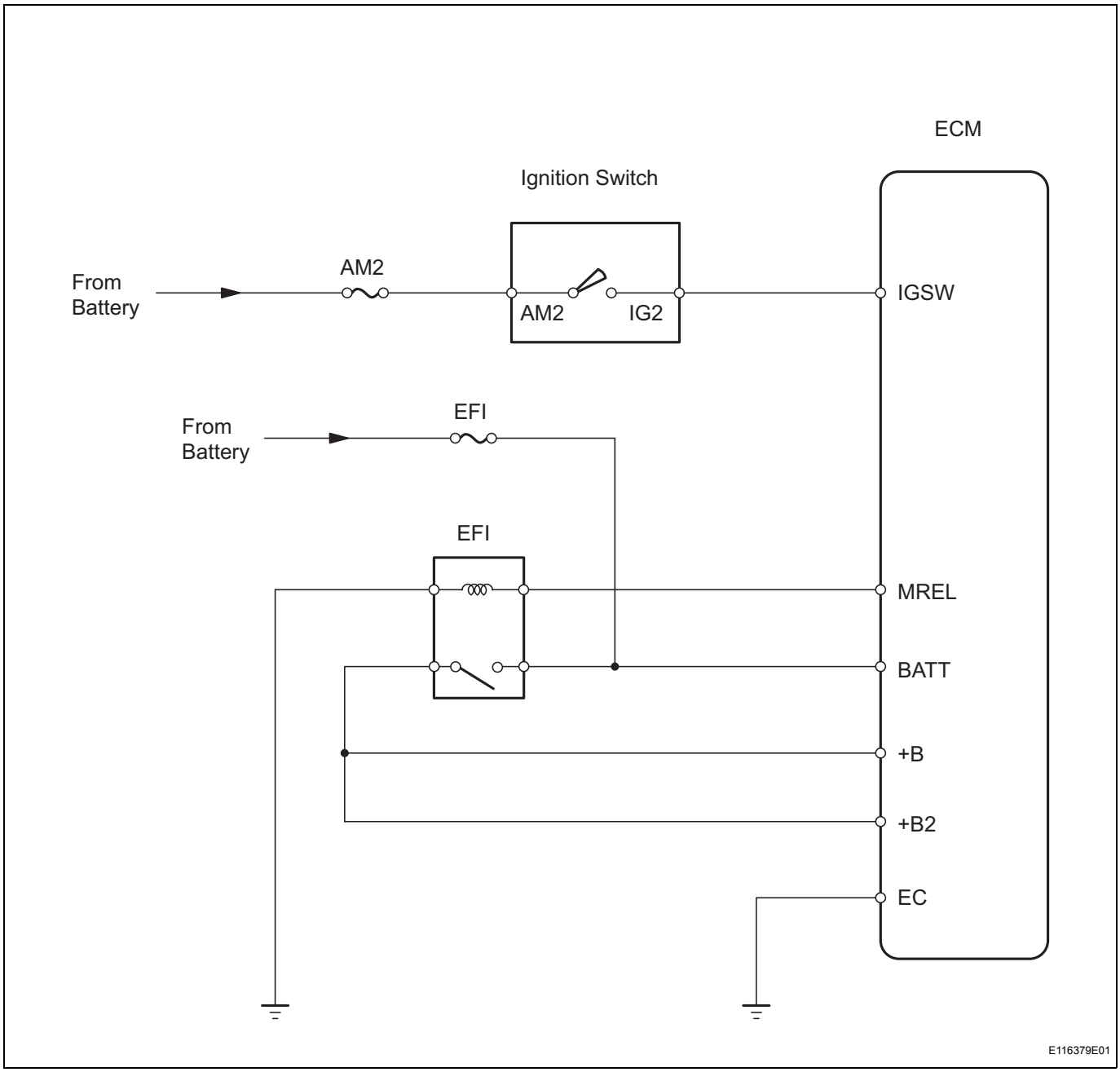
CA

ECM Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
ECM COMMUNICATION STOP MODE	• "ENGINE" is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "ECM COMMUNICATION STOP MODE" in the "DTC, BUS CHECK COMBINATION TABLE" • VSC function stops • TRC function stops • A/C control stops	• Power source or inside the ECM

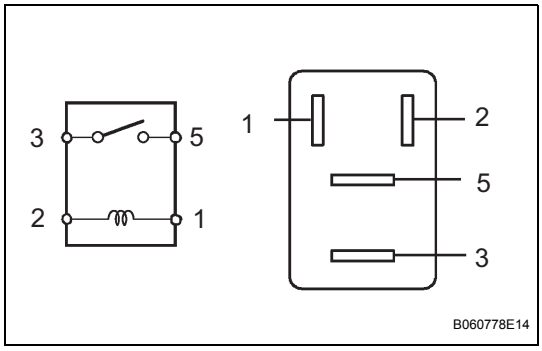
WIRING DIAGRAM



CA

INSPECTION PROCEDURE

1	INSPECT EFI RELAY (Marking: EFI)



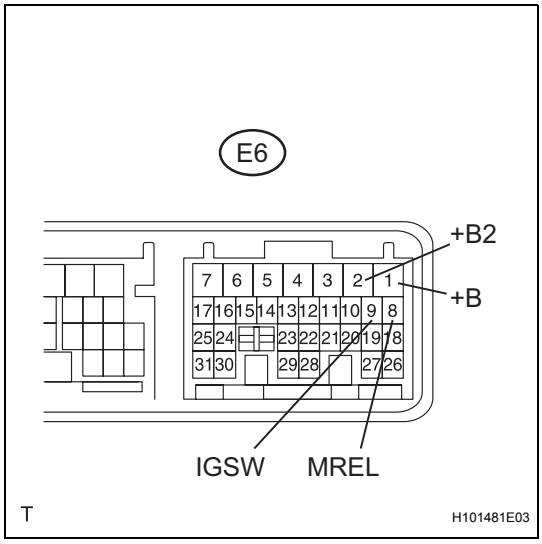
(a) Remove the EFI relay from the engine room relay block.
(b) Measure the resistance of the relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE EFI RELAY**

OK

2	CHECK POWER SOURCE CIRCUIT



(a) Turn the ignition switch ON.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

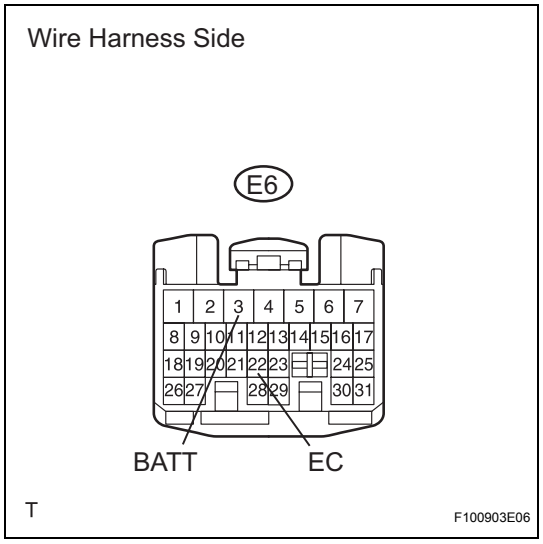
Tester Connection	Specified Condition
E6-9 (IGSW) - Body ground	10 to 14 V
E6-8 (MREL) - Body ground	10 to 14 V
E6-1 (+B) - Body ground	10 to 14 V
E6-2 (+B2) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CA

3	CHECK WIRE HARNESS (ECM - BATTERY AND BODY GROUND)



(a) Disconnect the E6 ECM connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
E6-22 (EC) - Body ground	Below 1 Ω

(c) Measure the voltage of the wire harness side connector.
Standard voltage

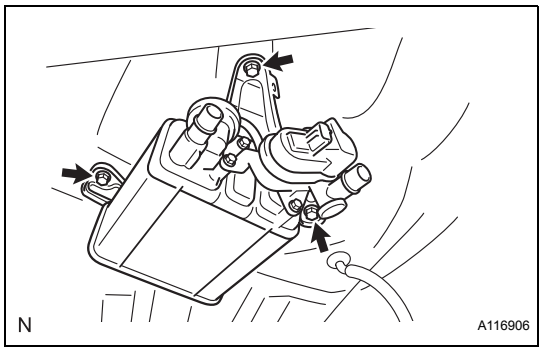
Tester Connection	Condition	Specified Condition
E6-3 (BATT) - Body ground	Ignition switch OFF	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

CA

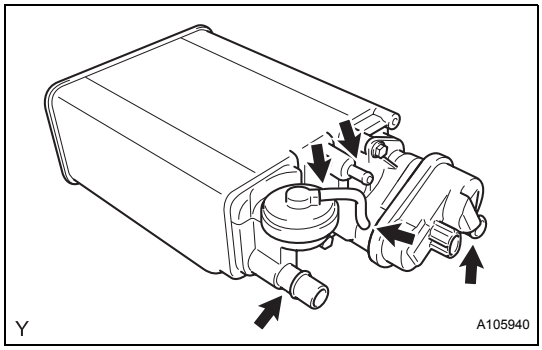


(c) Remove the 3 bolts and canister.

INSPECTION

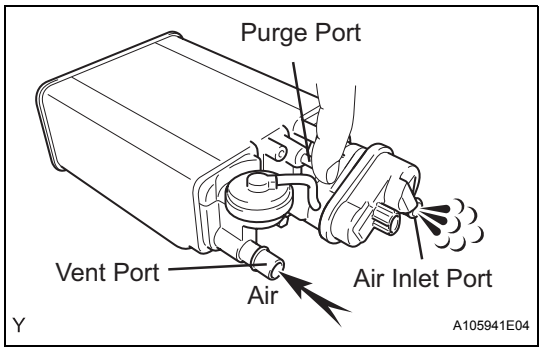
1. INSPECT CANISTER

(a) Visually check the canister for cracks or damage.
If cracks or damage are found, replace the canister.

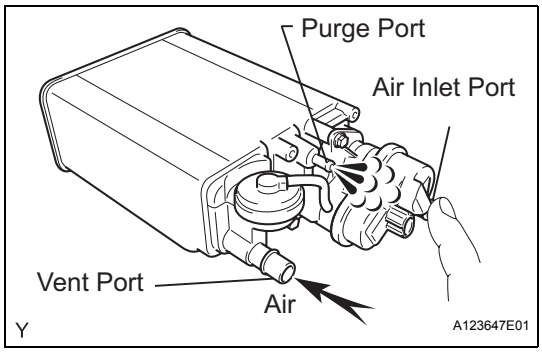


(b) Check the canister operation.

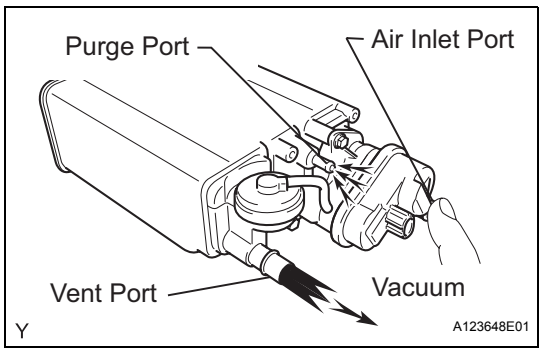
(1) While holding the purge port closed, blow air 0.39 kPa (4.0 kgf/cm^2, 3 mmHg) into the vent port, and check that air flows from the air inlet port.
If the result is not as specified, replace the canister.

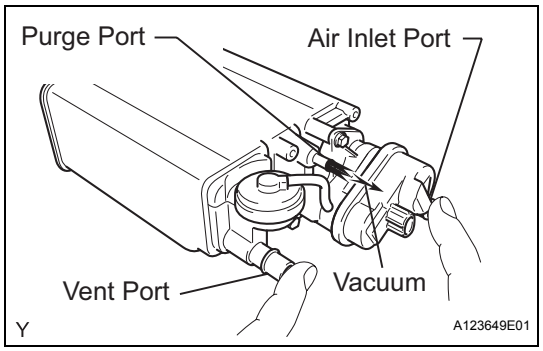


(2) While holding the air inlet port closed, blow air 0.39 kPa (4.0 kgf/cm^2, 3 mmHg) into the vent port, and check that air flows from the purge port.
If the result is not as specified, replace the canister.

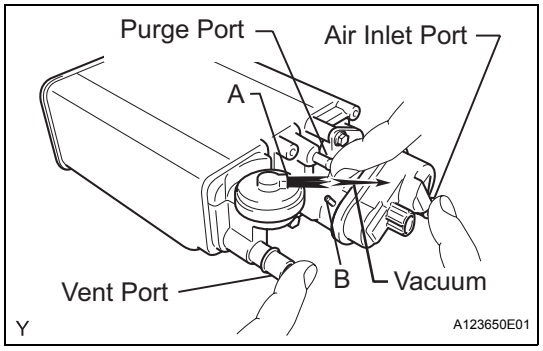


(3) While holding the air inlet port closed, apply vacuum 3.43 kPa (35.0 kgf/cm^2, 25.7 mmHg) to the vent port, and check that air is sucked into the purge port.
If the result is not as specified, replace the canister.



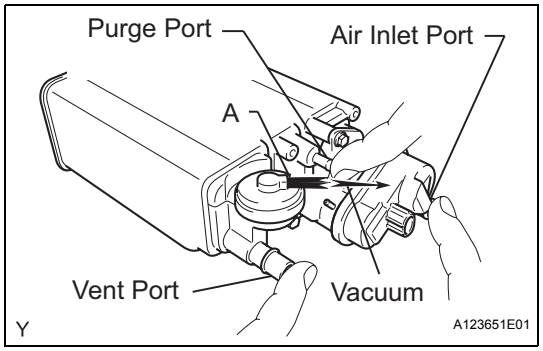


(c) Check the air tightness.
(1) While holding the vent and air inlet ports closed, apply vacuum 3.43 kPa (35.0 kgf/cm^2, 25.7 mmHg) to the purge port, and check that the vacuum is maintained for 1 minute.
If the result is not as specified, replace the canister.

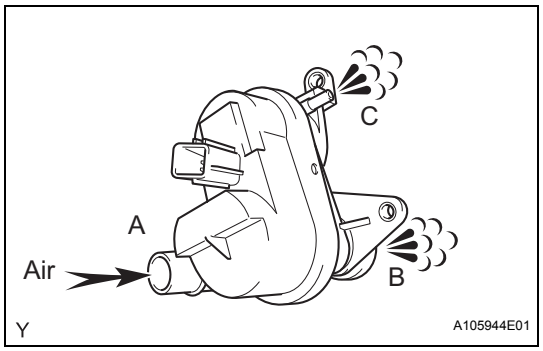


(d) Check the diaphragm.
(1) Remove the air hose between ports A and B.
(2) While holding the vent, purge and air inlet ports closed, apply vacuum 1.42 kPa (14.5 kgf/cm^2, 10.6 mmHg) port A, and check that air is not sucked into port B.

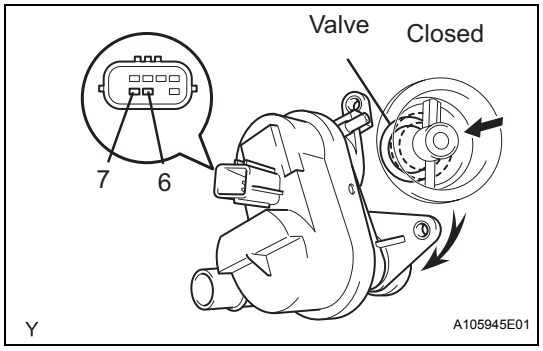
EC



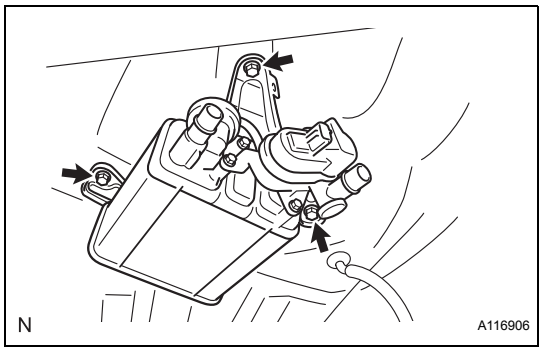
(3) While holding the vent, purge and air inlet ports closed, apply vacuum 1.42 kPa (14.5 kgf/cm^2, 10.6 mmHg) into port A, and measure how long it takes for the vacuum to drop.
Vacuum drop time:
10 seconds or more
If the result is not as specified, replace the canister.



(e) Check leak detection pump.
(1) Check that air flows from port A to port B and C.
If the result is not as specified, replace the canister.



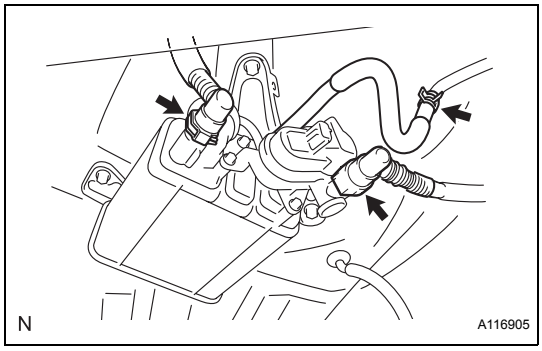
(2) Connect the positive (+) lead of the battery to terminal 7 and the negative (-) lead to terminal 6.
(3) Check that the valve is closed.
If the result is not as specified, replace the canister.
(4) Install the canister pump module.



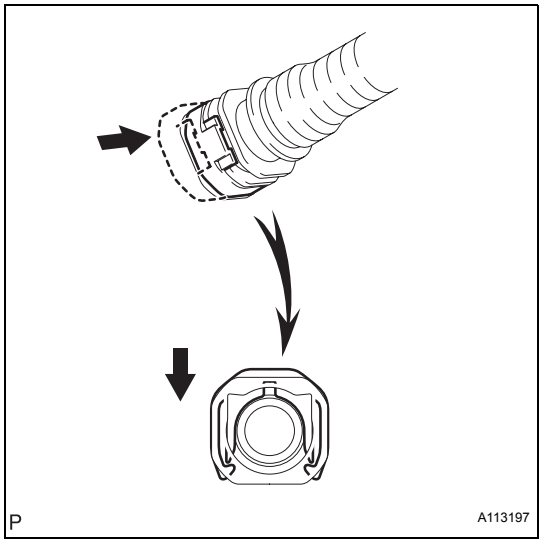
INSTALLATION

1. INSTALL CANISTER

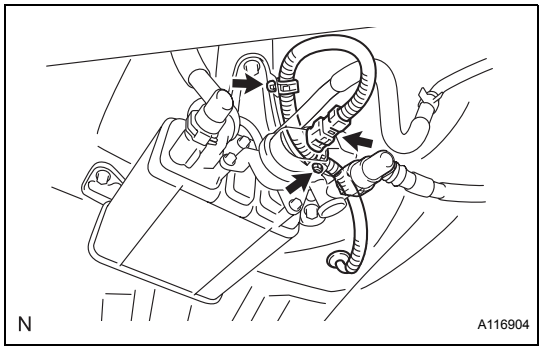
(a) Install the canister with the 3 bolts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



(b) Connect the 2 tubes and hose.



(1) Connect the air inlet line tube to the canister (leak detection pump).
(2) Connect the vent line tube to the canister.
(3) Connect the purge line hose.
HINT:
Install the hose to the canister, and then attach the retainer.

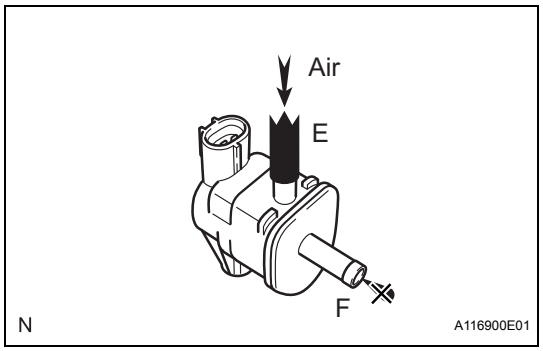


(c) Connect the connector and attach the 2 clamps.

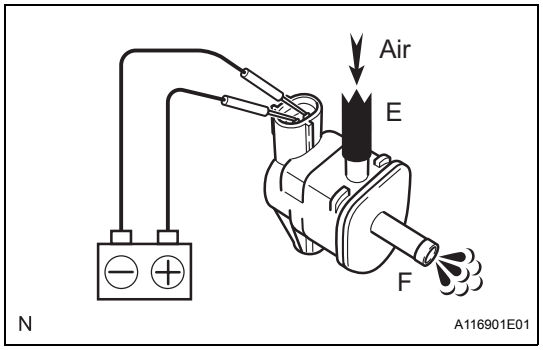
2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

3. PERFORM INITIALIZATION

(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.



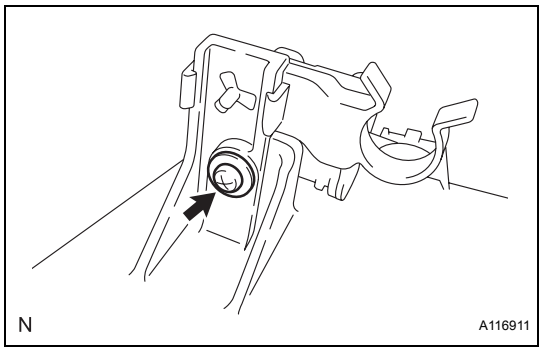
(b) Check operation of the purge VSV.
(1) Check that air does not flow from port E to port F.



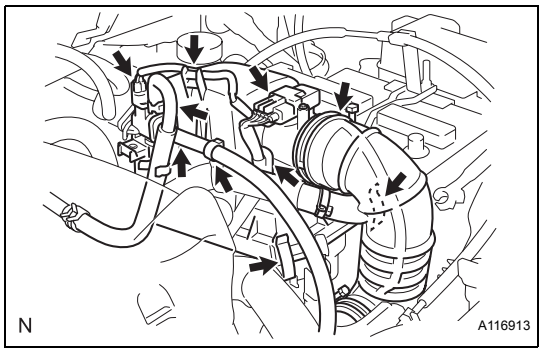
(2) Apply battery voltage across terminals 1 and 2.
(3) Check that air flows from port E to port F.
If the result is not as specified, replace the purge VSV.

EC

INSTALLATION



1. INSTALL PURGE VSV
(a) Install the purge VSV with the screw.



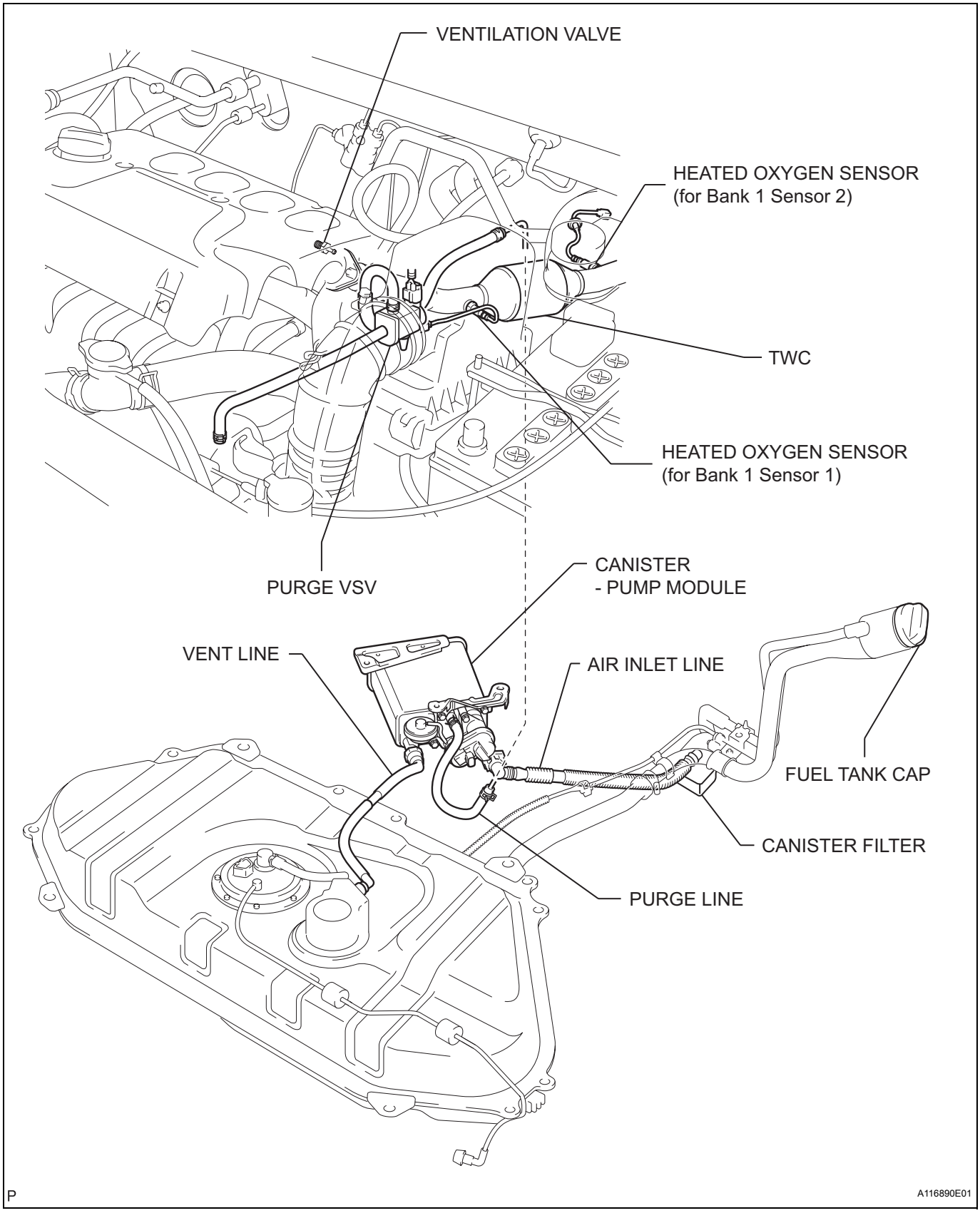
2. INSTALL AIR CLEANER CAP
(a) Install the air cleaner cap and tighten the hose clamp.
(b) Lock the 2 clamps holding the air cleaner cap to the air cleaner case.
(c) Connect the purge line hose to the hose clamp.
(d) Connect the 2 purge line hoses.
(e) Connect the 2 wire harness clamps to the air cleaner cap.
(f) Connect the purge VSV connector.
(g) Connect the MAF meter connector.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION
(a) Perform initialization (see page IN-23).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

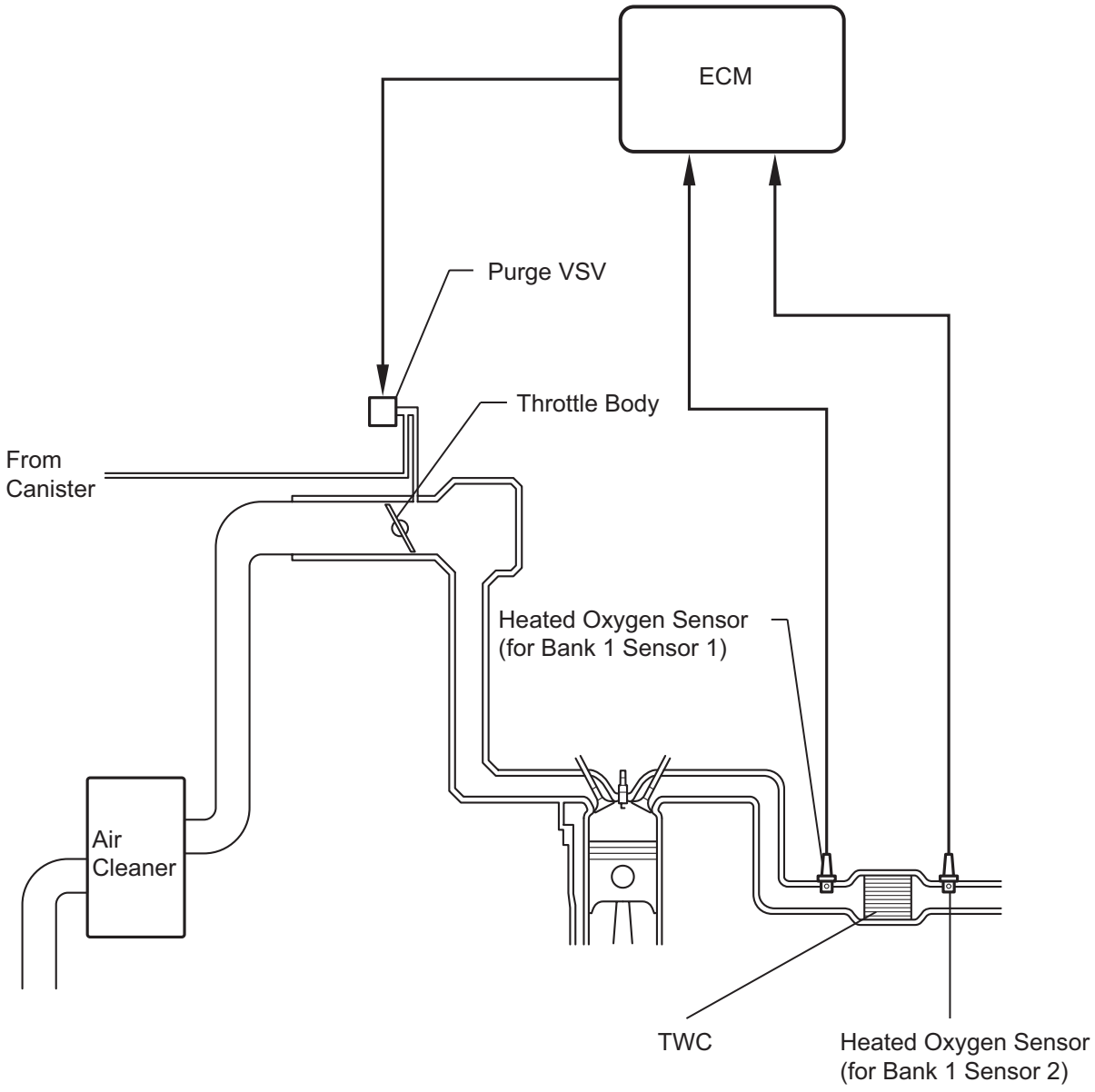
EMISSION CONTROL SYSTEM

PARTS LOCATION



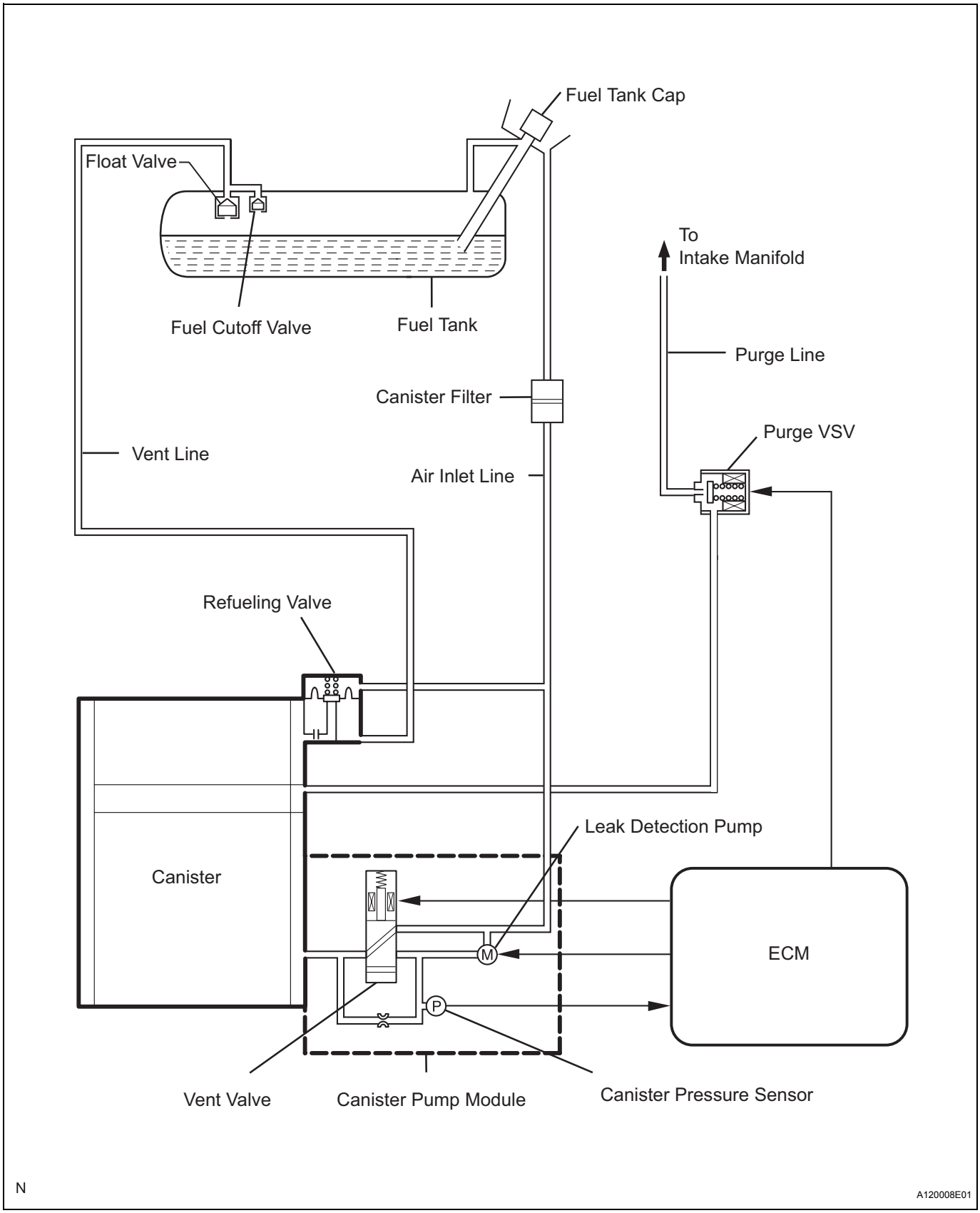
EC

SYSTEM DIAGRAM

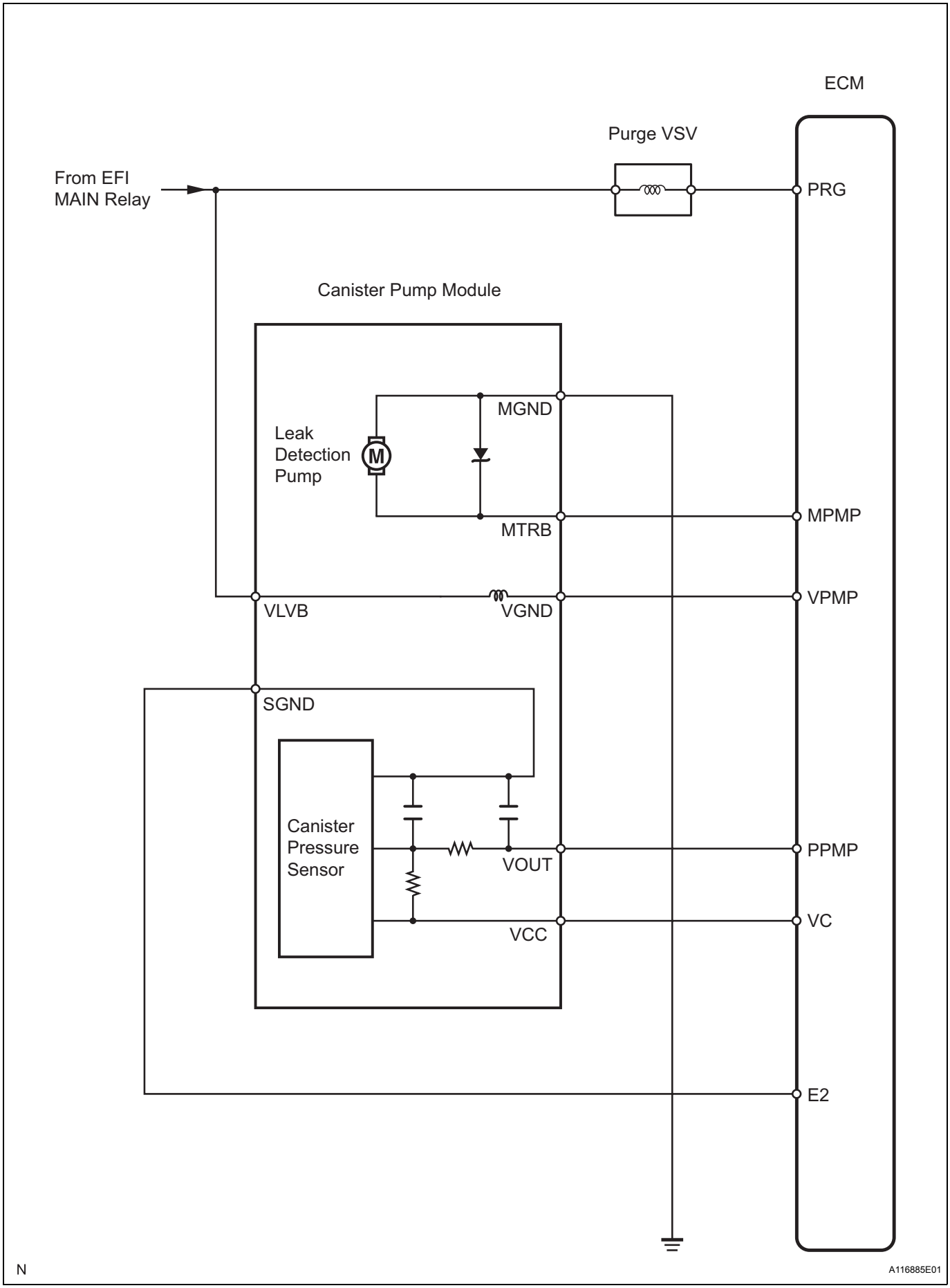


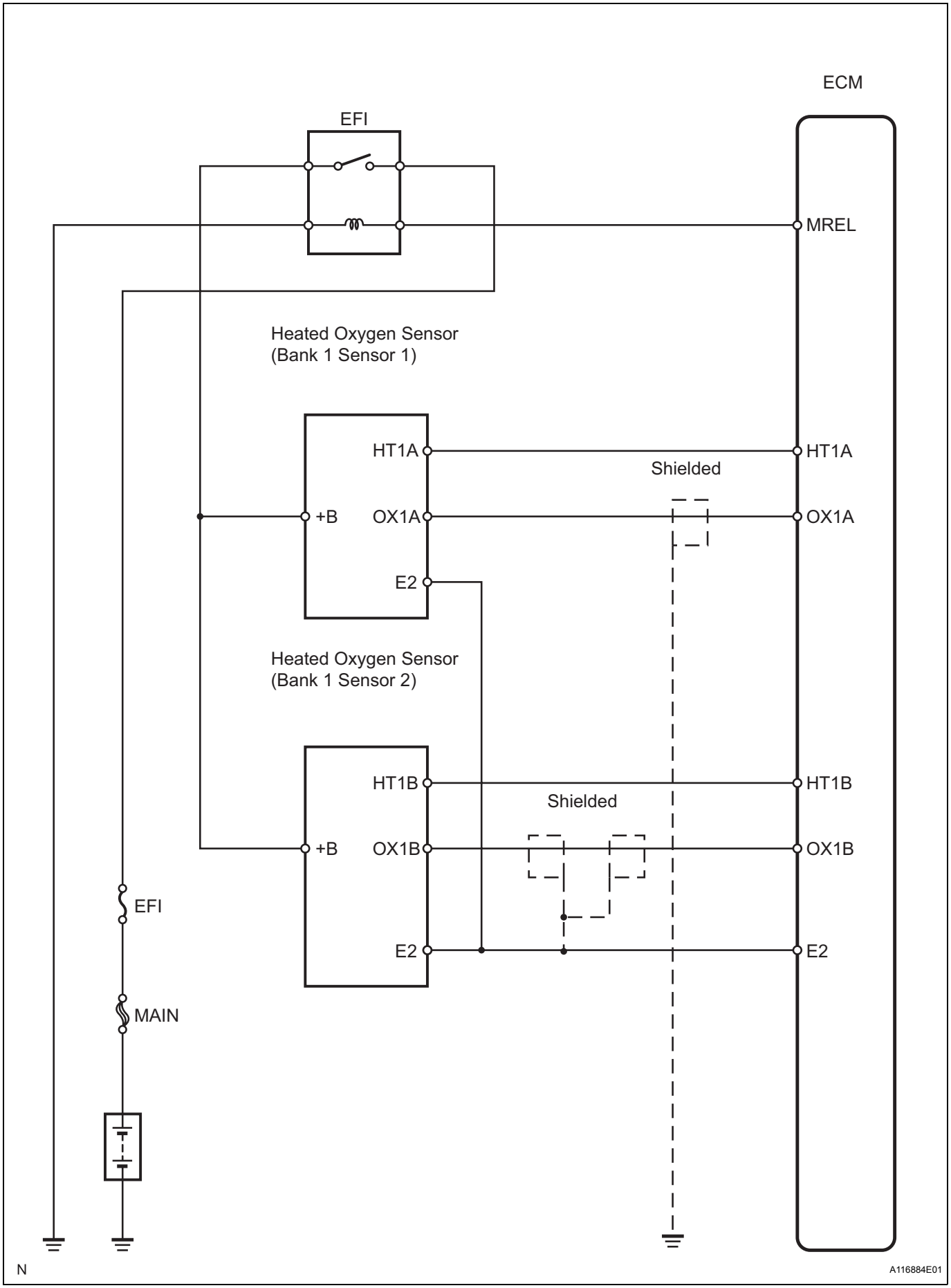
N

A116883E01

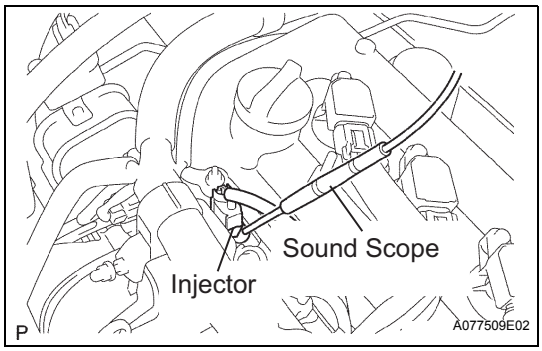

Fuel Tank Cap
Float Valve
To
Intake Manifold
Fuel Cutoff Valve
Fuel Tank
Purge Line
Canister Filter
Purge VSV
Vent Line
Air Inlet Line
Refueling Valve
Leak Detection Pump
Canister
ECM
M
P
Vent Valve
Canister Pump Module
Canister Pressure Sensor
N
A120008E01

EC


ECM
Purge VSV
From EFI
MAIN Relay
PRG
Canister Pump Module
MGND
Leak
Detection
Pump
M
MPMP
MTRB
VPMP
VLVB
VGND
SGND
Canister
Pressure
Sensor
PPMP
VOUT
VC
VCC
E2
N
A116885E01


ECM
EFI
MREL
Heated Oxygen Sensor
(Bank 1 Sensor 1)
HT1A
HT1A
Shielded
+B
OX1A
OX1A
E2
Heated Oxygen Sensor
(Bank 1 Sensor 2)
HT1B
HT1B
Shielded
+B
OX1B
OX1B
EFI
E2
E2
MAIN
N
A116884E01

EC



ON-VEHICLE INSPECTION

1. CHECK FUEL CUT RPM

(a) Increase the engine speed to at least 3,500 rpm.

(b) Use a sound scope to check for injector operating noise.

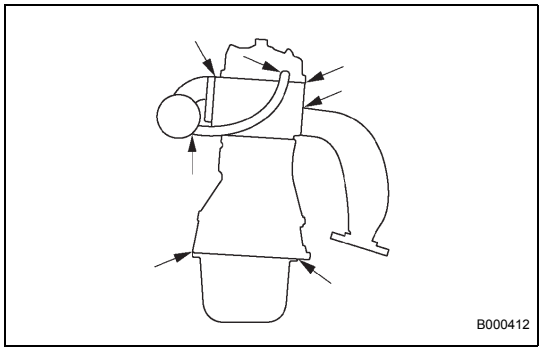
(c) Check that the operating sounds stop momentarily and then resume when the throttle lever is released.

HINT:

Measure with the A/C OFF.

Fuel return rpm:

1,400 rpm



2. VISUALLY CHECK HOSES, CONNECTORS, AND GASKETS

(a) Check that there are no cracks, leaks or damage.

NOTICE:

- **Detachment or other problems with the engine oil dipstick, filler cap, PCV hose and other components may cause the engine to run improperly.**
- **Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause an engine failure or engine malfunctions.**

If the result is not as specified, replace parts as necessary.

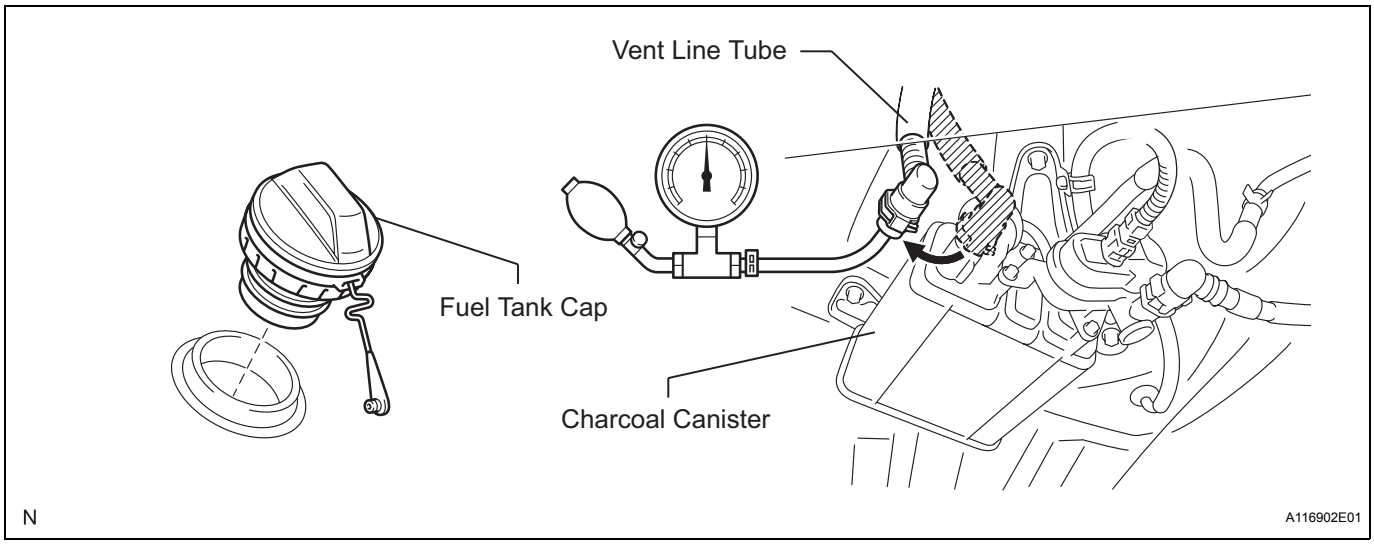
3. CHECK LINE AND CONNECTORS

(a) Visually check for loose connections, sharp bends or damage.

4. CHECK FUEL TANK ASSEMBLY

(a) Visually check for deformation, cracks or fuel leakage.

5. CHECK FUEL TANK AND VENT LINE



(a) Disconnect the vent line hose from the canister.

(b) Connect the pressure gauge to the vent line tube.

(c) Apply 4 kPa (41 kgf/cm^2, 30 mmHg) of pressure to the vent line of the fuel tank.
HINT:
Perform this inspection with the fuel tank less than 90% full. When the fuel tank is full, the fuel cutoff valve closes and pressure is released through the 1.5 mm orifice. As a result, when the fuel tank cap is removed, pressure does not decrease smoothly.

(d) Check that the fuel tank pressure is maintained for some time, and does not decrease immediately.
HINT:
If pressure decreases immediately, one of the following may be the cause:
- The fuel tank cap is not completely tightened.
- The fuel tank cap is damaged.
- Air is leaking from the vent line.
- The fuel tank is damaged.

(e) When the fuel tank cap is removed, check that pressure is released smoothly.
HINT:
If the pressure does not drop, replace the fuel tank assembly.

(f) Reconnect the vent line tube to the canister.

6. CHECK AIR INLET LINE

(a) Disconnect the air inlet line hose from the charcoal canister.

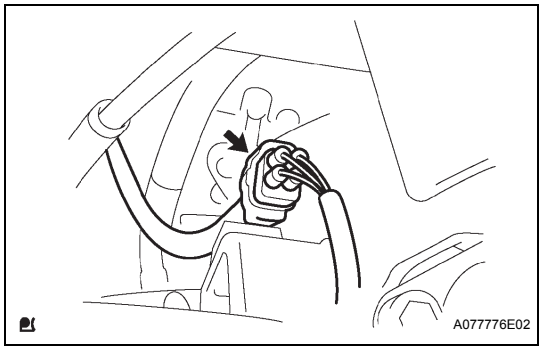
(b) Check that air flows freely into the air inlet line.
HINT:
If air does not flow freely into the air inlet line, repair or replace it.

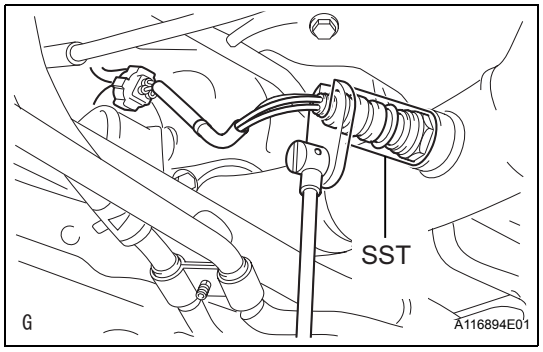
(c) Reconnect the air inlet line hose to the charcoal canister.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. **REMOVE HEATED OXYGEN SENSOR**
   (a) Disconnect the sensor connector.

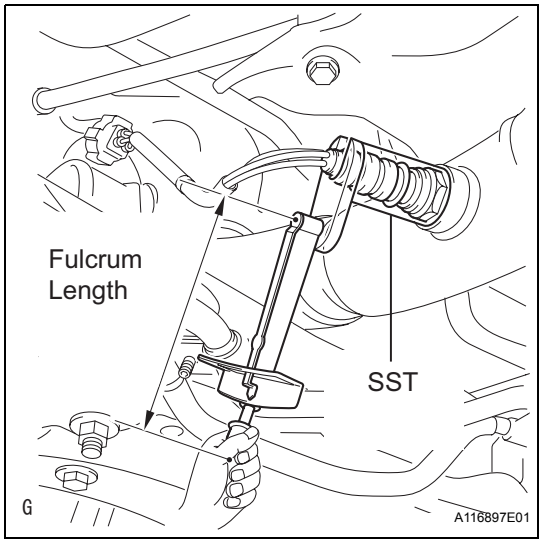




   (b) Using SST, remove the sensor.
   SST 09224-00010

INSTALLATION

1. **INSTALL HEATED OXYGEN SENSOR**
   (a) Using SST, install the sensor.
   SST 09224-00010
   Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf) for use with SST
   40 N*m (408 kgf*cm, 30 ft.*lbf) for use without SST
   HINT:
   Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).
   (b) Connect the sensor connector.



2. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

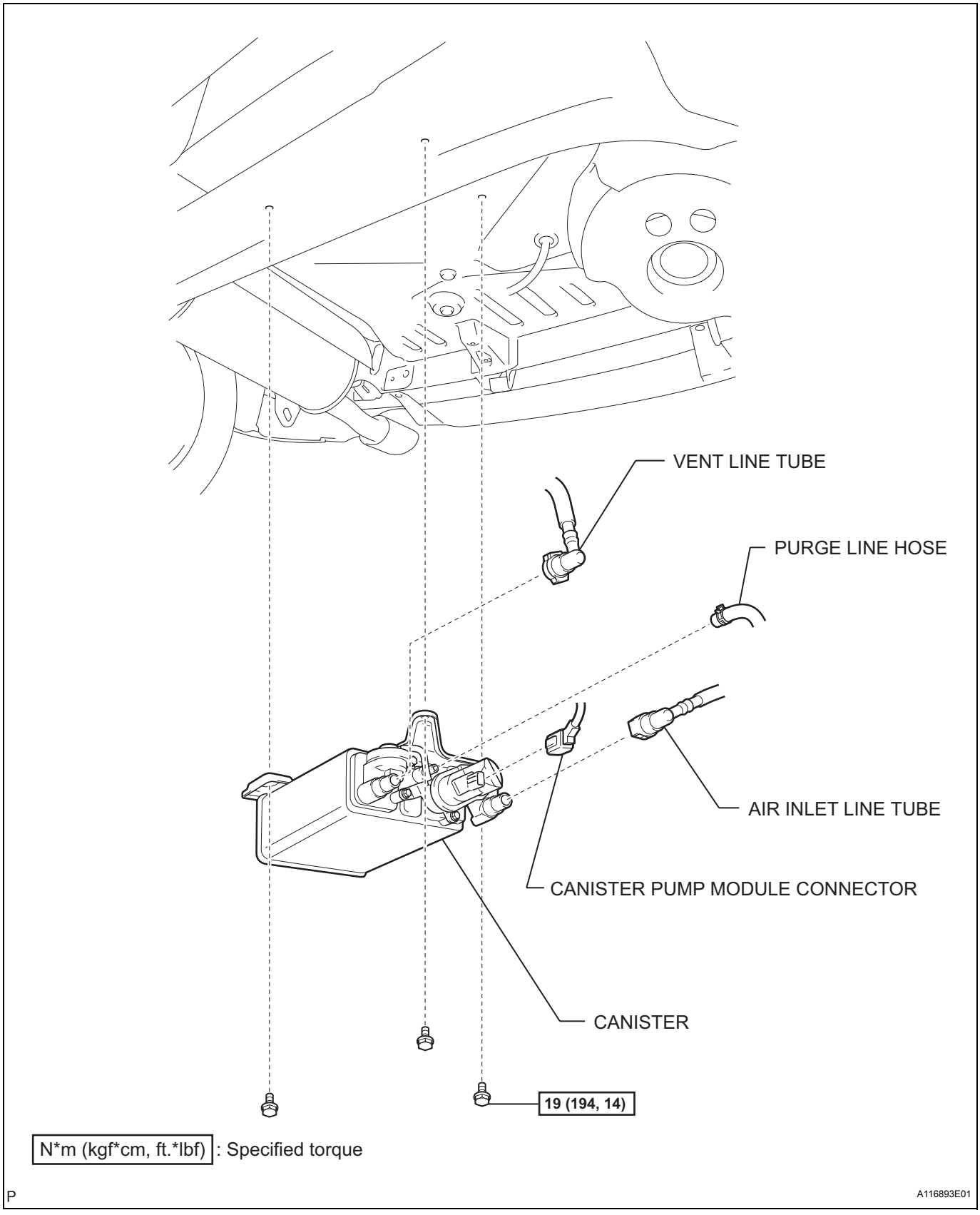
3. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting the cable from the negative (-) battery terminal.

4. **CHECK FOR EXHAUST GAS LEAKS**
   If gas is leaking, tighten the problem areas to stop the leak. Replace damaged parts as necessary.

EC

CANISTER

COMPONENTS



REMOVAL

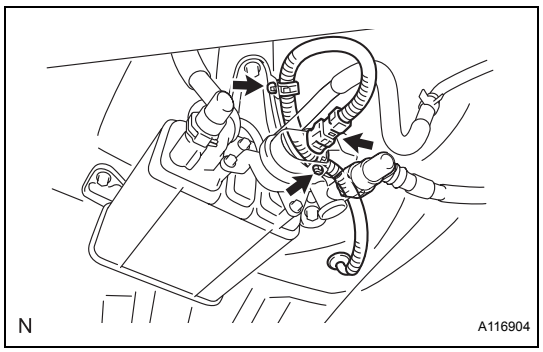
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

2. REMOVE CANISTER

(a) Disconnect the connector and detach the 2 clamps.

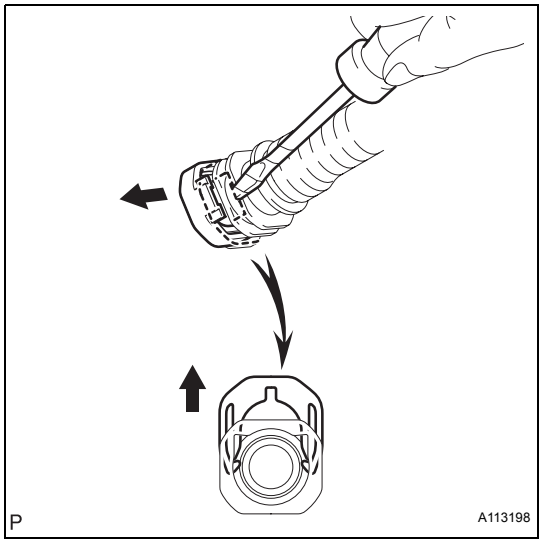


(b) Disconnect the 2 tubes and hose.

(1) Using a screwdriver, pry up the retainer.

HINT:

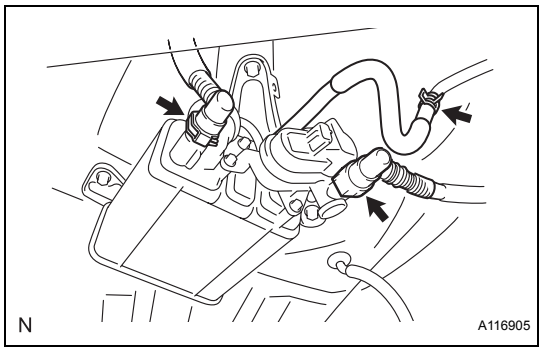
Do not remove the retainer.



(2) Disconnect the purge line hose.

(3) Disconnect the air inlet line tube from the canister.

(4) Disconnect the vent line tube from the canister (leak detection pump).

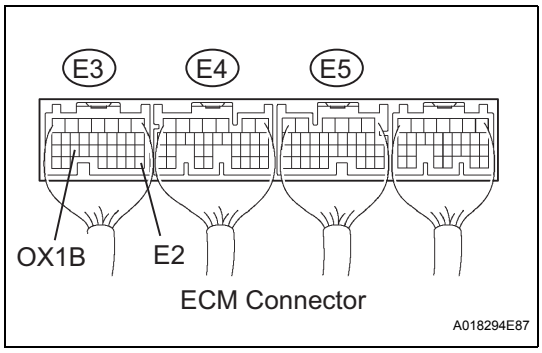


ON-VEHICLE INSPECTION

1. CHECK AIR-FUEL RATIO COMPENSATION SYSTEM

HINT:

The system can also be checked by choosing "DATA MONITOR/O_2SENSOR OUTPUT VOLTAGE" on the intelligent tester monitor.



(a) Connect the intelligent tester to terminals E3-25 (OX1B) and E3-28 (E2) of the ECM.

NOTICE:

Connect test leads from the backside of the connector with the ECU connected.

(b) Warm up the heated oxygen sensor at an engine speed of 2,500 rpm for approximately 2 minutes.

(c) Check that the voltage varies between approximately 0 V and 1 V at an engine speed of 2,500 rpm.

OK:

The voltage varies more than 8 times in 10 seconds.

NOTICE:

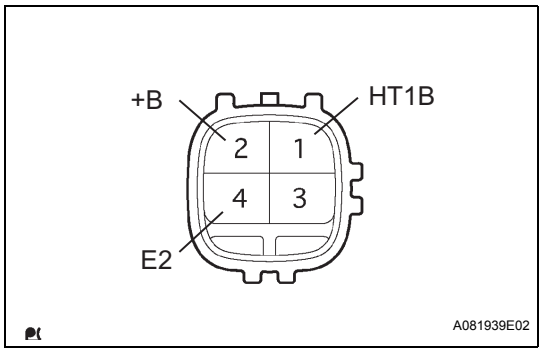
- **Perform the check immediately after warming up the heated oxygen sensor.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again.**

2. INSPECT HEATED OXYGEN SENSOR

(a) Disconnect the sensor connector.

(b) Measure the resistance of the sensor.

Standard resistance



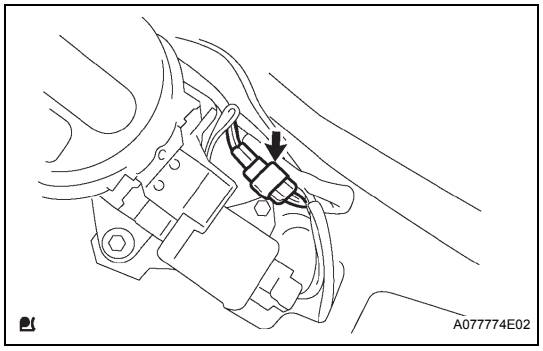
Tester Connection	Specified Condition
1 (HT1B) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
1 (HT1B) - 4 (E2)	10 kΩ or higher

If the result is not as specified, replace the sensor.

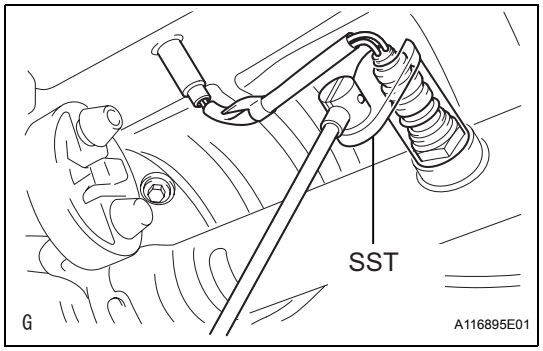
(c) Connect the sensor connector.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. **REMOVE SHIFT LEVER KNOB (for Manual Transaxle)**
3. **REMOVE REAR CONSOLE BOX (See page IP-26)**
4. **REMOVE HEATED OXYGEN SENSOR**
   (a) Disconnect the sensor connector.

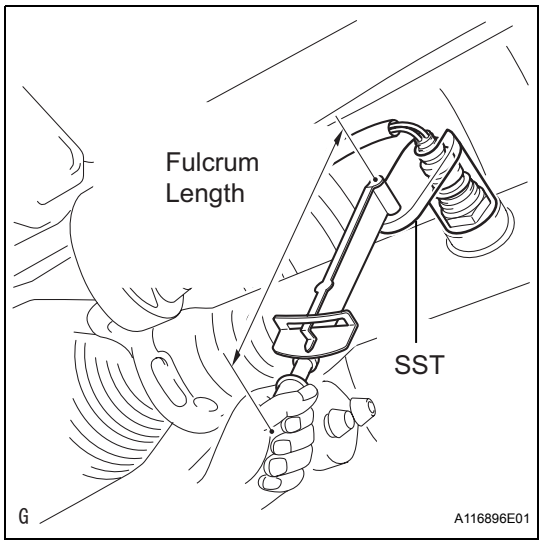


   (b) Using SST, remove the sensor.
   SST 09224-00010



INSTALLATION

1. **INSTALL HEATED OXYGEN SENSOR**
   (a) Using SST, install the sensor.
   SST 09224-00010
   Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf) for use with SST
   40 N*m (408 kgf*cm, 30 ft.*lbf) for use without SST
   HINT:
   Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).
   (b) Connect the sensor connector.
2. **INSTALL REAR CONSOLE BOX (See page IP-27)**
3. **INSTALL SHIFT LEVER KNOB (for Manual Transaxle)**
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

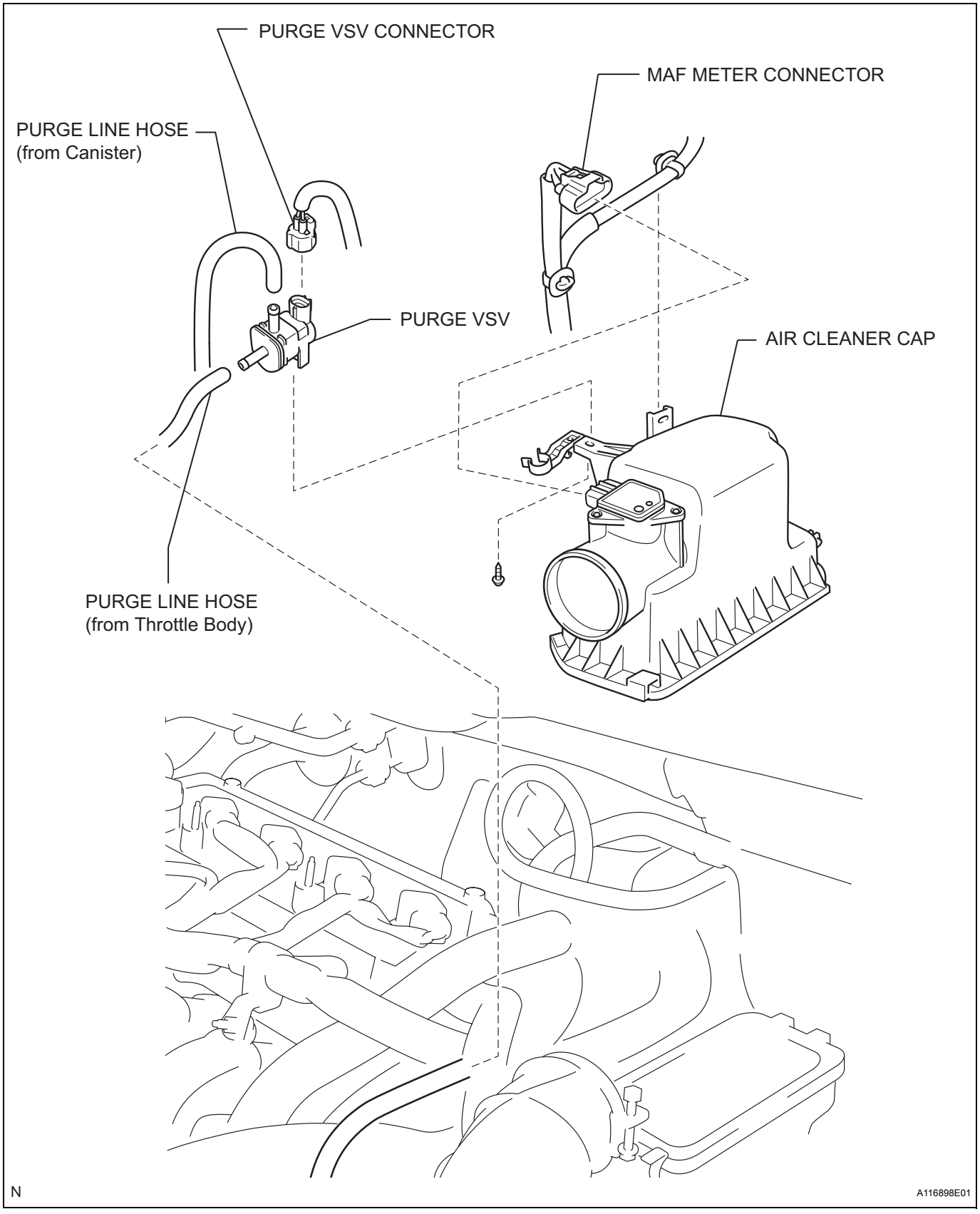


5. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-23).
   NOTICE:
   Certain systems need to be initialized after disconnecting the cable from the negative (-) battery terminal.

6. **CHECK FOR EXHAUST GAS LEAKS**
   If gas is leaking, tighten the problem areas to stop the leak. Replace damaged parts as necessary.

VACUUM SWITCHING VALVE

COMPONENTS

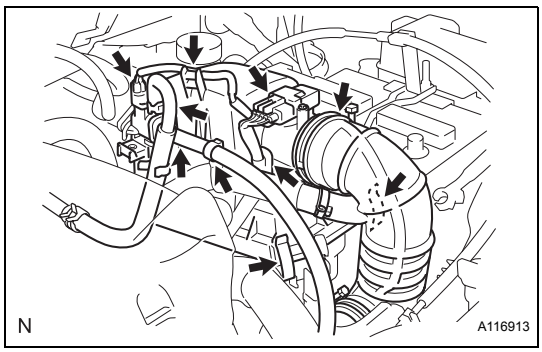


REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

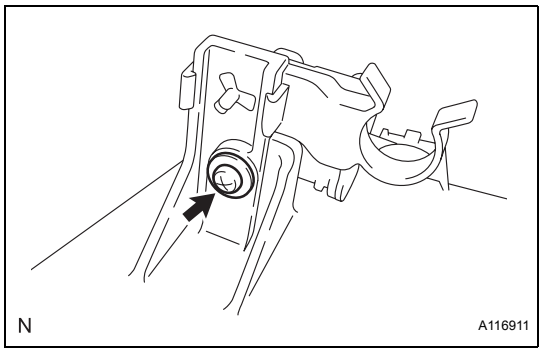
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.



2. REMOVE AIR CLEANER CAP

(a) Disconnect the MAF meter connector.
(b) Disconnect the purge VSV connector.
(c) Disconnect the 2 wire harness clamps from the air cleaner cap.
(d) Disconnect the 2 purge line hoses.
(e) Disconnect the purge line hose from the hose clamp.
(f) Unlock the 2 clamps holding the air cleaner cap to the air cleaner case.
(g) Loosen the hose clamp and remove the air cleaner cap.



3. REMOVE PURGE VSV

(a) Remove the screw and purge VSV.

INSPECTION

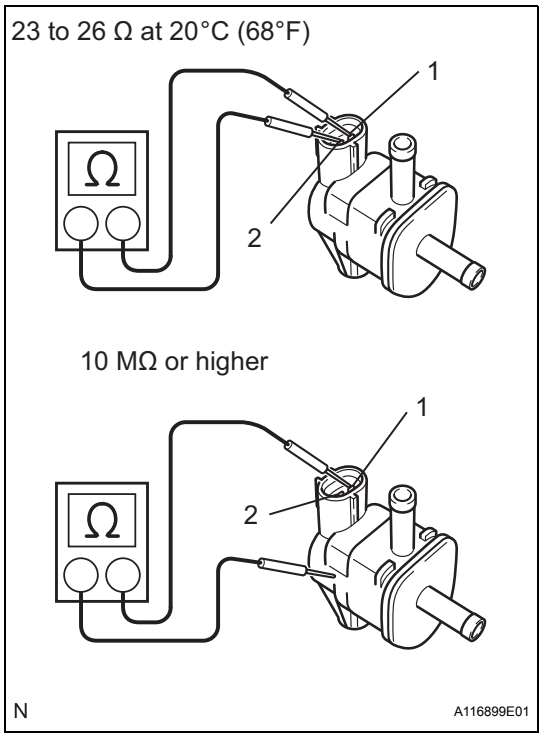
1. INSPECT PURGE VSV

(a) Measure the resistance of the purge VSV.

Standard resistance

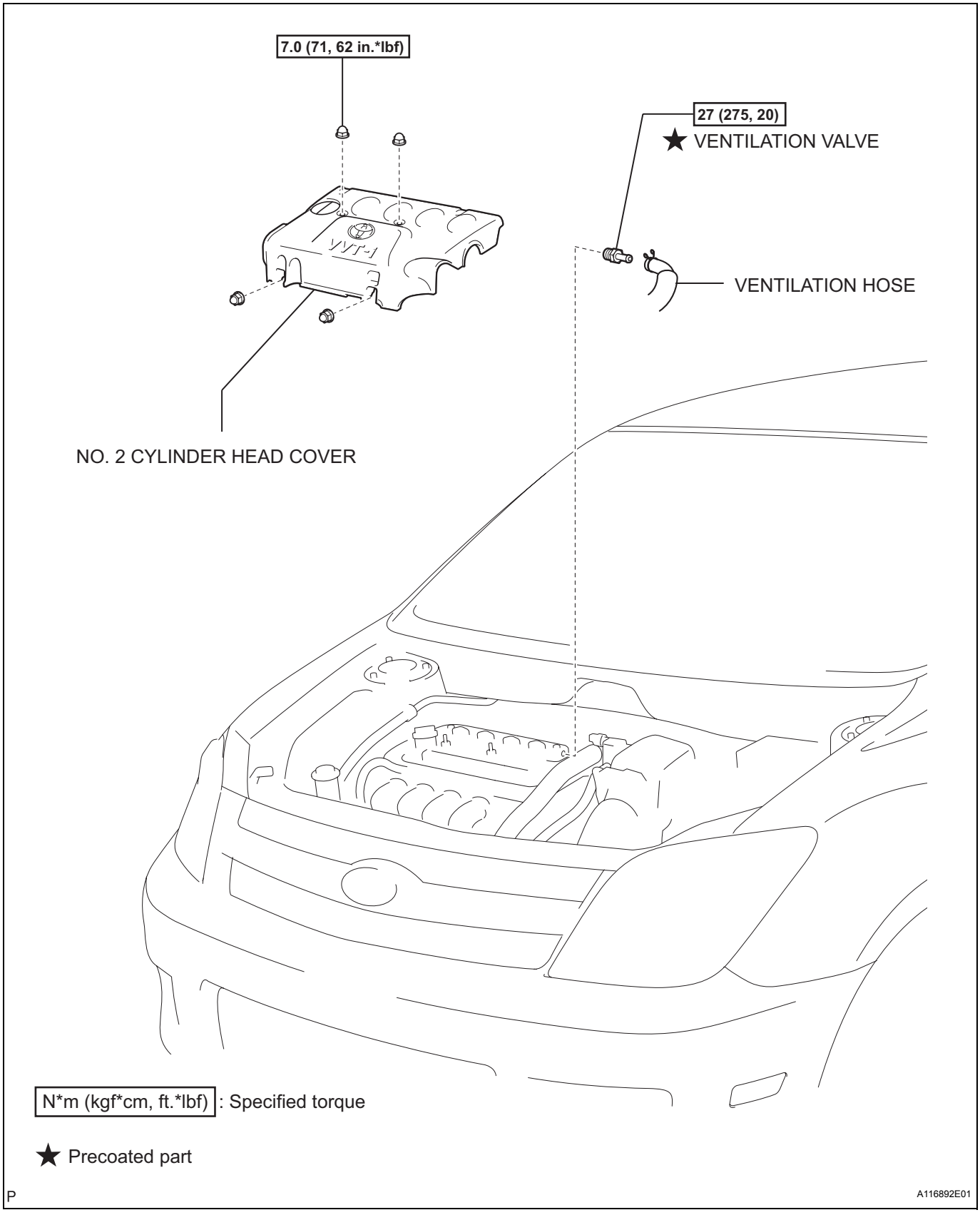
Tester Connection	Specified Condition
1 - 2	23 to 26 Ω at 20°C (68°F)
1 - Body ground 2 - Body ground	10 MΩ or higher

If the result is not as specified, replace the purge VSV.



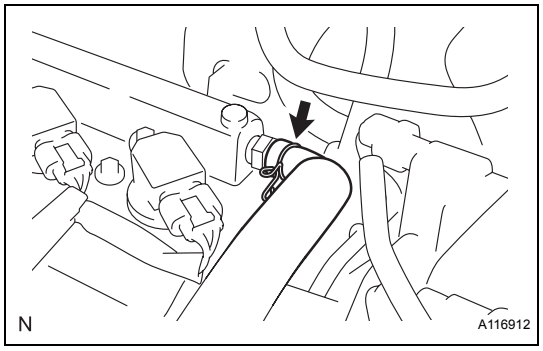
VENTILATION VALVE

COMPONENTS



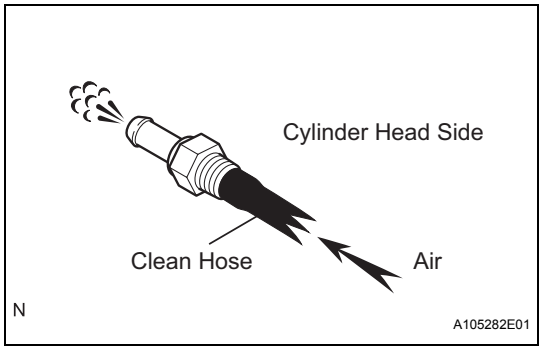
REMOVAL

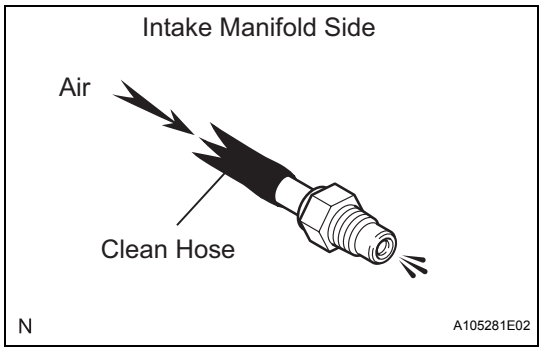
1. **REMOVE NO. 2 CYLINDER HEAD COVER (See page FU-11)**
2. **DISCONNECT VENTILATION HOSE**
   (a) Disconnect the ventilation hose from the ventilation valve.
3. **REMOVE VENTILATION VALVE**
   (a) Remove the ventilation valve.



INSPECTION

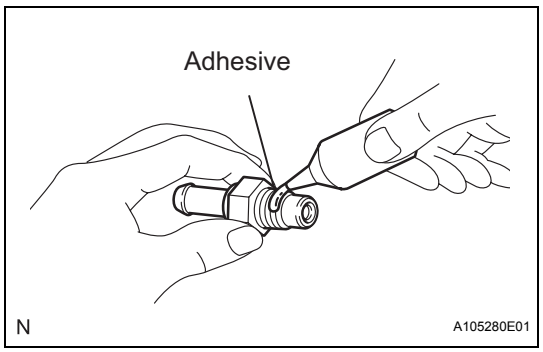
1. **INSPECT VENTILATION VALVE**
   (a) Install a clean hose to the ventilation valve.
   (b) Check the ventilation valve operation.
      (1) Blow air into the cylinder head side, and check that air passes through easily.
      CAUTION:
      Do not suck air through the valve. Petroleum substances inside the valve are hazardous to your health.
      (2) Blow air into the intake manifold side, and check that air passes through with difficulty. If the result is not as specified, replace the ventilation valve.
   (c) Remove the clean hose from the ventilation valve.



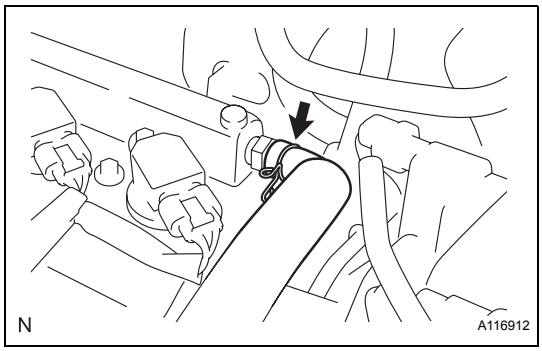


INSTALLATION

1. **INSTALL VENTILATION VALVE**
   (a) Apply adhesive to 2 or 3 threads of the valve.
   Adhesive:
   Part No. 08833-00070, THREE BOND 1324 or equivalent.
   (b) Install the ventilation valve.
   Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



EC

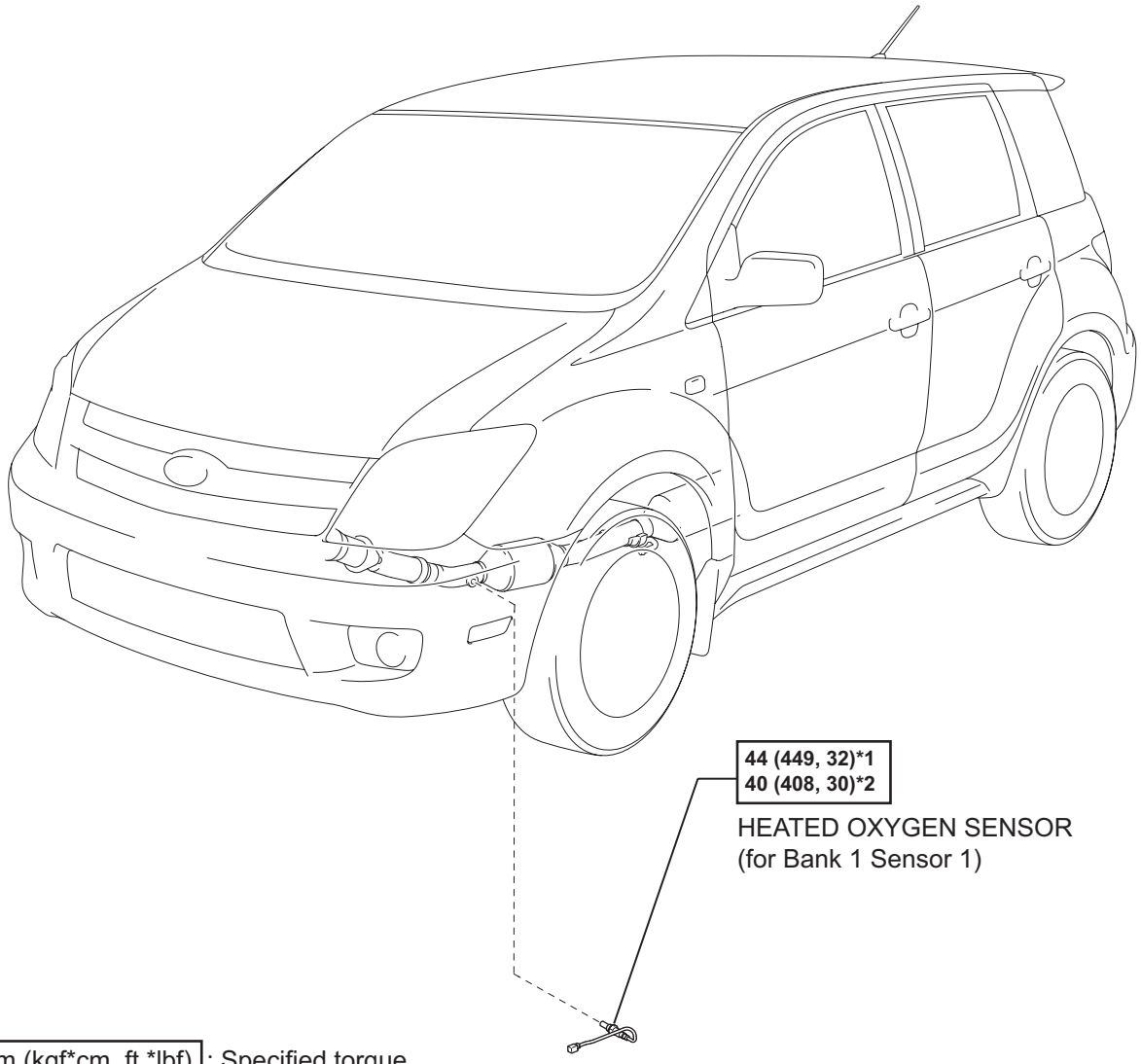


2. **CONNECT VENTILATION HOSE**
   (a) Connect the ventilation hose to the ventilation valve.

3. **INSTALL NO. 2 CYLINDER HEAD COVER (See page FU-15)**

HEATED OXYGEN SENSOR (for Bank 1 Sensor 1)

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

*1: For use with SST

*2: For use without SST

P

A116914E01

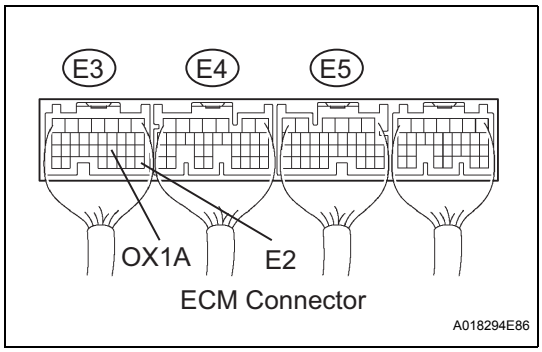
EC

ON-VEHICLE INSPECTION

1. CHECK AIR-FUEL RATIO COMPENSATION SYSTEM

HINT:

The system can also be checked by choosing "DATA MONITOR/O_2SENSOR OUTPUT VOLTAGE" on the intelligent tester monitor.



(a) Connect the intelligent tester to terminals E3-21 (OX1A) and E3-28 (E2) of the ECM.

NOTICE:

Connect test leads from the backside of the connector with the ECU connected.

(b) Warm up the heated oxygen sensor at an engine speed of 2,500 rpm for approximately 2 minutes.

(c) Check that the voltage varies between approximately 0 V and 1 V at an engine speed of 2,500 rpm.

OK:

The voltage varies more than 8 times in 10 seconds.

NOTICE:

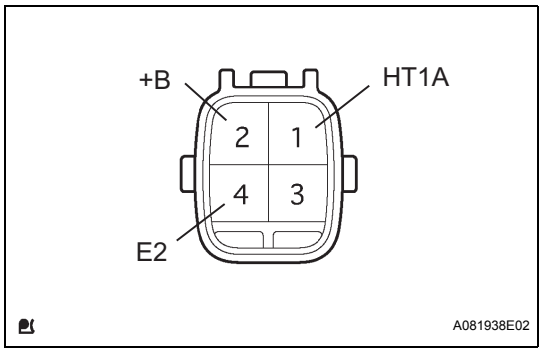
- **Perform the check immediately after warming up the heated oxygen sensor.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again.**

2. INSPECT HEATED OXYGEN SENSOR

(a) Disconnect the sensor connector.

(b) Measure the resistance of the sensor.

Standard resistance



Tester Connection	Specified Condition
1 (HT1A) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
1 (HT1A) - 4 (E2)	10 kΩ or higher

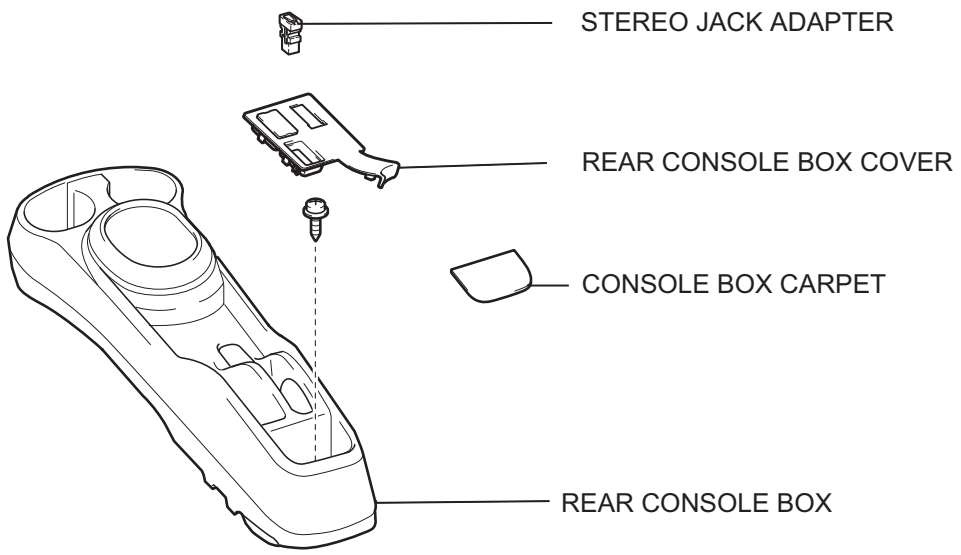
If the result is not as specified, replace the sensor.

(c) Connect the sensor connector.

HEATED OXYGEN SENSOR (for Bank 1 Sensor 2)

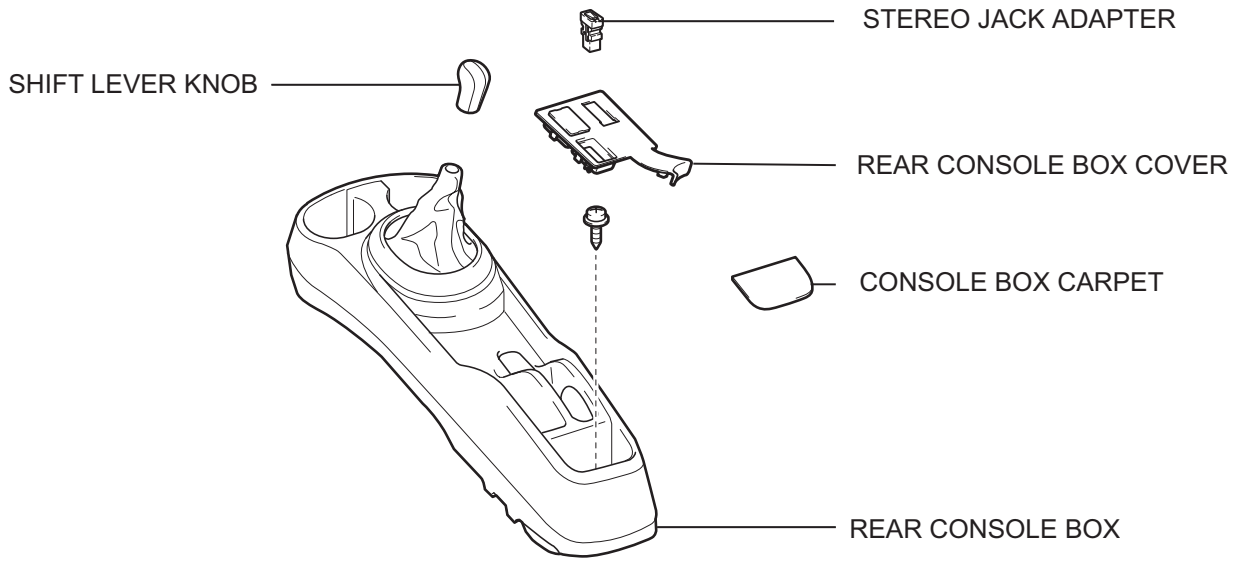
COMPONENTS

Automatic Transaxle

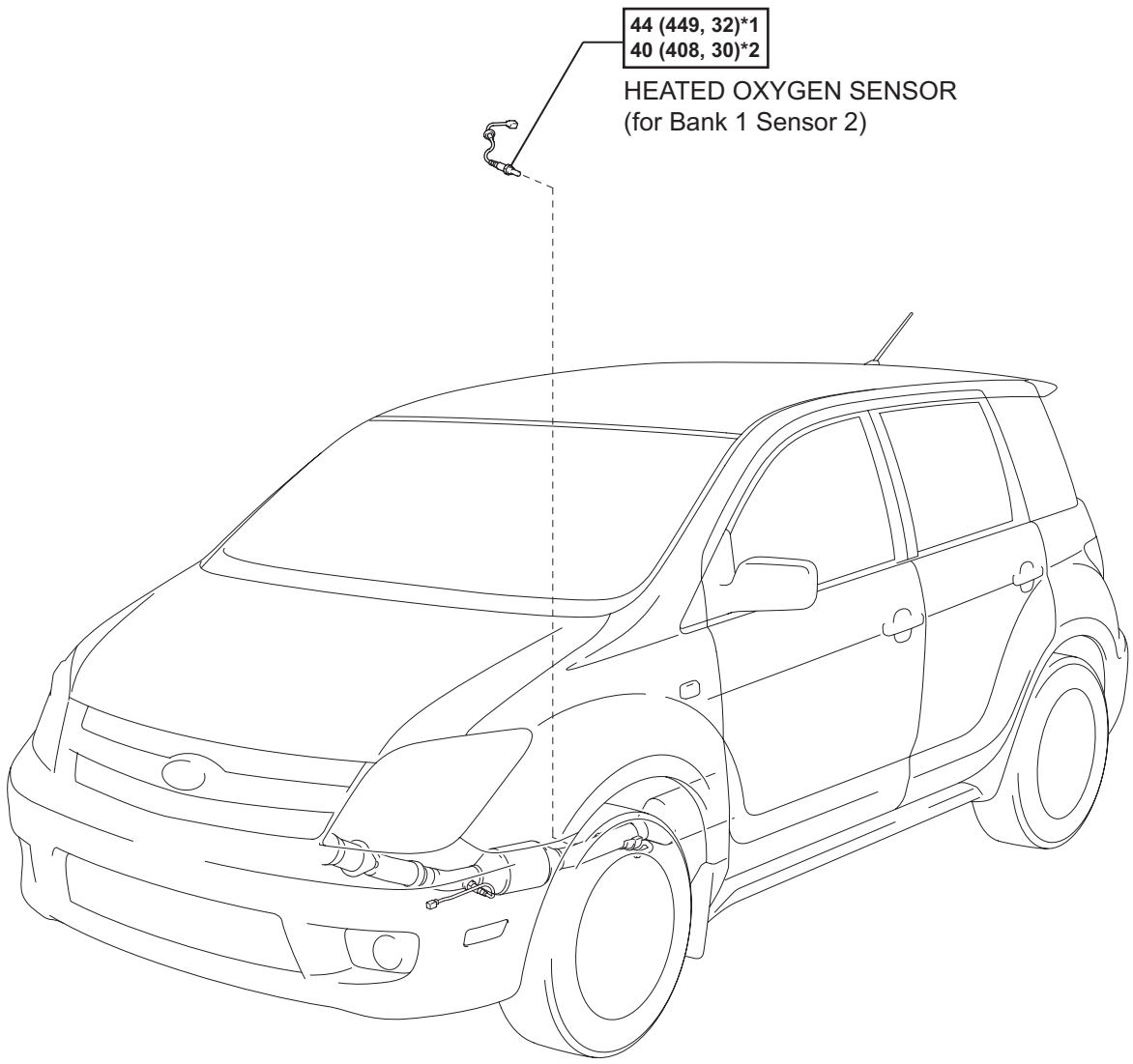


A118616E05

Manual Transaxle



A118617E05



EC

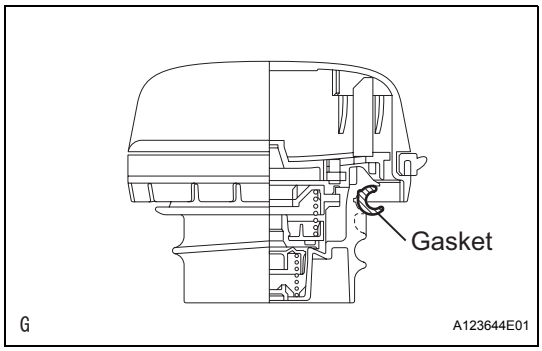
N*m (kgf*cm, ft.*lbf) : Specified torque

*1: For use with SST

*2: For use without SST

P

A116915E01



FUEL TANK CAP

ON-VEHICLE INSPECTION

1. CHECK FUEL TANK CAP ASSEMBLY

(a) Visually check if the cap or gasket is deformed or damaged.